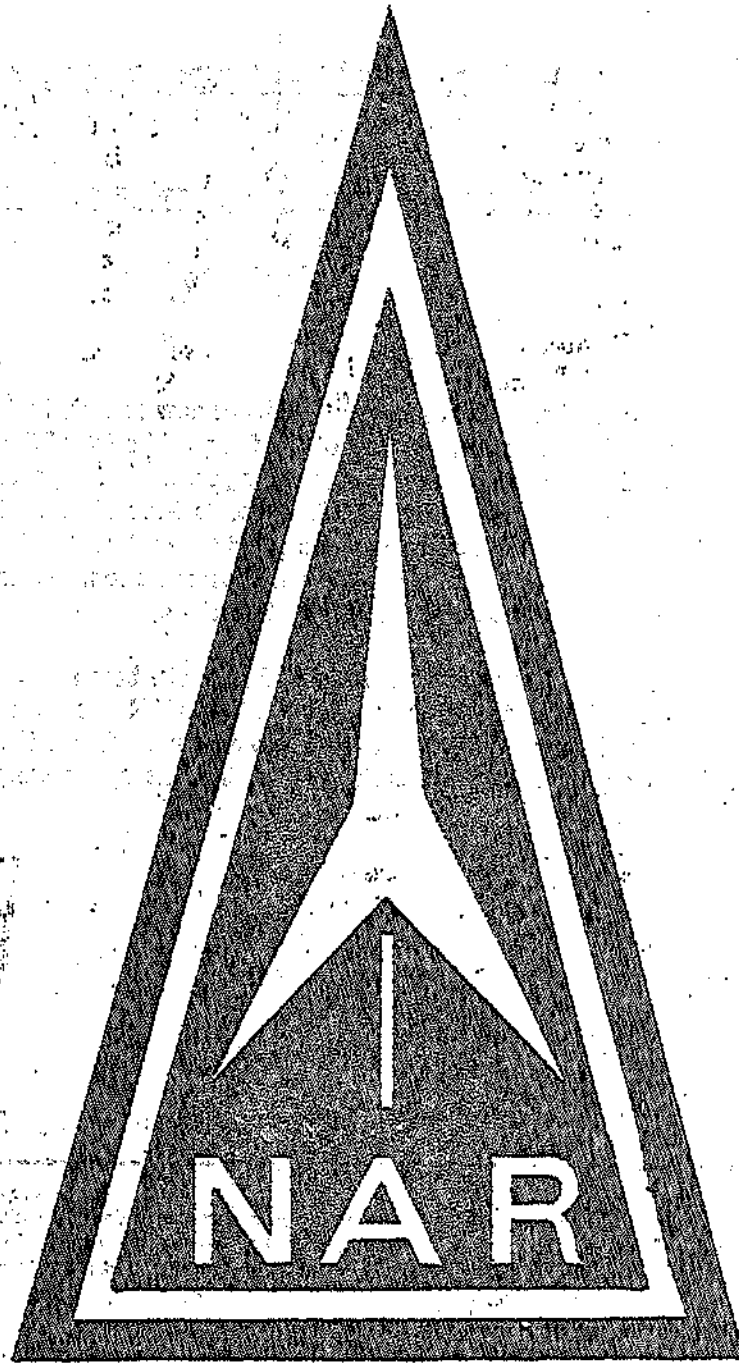


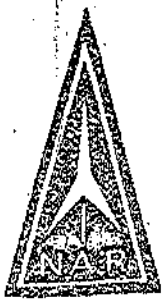
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National Association of Rocketry

an affiliate of the National Aeronautic Association

VOLUME THREE NUMBER THREE



National Association of Rocketry

Post Office Box 178
McLean, Virginia 22101

a message to the members of the NAR

A new Board of Trustees has been elected, the new officers have taken their places. One of the first problems tackled by this new board, was that of the financial health of the Association. As I know you are aware, we in the Association are faced with the same rising costs affecting every group. It costs more for printing, to have a telephone, and even mail letters. Paper costs have skyrocketed as well as all services required by the Association. These rising costs have increased the cost of the Model Rocketeer magazine to you the members. To keep our association a sound, effective organization, we have been forced to increase our membership dues. The increase was kept to the smallest possible.

We must have an association with a sound financial base if we are to continue our support of both you, the member and the Model Rocketry Hobby. The NAR has a great future, many new programs are underway now. We need your continued support now and in the future if we are to have viable organization. Remember this is your association, and each member has the opportunity to make a contribution to our continued success.


A. L. Lindgren
President

Gentlemen,

Please accept this application for full membership in the National Association of Rocketry (NAR). If I am accepted in the NAR I pledge to observe and follow the NAR safety code. I am aware that a reported violation of the NAR safety code may lead to the revocation of my membership right. I also agree to abide by the by-laws and the standards and regulations of the NAR.

Signature _____

MEMBERSHIP CATEGORY (Please check one box only)

- | | | |
|--------------------------|--|----------------------|
| <input type="checkbox"/> | JUNIOR MEMBERSHIP (Under 16 as of January 1) | \$7.00 |
| <input type="checkbox"/> | LEADER MEMBERSHIP (Under 21 as of January 1) | \$8.00 |
| <input type="checkbox"/> | SENIOR MEMBERSHIP (21 or over as of January 1) | \$10.00 |
| <input type="checkbox"/> | New | |
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| | NAR Number _____ | Section Number _____ |

DATE OF BIRTH _____ AMOUNT ENCLOSED _____
Month Day Year

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- Family Plan Membership. Deduct \$2.00 (One member of family joins at full price, remaining members at the reduced rate—one copy of Model Rocketeer per family)
- FAF Stamp \$2.00 (Required if you wish to compete on international level.)

THERE'S NOTHING AS REWARDING AS ROCKETRY

IMPULSE

The Journal of the Model Rocketry and Aeromodeler's Club

1974

Volume 3 Number 3

IMPULSE STAFF

Editor - Don Carlson

Featured Reporter -

Randy Picolet

General Assistant -

Jerry Speidel

Published through the courtesy of
Festus Senior High School.

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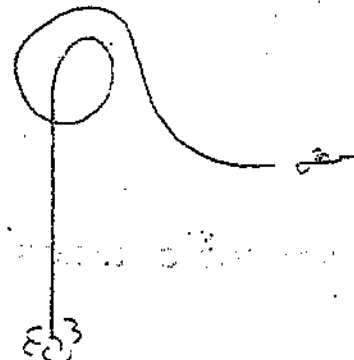
IMPULSE is a non-profit project developed for the betterment of model rocketry. Advertising is sold only to defray some of the publication costs. Advertisers should write the IMPULSE offices for information concerning advertising.

1974 - IMPULSE

Rt. 1 Box 407, Festus, Mo., 63028

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EDITORIAL -

The Return Rule Controversy

The debate over the supposed merits of the return rule (US Model Rocket Sporting Code, section 9.6) has been growing since the publication of the new Sporting Code. I had hoped to stay out of the argument, but events surrounding the Pinkbook session at NARAM-15 and recent statements made in the Model Rocketeer have drawn me into it.

Elaine Sadowski wrote in her "Editor's Nook" column in the August '73 Model Rocketeer:

"Why do models have to be returned? Well, aren't model rockets supposed to be re-usable? Which takes more skill, building a rocket just to attain a long duration, not caring whether or not it ever comes back, or building a rocket to attain a long duration and come back to the modeler? It seems to us that the latter does. For example, it's easy to get a good time in Parachute Duration by sticking a huge parachute in a rocket. It takes more skill, however, to select the proper sized 'chute and put it into a carefully designed rocket so that the rocket can both get the longest duration and come back. It's more like real engineering, too. There's more to competition than amazing points."

The only valid point in this argument is that without the return rule, some rocketeers would abuse the new freedom and build high-performance vehicles with no intention of successful recovery.

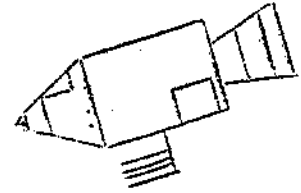
(For sake of clarity, when I say "successful recovery," I mean returning the model in an undamaged condition.) That it is "more like real engineering" or "it takes more skill" to recover a model in your field just isn't always true.

Following this logic, modelers flying in relatively flat, treeless states (such as Kansas and Mid-Illinois where the fields are miles in length and width) are better engineers and more skilled than those living in hilly, highly vegetated areas (where fields are little more than clearings barely more than a few thousand feet across) simply because they can recover their models in their field. If I sat down right now and built a high-performance E/G, I could fly it in Kansas with a high probability of successful recovery. If I then took the same glider and flew it in our club flying field, I'd lose it without a doubt.

Engineer it to land in a small field you say? To do so would drastically cut its flying duration, which is the name of the game. This is a definite advantage for people with endless field space, for those of us with small fields have almost no chance to equal or better their times and thus we're unable to compete with them for records. I have witnessed several occasions where records would have been broken had the return rule not been in effect.

How are we to engineer our models to cope with unseen high-altitude winds or thermals? The cost and weight of radio control units for gliders would be
(Continued on page 12)

CAPSULE COMMUNICATIONS



OOPS!

- BEEP -

Due to an oversight, the announcement that volume 3, number 2 was a "Blueprint Special" was deleted from the cover. Thus, readers (and our featured reporter) had no idea that the issue was a collection of plans and articles from past issues centering on altitude and duration events. We apologize for this error and hope that you will enjoy the next "Blueprint Special" (centering on gliders) which will appear as the next issue.

The IMPULSE staff

- BEEP -

Steve Behrends, President of the Evanston Model Rocket Association and Geoff Landis, former EMRA president and current student at MIT, were picked-up by the M.P.s at a Chicago-area Army base. Writes Steve:

"You might be interested to know that Geoff Landis and I were arrested by the military police on the suspicion of rippin' off classified information at the local U.S. Army base. You see, for five days, three hours a day, Geoff and I were out taking measurements off the Nike-Ajax display missile at Fort Sheridan. On the last day, we were picked-up by the M.P.s and had to sit in their little room for over two years (hours). Then they found out that the missile was obsolete, but still took our data and held it for 24 hours. We now have a truly great set of data. We have paint chips and data down to the twenty different types of screws."

Steve is in charge of ETR-4, schedules for mid-July. On page 7 is a survey for interested rocketeers.

UPI, February 13

On March 2, another 90-minute ABC-TV anthology series, the Saturday "Suspense Movie," offers a fictional work built around "the struggle to return the Apollo 13 astronauts safely to earth after their moonbound spacecraft was damaged."

A network spokesman said this teleplay, entitled "Houston, We've Got a Problem," is "based on events that occurred in April of 1970, when America's third moonlanding mission was aborted." The astronauts involved in that mission were James Lovell, John Swigert, and Fred Haise.

According to ABC-TV "Richard Nelson's fictional screenplay tells of mission control's grueling efforts to bring Apollo 13 home, against a backdrop of personal crises besetting members of the mission control team."

"The movie was filmed with the cooperation of NASA...the actual voices of Astronauts Lovell, Haise, and Swigert-taped from in-flight transmissions following the Apollo 13 (problem) - are heard in the film," the network spokesman said.

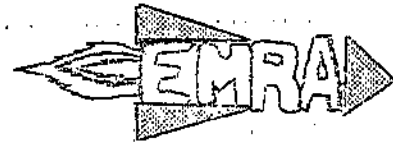
Among the performers in the teleplay are Robert Culp, Gary Collins, Clu Gulager, and Sandra Dee.

- BEEP -

Estes Industries' 1974 model rocketry catalog is out and has a few developments that have caught us here at "Impulse" by surprise.

First of all, a new glider concept has been introduced. Known as the "Scissor Wing Transport", the glider differs from conventional swing-wings in that the entire wing is one piece and pivots around a central axis. (Continued on page 20)

ETR-4



Survey of the Fourth EMRA-TIROS Regional

- 1) Have you attended any previous ETRs?
 ETR-1 ETR-2 ETR-3
- 2) At those ETRs that you attended, was the event selections:
 excellent good
 fair poor
- 3) Will you attend ETR-4 if the maximum number of contest points is not reached?
 yes no
- 4) Will you attend if there are no tracking events?
 yes no
- 5) Do you prefer (weighing the possible effects of the "energy crisis"):
 a one day meet a two day meet
- 6) Would you be willing to work as a member of the tracking crew?
 yes no
- As a member of the range crew?
 yes no
- As a member of the contest jury?
 yes no
- 7) Concerning tracking, are you:
 an expert not bad
 a novice never tracked
- 8) Do you feel that trophies for division winners are a must?
 yes no
- 9) Do you feel that some award (ribbon, plaque, certificate) is a must for event winners?
 no yes. for 1st place
 yes for 1st and 2nd places
 yes for 1st, 2nd, and 3rd places
- 10) Is a single entry fee better than a fee based upon the number of events?
 yes no
- 11) The date set for ETR-4 is July 22 and 23. Is this acceptable?
 yes no
- 12) Looking ahead, what type overnight arrangements shall you use?
 a motel camping on or near the field
 staying at people's homes
- 13) Do you wish a rap (chew the brue) session sometime after flying hours?
 yes no

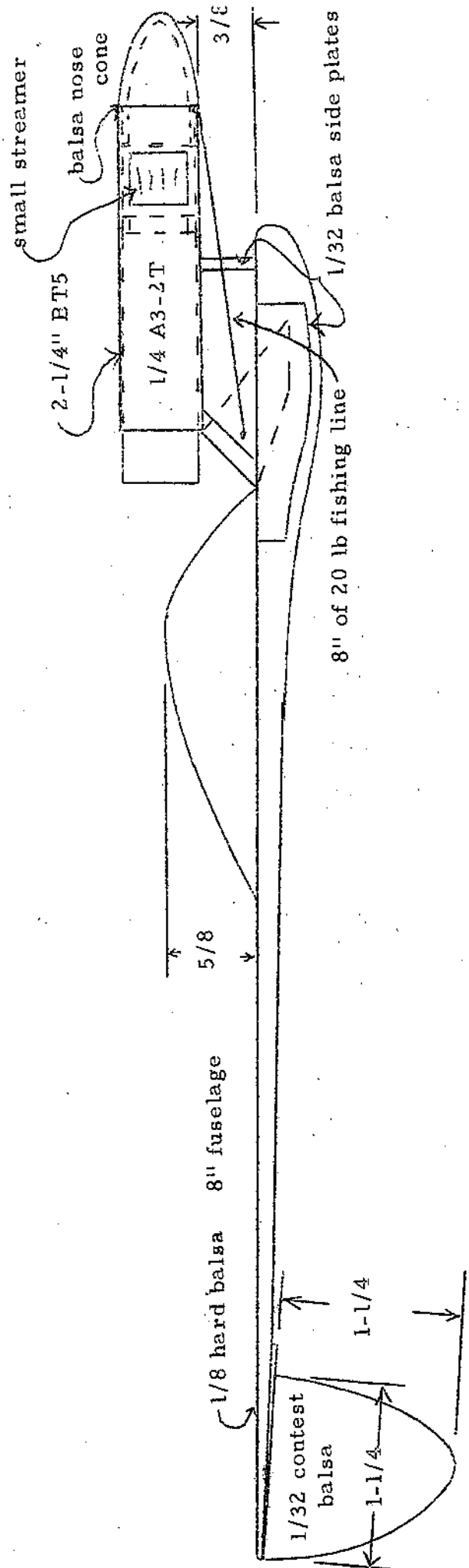
Photocopy this form, fill it out and send it to: Steve Behrends, 933 Sheridan Road, Highland Park, Illinois, 60035.

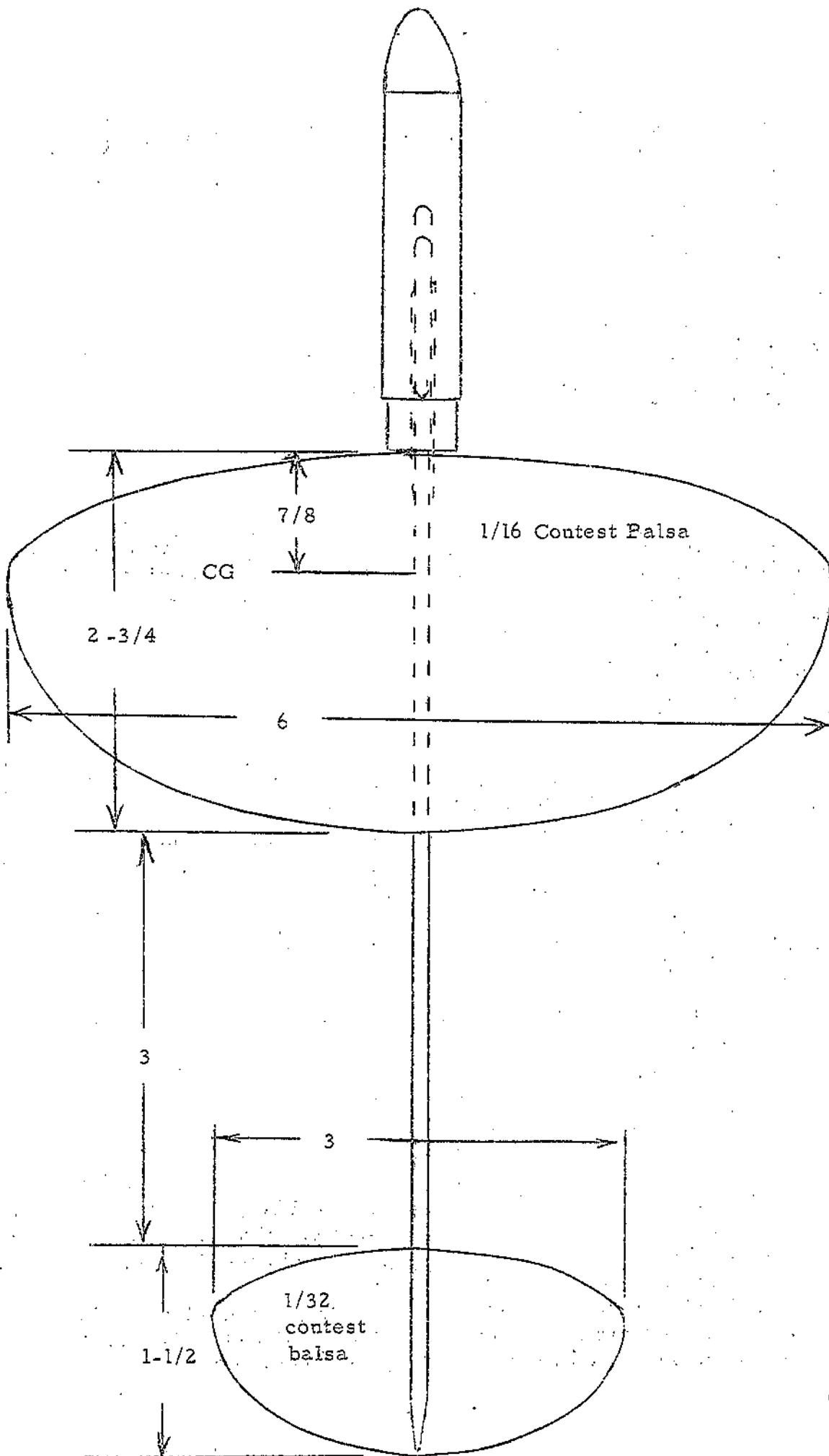
To further explain this survey: ETR-4 will be held. This survey is only to give us an impression of what you people like in a contest. Our main problem is tracking; we need a good crew. Don't put "yes" for number four until you think, "Is it worth flying a tracking event with blind trackers?"

SEE YOU AT ETR-4!!

Brat
Gnat/Hornet B/G
Designed & Drawn by Jon Robbins

Finish with 3 coats of clear
dope. Use black magic
marker for underside of
glider.





THE MISADVENTURES OF SUPERREPORTER

alias Randy Picolet

(As I was calmly leafing through my newly-arrived copy of the last issue of "Impulse," I happened to notice a few items of particular interest to me:

1) I was billed as "Featured Reporter." This was rather surprising, as I've only written a couple of articles for "Impulse," and that was sometime last year.

2) As I thumbed thru the magazine, I saw what appeared to be hundreds of wonderfully boring plans, most of which had appeared in previous issues. Also included were a wishy-washy editorial, a logic test (also repeated from a past issue) to which nobody has an answer, and zilch-o articles of interest.

3) Buried in the club news about elections was a line saying that I "signed on as Featured Reporter." Now Don, I don't remember signing anything, unless it was during, shall we say, a time of deep psychological stress. Be that as it may, all that billing has given me a guilty conscience.

To remedy all of these situations, I decided that the big FR should sit down and write something worth publishing, so MORAC doesn't have to publish its entire files. Beginning with this issue, I vow (?) to write at least one article per month, which will give everyone a

break from the usual mish-mash of plans-contests-elections-bulloney. Here's this month's thriller.)

PART ONE

As we join our fearless hero, he has agreed to meet Big (Ed.) at the launching of the first Spacey Shuttle, in order to cover the event for "Imposter" magazine. Both SR and Big (Ed.) had obtained Press(ure) passes to view the launch. We pick up the action at T-minus one hour:

"Well Martha, I think I better feed them dad-blasted cows before. . ."

Hold it, wrong channel. Let's try again:

"Will all members of the Press please board the busses for Pad 39F. This will be your last chance to take close-up pictures and to interview the piolet and crew," boomed the loudspeaker.

"Gee," said SR as the busses left, "I never thought this moment would come, did you?"

"No," replied Big (Ed.). "Just think, we'll get to meet Neil Barnstorm and Frank Gibbons in person! But I still don't understand why GASA is using such old astronauts."

"It's part of their deal with Congress to get enough funds to finish the Shuttle. This way, they don't have to train any new personnel, and they already have the old one's clothes sizes. Do you remember the original plans for the Shuttle? It was going to be huge, almost as big as the old Saturn V's!"

"Yeah, but the paint shortage took care of that. I remember something about it was going to be re-usable, but that got too expensive, too."

"Those were the good ole days, were not they," commented SR as they got off the bus and onto the elevator which would take them to the cockpit. As the group stepped off the elevator, someone tapped SR on the shoulder thru a partially opened door.

"Hey, excuse me," whispered the some one. "Could you help in here a minute?"

Super Reporter, ever eager to help his fellow man said, "Er... uh... well, I guess so," as he stepped into the dingy white-room. "What can I do for - wait a minute, you're Neil Barnstorm!" cried SR as his eyes adjusted to the light.

"Shh! Please don't shout! Yes, I'm Neil Barnstorm and I need you to zip up this confounded flight suit. Oh, for the good ole Apollo days. Do you know that they used to have seven men to help me dress! By the way, who were all those people getting off the elevator?"

"Members of the Press, just as I," answered SR as he jerked on the stuck zipper.

"What?! Oh no, no, NO! I can't face those cameras now! I'm too scared, and besides, I don't have any new quotable quotes!"

"You, scared? Why, you've been to the moon!"

"But that was when they used safe rockets and you had years of training. How would you like to fly on this thing? Do you know what they're using for fuel?"

"The press release said something about an advanced new fuel," mumbled SR.

"Advanced?! Huh!! Have you ever heard about a company called Pestes Model Rockets? Well, they went bankrupt about a year ago, and they had 410 little buildings filled with you-know-what."

"You're kidding!! No wonder you're scared."

"The only reason I'm going is to make sure I keep my pension," admitted Neil.

This last statement put a glitter in SR's eyes as well as an idea in his ever-generous mind.

"Hey Neil, ole buddy, could you help me with this zipper. . ."

Meanwhile, back with the rest of the reporters. Big (Ed.) was beginning to feel rather irregular, partially due to the excitement of waiting and partially due to those 4 1/2 pizzas he'd had last night. He anxiously began looking around for somewhere to relieve himself, when he spotted a likely-looking door in the space-craft itself. "Why not?" he thought to himself. He quickly slipped into the tiny room and sure enough, it was some strange kind of commode. As he was philosophizing on the possible lack of wisdom of eating 4 pepperonis with mushroom and onion and half of SR's shrimp and anchovy, he noticed a deep rumbling which at first thought to be the onions. As the rumblingd grew in magnitude, he suddenly realized that he was sinking deeper and deeper into the space commode!

"Great Stine's Ghost! This thing is premature!!!"

You guessed it, reader. Super-Reporter is at it again, and this time he's really outdone himself. Will the Shuttle blow up on all those Festes engines? Will Super-Reporter be able to pilot the craft? Will Big (Ed.) ever get out of the commode? Find out next time in the exciting Adventures of Super-Reporter!!!!

(I tried to keep it believable, so that its literary value can be appreciated. Hopefully, things will get better with each part of the series. Till next time, this is your Featured Reporter wishing you quiet onions.)

MORAC NEWS

by Rob Cayse

I have finally come to grips with myself and have decided to face the fact that I will be writing this article for every printing of "Impulse." For the past 4 days (it seems like years) I have had (and still have) a splitting headache, cough, runny nose, and a fever of about 137 degrees. So, if this article fails to make any sense to you, don't blame me.

I would like to say that I am very honored to have been elected president. I will try my best to use good judgment and to keep MORAC going straight. I just hope I can come up to Don Carlson's standards.

One of the issues facing me is to keep the club from collapsing when the "founding fathers" go off to college. We cannot let MORAC die after all they put into it. Things aren't quite that bad, though. With a little deter-

mination and some new member recruiting, we can shake this problem and continue doing things as a club.

I would really like to see MORAC go to NARAM-16. (Who knows? One of us may win something this time.) What? Did I hear you mentioning a petroleum shortage? Yes, the gas shortage will play a big roll when we decide whether or not to go to Manassas, Virginia. On the other hand, with each NARAM we attend we will gain more modeling experience, meet new people, and get to know each other better.

If you or anyone you know would like to join MORAC, call me at 937-4451 or write me at; 501 Rose Lane, Festus, Missouri, 63028. We need YOU!

(Editorial, continued)

impractical and I've yet to see a steerable model rocket parachute, so how do we compensate for nature without directional controls? Let's face it; we're at the whim of the winds.

The solution to all of this is obvious; modify the return rule so that duration models are not required to be returned, but failure to return the model will penalize the contestant contest points. Along this line of thought, I urge the following policy on returns be considered;

1. All engines must be inserted in front of a member of the contest jury. In cases of complex engine arrangements (and where large amounts of time would be used while standing in line), an approved member of the contest jury may accompany the contestant to his prep-area to check and witness engine installation. Recording of engine designation is recommended, but optional.

(Continued on page 31)

MONAD

OPTIMIZED CL. 00 P.D. DESIGN

DESIGNED BY TOM GRESSMAN

BODY = 6.5" of CMR RB52

NOSE CONE = CMR NC52P

FINS = 1/64" plywood (MR PL1), rounded leading edge and razor sharp trailing edge. Sealed with sanding sealer, cemented with Devcon 5 min. epoxy, set forward 1/8" from end of RB52 to allow for complete "Teardrop" epoxy fillets.

ENGINE MOUNT = 0.5" of RB50 + block

PAINT = Body sealed with sanding sealer after sanded smooth with 400 and 600 grit sand paper. Entire model except for NC52P is coated with glassy-light coat of bright red Pactra Enamel.

SHOCK MOUNT = A 12-16 inch piece of CMR RM1 (0.15) CMR shock line SC3 is mounted in the RM1.

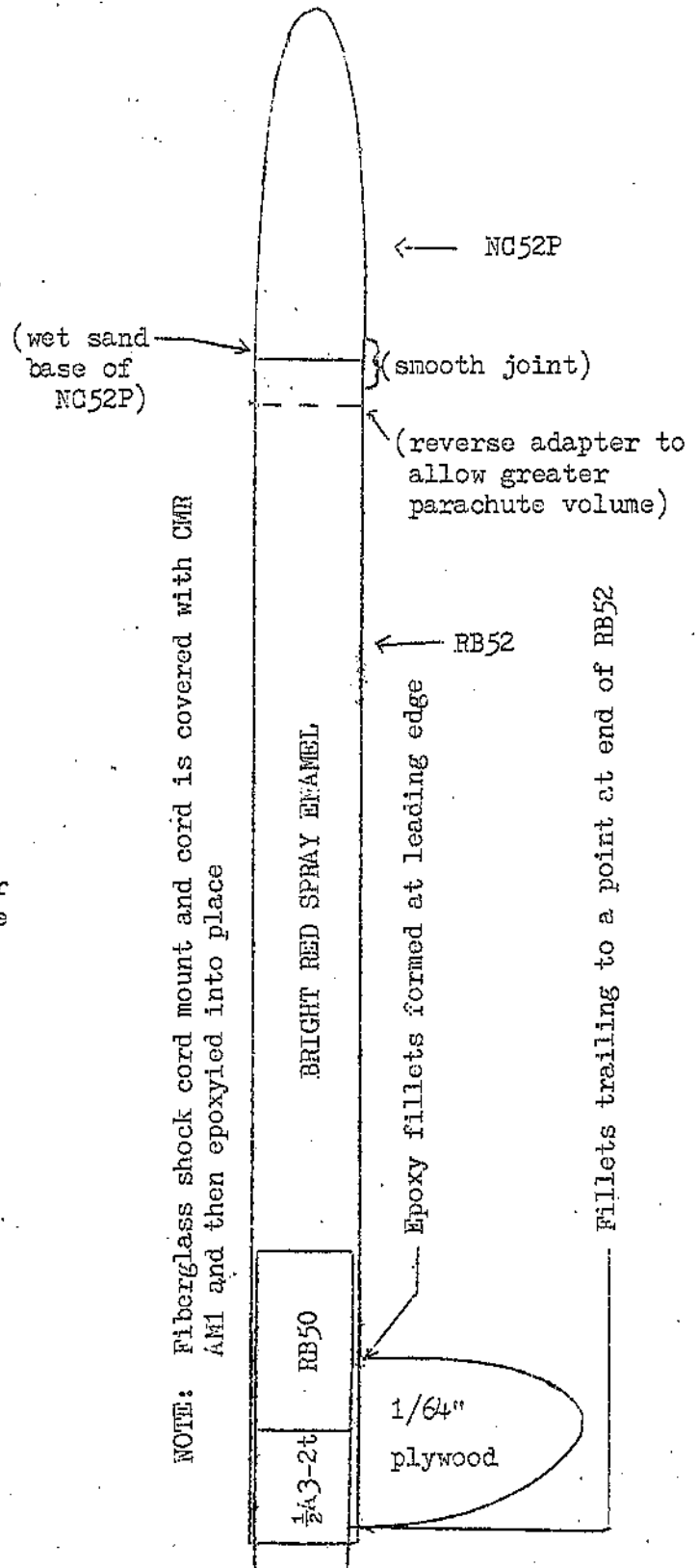
POP LAUNCH LUG = Used of the L5S construction type only. The lug is 3.75" long.

PARACHUTE = 16" diameter aluminized mylar chute with 8-32" long shroud lines of the CMR SL1 type.

ENGINE = Estes 1/4A3-2t

PERFORMANCE = Took first overall at WORM - 1 with 217.5 seconds.

** Alignment of fins made with CMR FJ3 Fin Jug.



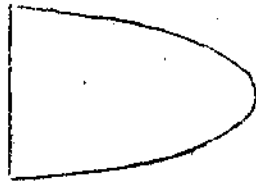
SIMPLICITY-ONE

CLASS I ALTITUDE

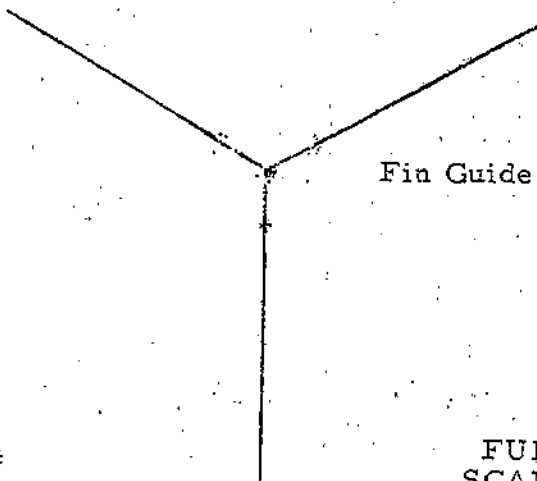
DESIGNED BY DAVID LUETZINGER

PARTS LIST (CMR)

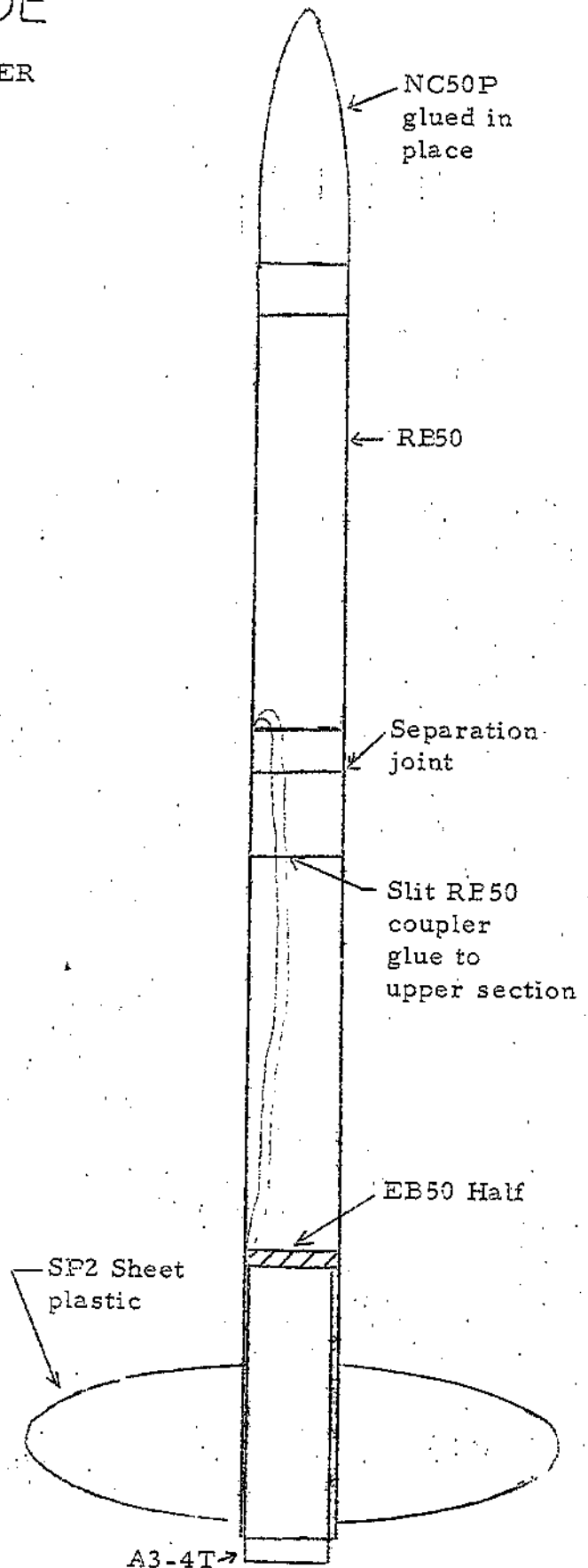
- 1 NC50P - nose cone
- 8-1/4 " RE50 - body tube
- 1 EB50 - engine block
- 1 SP2 - sheet plastic
- 15" Nylon shock cord
- 1 L5 - "pop" lug



Fin template



Fin Guide



MITCON-7

Dear Model Rocketeer:

The MIT Rocket Society is once again hosting its annual Technical Model Rocketry Convention. MITCON-7 will be held on the weekend of March 29-31 in the MIT Student Center in Cambridge, Mass. All persons interested in model rocketry are invited to attend.

As in past conventions, we will be sponsoring an R&D competition where persons can present their research in model rocketry and be recognized and rewarded for their efforts. The rules governing this contest are listed on the following pages. Summaries of all the R&D reports presented at the Convention will be published, and these summaries will be ready for sale on March 29.

In addition to the R&D competition, we are sponsoring three other contests at the Convention. We recognize that there are many rocketeers who do not have the inclination, finances, or ability to conduct an R&D project. We are therefore conducting these other contests so that all rocketeers attending the Convention can participate in the activities. The three contests are

- 1) "Instant" B/G Contest
- 2) Plastic Model Contest
- 3) Photography Contest

A brief description of the rules for each contest is given below.

- 1) "Instant B/G. This event will be a different type of contest, where the contestant must build a Hornet ($\frac{1}{2}$ A engine) boost-glider from a standard set of parts in a limited amount of time. Each contestant will be supplied one piece of balsa wood, $1/16"$ x $12"$ x $3"$, and one piece of spruce, $1/8"$ x $3/8"$ x $12"$, of which to construct his B/G, and he will be permitted two hours in which to build his glider. The contestant must supply his own pod, which may already be assembled. All gliders will be flown at the launch, and the glider with the longest successful flight will be the winner.
- 2) Plastic Model. The model must be of a rocket or rocket-like vehicle. Jet-powered airplanes are permissible, but propellor-powered planes and helicopters are not. The models will be judged on difficulty and neatness of conversion, craftsmanship, and flight ability. Any model which the Range Safety Officer considers unsafe will not be allowed to fly.
- 3) Photography Contest. In this contest, the entrant submits what he considers is his best picture of a model rocket or model rocket activities. The photo will be judged on quality, composition, and content.

More detailed rules will be sent in the information packet after we receive your application.

(Continued on page 20)

GENERAL INFORMATION

1974 MIT TECHNICAL CONVENTION

Time: 7:00 p.m., Friday, March 29, 1974 to
1:00 p.m., Sunday, March 31, 1974

Place: MIT Student Center, Cambridge, Mass.

Fees: \$ 8.00 with no meals
15.50 with banquet and 3 other meals - both payable in advance

Accommodations: Rooms will be available at the Holiday Inn in Cambridge at the following rates:

Single - \$40.00 per person for two nights
Double - \$26.00 per person for two nights
Triple - \$18.00 per person for two nights
Quad - \$15.00 per person for two nights

Incidentals: Budget about \$7.50 for bus fare from the airport and between the hotel and MIT, and for food on Friday.

Deadlines: We must have your applications by Friday, March 15, if you need a hotel room, and by Monday, March 25, if you do not.

Convention Mailing Address: MIT Technical Convention
c/o MIT Rocket Society
MIT Branch P.O. Box 110
Cambridge, Mass. 02139

Keynote: "The Principles of Model Rocketry"

Activities: R & D contest and report presentation
"Instant" B/G contest
Plastic Model contest
Photography contest
Rocket Launch
Model Rocket Movie Session
Computer performance prediction service
Manufacturers' displays
4 meals (optional) - snack breakfast on Sat., sandwich lunch,
sit-down banquet dinner, bacon-eggs breakfast on Sunday
Discussion Groups (five one-hour periods) including:
R&D Techniques
Principles of Rocket Engines
Theory of Wings and Fins
Advanced Propulsion Topics
B/G Construction Techniques
Radio-Controlled B/G's
Scale Modeling
Dethermalizers
Plus much more!

1974 MIT TECHNICAL CONVENTION

PRELIMINARY SCHEDULE

Friday, March 29, 1974

1:00 - 12:00 p.m. Registration
1:00 - 6:00 p.m. Tours of MIT conducted by MITRS members
Computer altitude prediction service (free)
Rocket engine static testing service (free)
NASA and aerodynamic movies
7:00 - 7:30 p.m. Formal Opening Ceremonies
7:35 - 8:35 p.m. Discussion groups
8:45 - 9:45 p.m. Discussion groups
10:00 - 12:00 p.m. "Instant" B/G Construction Session

Saturday, March 30, 1974

8:00 - 1:00 p.m. Rocket Launch (breakfast provided)
1:00 - 2:00 p.m. Lunch
2:00 - 4:30 p.m. R & D Oral Presentations
4:40 - 5:40 p.m. Discussion groups
6:00 - 7:30 p.m. Banquet, followed by keynote speech
8:00 - 10:00 p.m. R & D Oral Presentations
10:10 - 11:10 p.m. Q & A with manufacturers
11:15 - 12:30 a.m. Model Rocket movie session

Sunday, March 31, 1974

9:00 - 9:45 a.m. Bacon-and-eggs breakfast
10:00 - 11:00 a.m. Discussion groups
Critique session for R&D entrants
11:10 - 12:10 p.m. Discussion groups
12:15 - 1:00 p.m. Awards ceremonies and closing of MITCON-7

PRELIMINARY LIST OF DISCUSSION GROUPS

R&D Report Presentation	B/G Construction Techniques
R&D Techniques: Statistics	Finishing with Fiberglass
Methodology	Radio-Controlled B/G's
Report Writing	Dethermalizers
Technical Art	Rocket-Glider Designs
Principles of Rocket Engines	Scale Modeling Techniques
Theory of Wings and Fins	Egglofter Designs
Drag and its Minimization	Plastic Modeling
Dynamics of Boost-Gliders	How to cover with Jap Tissue
Advanced Propulsion Topics	Altitude Prediction
Electronic Instrumentation	Basic Wind Tunnels & Their uses

1974 MIT TECHNICAL CONVENTION

INFORMATION FOR ROCKETEERS PRESENTING R & D REPORTS

Once again, in order to ensure that the efforts of those rocketeers who have the energy and intelligence to do serious research work in the hobby are not forgotten, we are establishing the following rules for entrants in this event:

1. All persons who intend to enter the R&D contest must get a summary of their project to us by Friday, March 15. Persons failing to meet this deadline will not be permitted to compete.
2. These summaries must be neatly typed on white, unruled, 8½" x 11" paper. All typing must be double-spaced, and the summaries must be no longer than four pages. One page of charts, graphs, tables, and drawings may be included in the summary (do not send photographs).
3. Summaries that are seriously deficient in grammar, spelling, or neatness will be rejected.
4. Summaries should include primarily that information which would be most useful for the immediate application of the project's results by others; emphasize conclusions and their application rather than method and procedures.
5. The name and address of the author must be given at the beginning of the summary, so that interested persons may correspond with him concerning his work.
6. Full reports for every project must be turned in at the registration desk before midnight on Friday, March 29. These reports should include details on experimental procedure, full data, analysis of data, conclusions, etc., and may be of any length.
7. Each entrant will be scheduled for a ten-to-fifteen minute oral presentation before the R&D judges and convention participants on Saturday. Tips on how to make such presentations will be given in a Friday-night discussion group. Let us know in advance if you will need any audi-visual equipment.
8. Authors will retain full rights to their material. The MIT Rocketry Society will print the collected summaries of all R&D entries in booklet form. These Proceedings will be offered for sale at the convention and through NAR Technical Service.
9. Contestants in R&D will receive one copy of the Proceedings free. Our few remaining copies of last year's Proceedings will be offered for sale at the convention.

This competition will be conducted in two age divisions: 17 years and younger, and 18 years and older. All ages are as of March 29, 1974. First place winners will receive trophies; second and third place will get plaques. In addition, first, second, and third place winners will receive prizes from the manufacturers. We strongly urge all persons attending this convention to consider entering this competition; one of the two most important R&D events of the year.

APPLICATION

1974 MIT TECHNICAL MODEL ROCKETRY CONVENTION

c/o MIT Rocket Society
MIT Branch P.O. Box 110
Cambridge, Mass. 02139

All fees must be enclosed with this application.
MAKE CHECKS PAYABLE TO: "MIT Rocket Society"

DEADLINES: with hotel - March 15 without hotel - March 25

PLEASE PRINT LEGIBLY

NAME _____ NAR # _____
(if member)
MAIL ADDRESS _____
BIRTH
DATE _____
(if under 21)

TYPE OF HOTEL ROOM DESIRED _____

DESIRED ROOMMATES _____

DO YOU PLAN TO ENTER AN R & D REPORT? _____

REPORT TITLE _____

DOES YOUR R & D PROJECT INVOLVE A FLIGHT DEMONSTRATION? _____

DO YOU PLAN TO ENTER THE "INSTANT R/G" CONTEST? _____

PLASTIC MODEL CONTEST? _____

PHOTOGRAPHY CONTEST? _____

DO YOU PLAN TO BRING ANY MODEL ROCKETRY MOVIES? _____

Convention fees enclosed (circle appropriate ones):

Entrance fee (with meals) -	\$15.50	Single hotel room -	\$40.00
" " (no meals) -	\$ 8.00	Double " " -	\$26.00
		Triple " " -	\$18.00
		Quad " " -	\$15.00

TOTAL ENCLOSED _____

Please use a photocopy of this form as an application.

(Continued from page 15)

The keynote topic of this year's Convention is "The Principles of Model Rocketry." We will be having a number of discussion groups on the basic physics and principles of model rockets, including the Principles of Rocket Engines, Theory of Wings and Fins, Drag and its Minimization, and the Dynamics of Boost-Gliders. By knowing how and why a model rocket works, we hope that you will be able to construct better rockets.

In addition to the keynote topic, we will continue to emphasize R&D and related topics and will be having discussion groups on R&D Statistics, Methodology, Report Writing, Technical Art, and Report Presentation. Our technical topics include advanced propulsion topics, electronic instrumentation, and wind tunnels. We will also have various construction techniques, including scale modeling, B/G wing construction, using Jap tissue, and, finally, a new area in rocketry; finishing with fiberglass and polyester resin. We are sure you will find these discussion groups enjoyable and informative.

If you plan to come to the Convention, please complete the application form and send it to us with the appropriate fees as soon as possible. We will send you an information packet containing a final schedule and directions to MIT when we receive your application.

Looking forward to seeing you at MITCON-7!

Sincerely yours,

Chris Flanigan
Convention Chairman

(Capsule Communications, continued)

In the words of Estes: "Lifts off vertically with main wing parallel to the fuselage. At apogee, the internal pod ejects and main wing pivots to a perpendicular position initiating a gentle glide phase". The SWT looks remarkably similar to a rocket-glider Rob Cayse (MORAC President) flew at St. Louis Area Meet-4. Rob's glider used this scissor-wing concept, but due to structural problems, it disintegrated during boost. It would be interesting to see how this concept performs in competition (especially rocket-glider competition).

Another exciting development is a line of rockets designated "Maxi-Brutes."

This line, of which only two models have been introduced, consists of BIG rockets. For example, the specifications for the V-2 and Pershing 1-A Maxi-Brutes:

V-2

Length 33.5"
Dia. 3.938"
Weight 12.5 oz.
Engine D12-3

Pershing 1-A

Length 41"
Dia. 3.938"
Weight 11.5 oz.
Engine D12-3

(Continued on page 31)

ROCKETRY IN THE FIFTIES

Shades of greasy hair, white socks and button-down shirts! Prepare yourself for a brief journey in time back to an innocent era - the late fifties. No Estes Industries, No Centuri Engineering, No CMR or Reese Industries; only an obscure group of people known as the "Model Missile Association" and a model rocket company called "Model Missiles, Inc." Everybody's heard of the American Rocket Society, but the MMA? (Who's that?)

Model rocketry as we know it did not come into existence until that fateful day in 1954 when Orville H. Carlisle (NAR #1) invented what we call today "a model rocket engine." There had been solid propellant, paper-and-wood rockets built as early as the 30's by the American Interplanetary Society (known in the fifties as the American Rocket Society), but they were very large vehicles with unreliable, hand-packed engines. Model rocketry is in its infancy in the specific year that we will be concerned with (1958) and is awaiting the arrival of Vern Estes, who will build "Mabel" (the automated model rocket engine maker) and continue on to his model rocket empire. Say, daddy-o, wanna cruise over to Billy's in my 47 Buick and make fun of those stupid, primitive toy rockets of his?

I'm not going to concern this article with the history of model rocketry, but the reason why model rocketry came into existence. On the next few pages

you will find reproductions of a 1958 edition on Popular Mechanics' article on rocketry. Not model rocketry, but what we call today "amateur rocketry."

Take careful notice of how similar rocketry of 1958 is to the model rocketry of 1974. (The ARS has grown to be known as the American Institute of Aeronautics and Astronautics, a highly respected organization with a safety code that makes the NAR-HIAA Safety Code look like a joke.) Also notice the differences in the two hobbies; model rocketry needs no bunkers, block houses, or desolate areas.

On page 29 is a page from a February '57 issue of Popular Science. Although the reproduction is poor, you should be able to pick out a few details of interest of Jim Blackmon's basement bomb.

First of all, the two tanks (yes, liquid fuel) are located in such a manner that, if the rocket did not explode on the pad and made it into the air, it would go unstable as the fuel was consumed and the center of gravity shifted. The tanks are located at the top, near the nose cone and about the middle, near Jim's hand. Jim also used what looks like common copper tubing and plumber's valves for fuel control. The entire vehicle is made out of metal. It exhibits talent, but thank God he didn't launch it! The crater it would have left would have been impressive!

Reading all this left me with a greater appreciation for the Orville Carlises (Continued on page 30)

SEPTEMBER 1958

How We'll Steer in Space

35 CENTS

SEPTEMBER 1958

POPULAR MECHANICS

POPULAR MECHANICS

MAGAZINE

BY CAN USE AND IT



OWNERS REPORT ON THE VAUXHALL

For the Craftsman
Beginning an Important Feature
for Shop Men:

**SHOWCASE OF TOOLS—
CIRCULAR SAWS**

**Rocketeers
Play Safe**
—page 73



POPULAR SEPTEMBER 1958 MECHANICS

WRITTEN SO YOU CAN UNDERSTAND IT
VOL. 110 NO. 9

THESE ROCKETEERS PLAY SAFE

By Joseph E. Brown

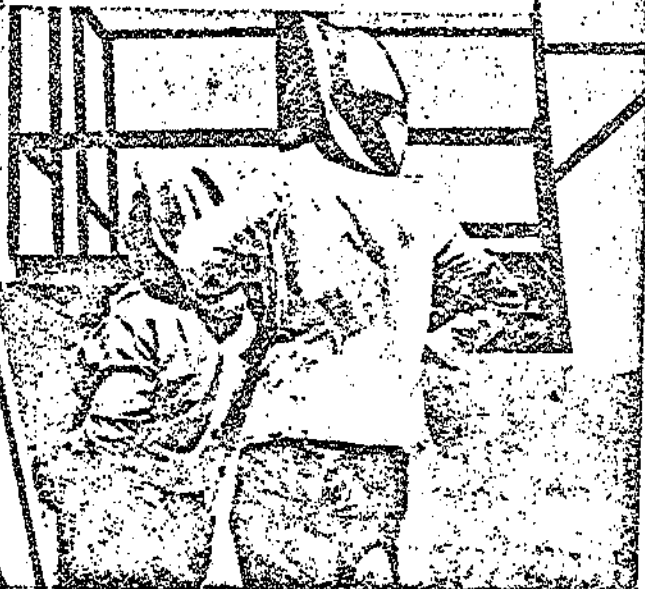
WHEN SATELLITES started beeping overhead, thousands of youngsters all over the country launched themselves into a new hobby—rocketry—with or without parental permission.

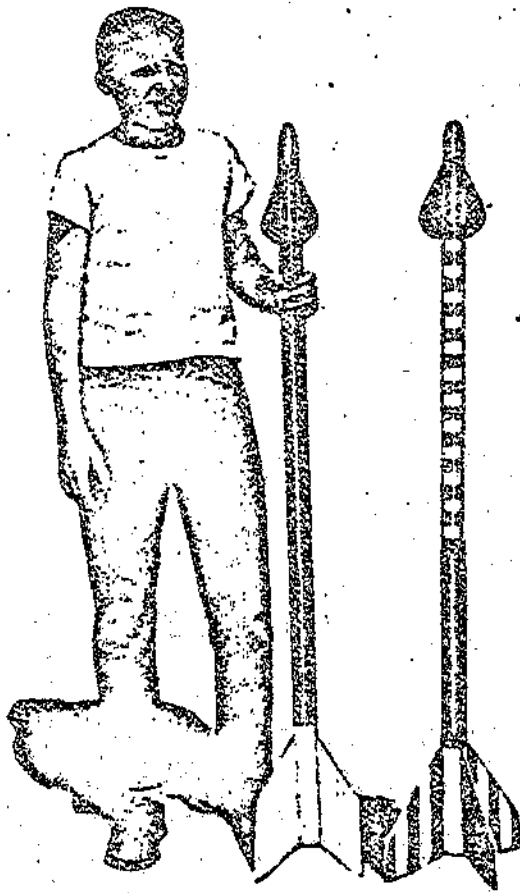
No doubt about it, amateur rocketry can be extremely dangerous. But rocket clubs which have been in existence for years prove that it also can be reasonably safe—if rigid rules are enforced. Safety precautions, teen-agers have found, don't cut down on the fun; they just cut down on the accidents.

Take a look at a supervised firing of an amateur rocket:

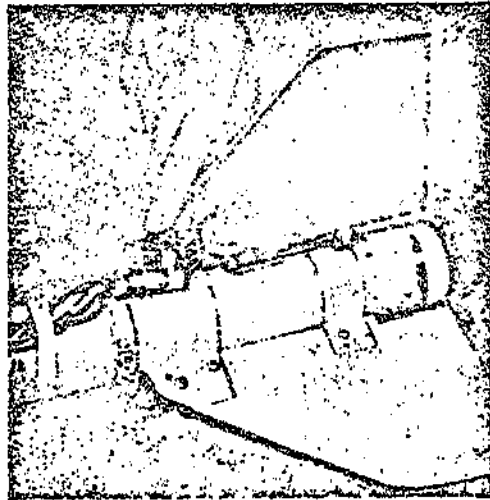
From a steel launching tower anchored

Teen-age rocketeer loads his four-foot rocket on the 16-foot launching stand in the Mojave Desert





Young member proudly shows rockets he designed. After fueling, the rockets are stored in shed, below.



Ingenious mechanism eases the second and third stages of a three-stage rocket as the first stage falls away.

to the floor of California's sprawling Mojave Desert, a silvery rocket vaults into the sky, its yellowish smoke trailing behind to mingle with the sagebrush.

Inside a concrete-block building, a tape recorder feels the rocket's heartbeat. Two men, wearing short-wave-radio headsets, wait for reports from tracking teams scattered in the brush. The rocket reaches its summit, hesitates, plunges earthward at 300 miles per hour.

A thousand feet from the launching pod, a crowd huddles in slit trenches behind thick earthen barricades. Earlier, before the missile was triggered by remote control from the safety of the blockhouse, a siren had wailed, a red flag fluttered, a light flashed and a loudspeaker blared intermittent warnings.

The occasion was the annual public firing of the Reaction Research Society of Glendale, Calif., one of the United States' two major nonprofessional rocket groups and an organization which is gaining new members every week.

Societies Promote Safety

The elaborate launching precautions—the siren, red light, flag, trenches and loudspeaker—are examples of how far the RRS and its sister societies have gone to promote safety in the field of amateur rocketry.

Since the RRS was organized 15 years ago in southern California, more than 300 rockets have been static tested and fired into flight. Yet the society's accident record in that period is without a blemish.

Unfortunately, all amateurs cannot boast such a record. Back-yard rocketry has bloomed everywhere in the United States. Garages have become rocket-building

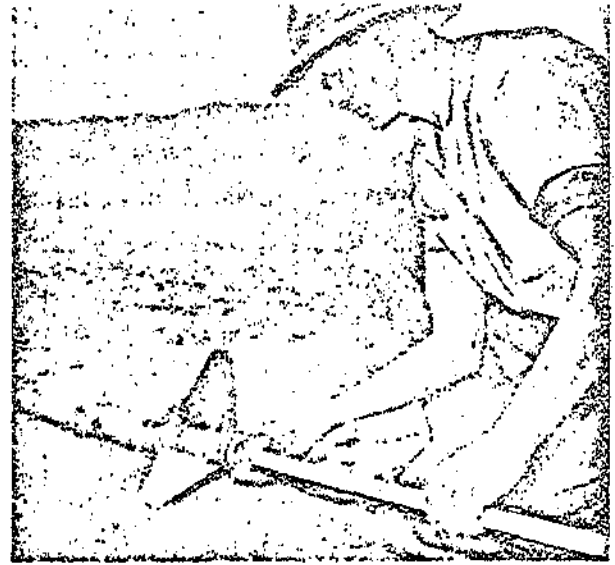


Pop-off explosion after months of labor: Will it work? Here a homemade rocket tilts off in controlled test

shops; science classrooms have taken on a space-laboratory air, and homemade missiles are shooting skyward from vacant lots.

And So, the Inevitable

With this burst of amateur interest in space, the inevitable has happened. In Texas, a homemade rocket fashioned from water pipe and stuffed with match heads blew up, permanently disfiguring its 14-year-old builder. Two youngsters in New England suffered near-fatal burns when a "dead" rocket reignited. Across the country, safety organizations began demanding action.



Full safety precautions are observed during the critical period when the solid fuel is cramped into place

Connecticut banned amateur rocketry altogether. Other groups, such as the National Fire Protective Association of Boston, urged laws on a nationwide scale to curb such tragedies.

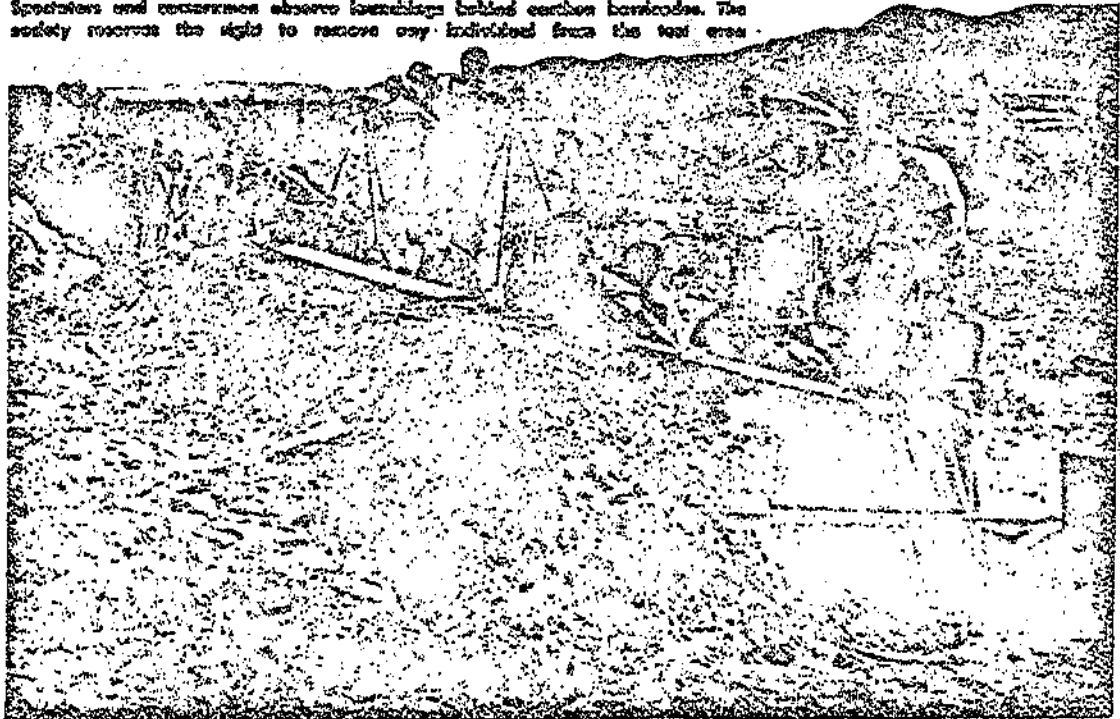
Firings Without Mishaps

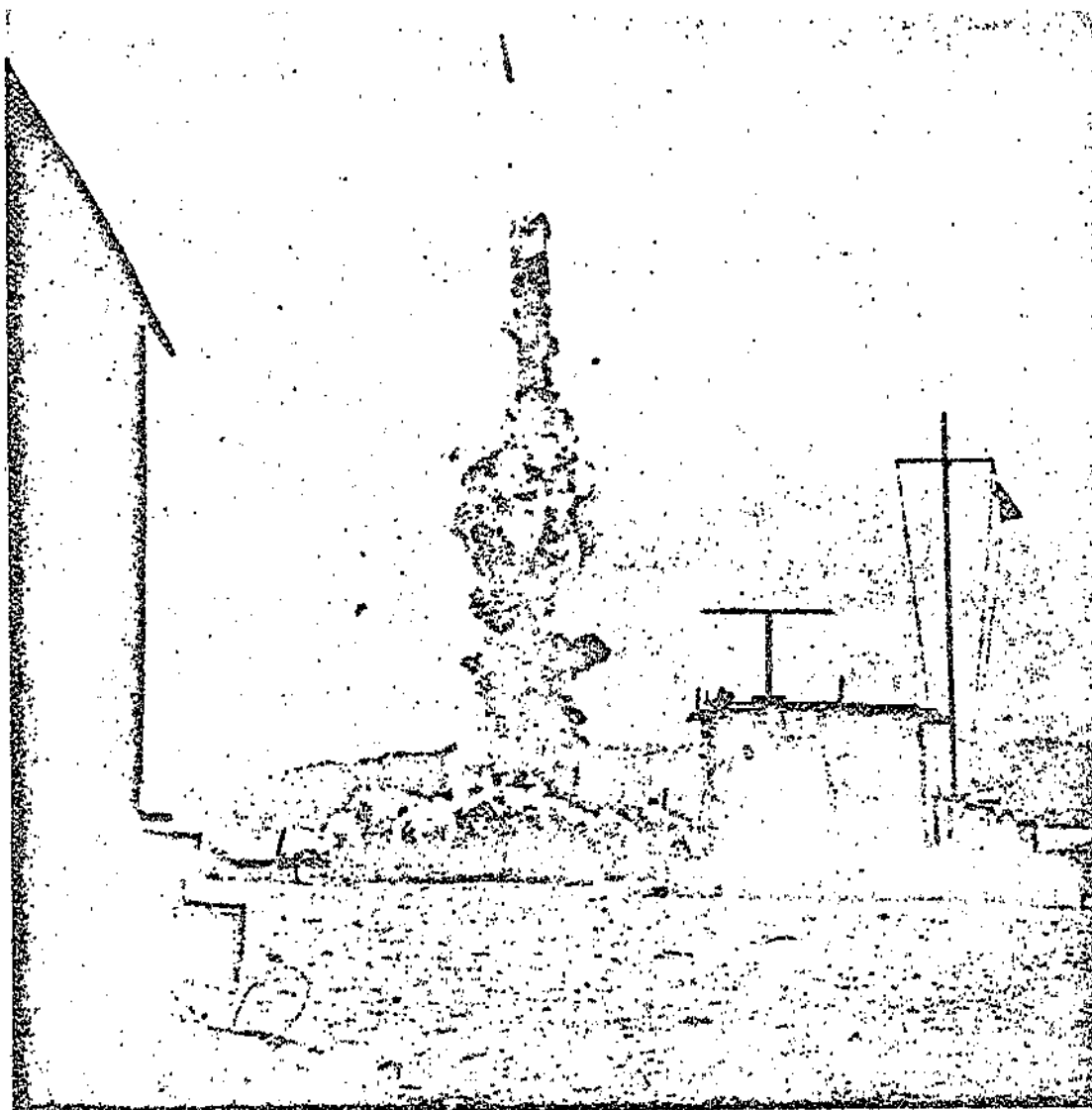
Yet today, in the vast open spaces of the West, future scientists banded in groups such as the RRS are firing dozens of rockets every year—within the law—without serious mishap.

The secret?

Supervision, a strict set of rules, and constant enforcement of those rules.

Spectators and cameramen observe launchings called carbon barbedoes. The safety reserves the right to remove any individual from the test area





Rocket takes off in perfect test as RRS officials watch from safety of blackbox 40 feet from launching stand

POLICY TO BE FOLLOWED AT PUBLIC LAUNCHINGS REACTION RESEARCH SOCIETY REGULATIONS

The Executive Council of the Reaction Research Society has adopted the following policy to be followed at public launchings.

1. No rocket will be fired unless everyone is behind shelter.
 2. Only the recovery crew will be allowed in the impact area between firings to find and flag the rocket.
 3. The public will be allowed to go into the impact area to observe and photograph the downed rockets only at specified times.
 4. The public will not be allowed in the fenced area except at the discretion of those responsible for the firing.
 5. No alcoholic beverages will be allowed inside the test area.
 6. No firearms will be allowed inside the test area.
- FIRING PROCEDURE**
1. **PREPARATIONS:** Signal, green flag. Spectators may witness and take pictures of activities but must stay clear of fenced areas.
 2. **COMMENCE LOADING:** Signal, yellow flag, one blast of siren. All persons not engaged in the test must return to the sheltered area.
 3. **ARMING:** Signal, red flag, two blasts of siren. All personnel must be in protected area. The rocket is ready to be fired.
 4. **X MINUS ONE MINUTE:** Start of countdown.
 5. **10-SECOND WARNING:** Siren and flashing red light. All persons must be behind protective cover during flight.
 6. **FIRM:** All persons must remain behind protective cover during firing and be prepared to move to better cover in case of erratic flight.
 7. In case of misfire or delay there will be an intermittent blast of the siren. All persons are to remain where they are and instructions will be given over the public address system.
- We demand the cooperation of all visitors in observing these regulations and reserve the right to remove any individual from the area.

RRS President Calvin VanWagner, a semiprofessional rocketeer at 18, puts it this way:

"We live safety. There's always an element of danger in rocketry—amateur or professional—but we can at least minimize that danger. We hope to keep groups like the RRS going for a long time.

"At the same time," he adds, "we're trying to discourage the type of amateur rocketry that's given us a bad name."

Safety is written into the bylaws of the California society and carried out to the letter during the periodic private launchings and once-a-year public firings on a 40-acre site leased from the federal government.

RRS rockets range from two and three-inch bulletlike affairs to elaborate two and three-stage missiles equipped with parachutes, cameras and radio transmitters. None has yet gone aloft with a dog aboard; but the next best thing—insects—will take a ride soon on the Mojave.

Rocketeers Are Teen-Agers

The designer-builders are, for the most part, teen-agers of colleges and high schools in the Los Angeles area. Most of them will admit what they learn about their hobby—rocket construction, fuses, fuel and firing techniques—isn't new, and that most of their findings are old hat at Cape Canaveral or White Sands.

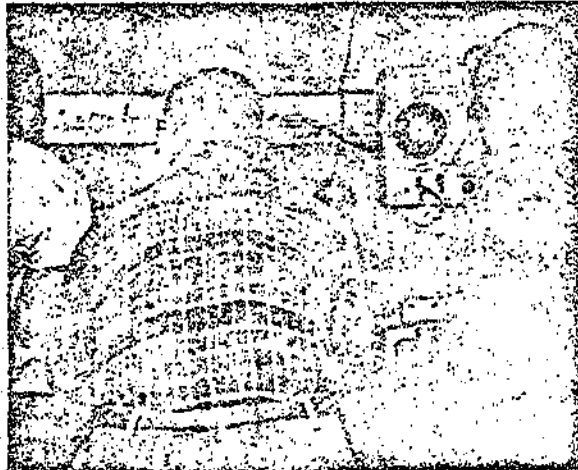
But the fail-and-try-again persistence reaps big dividends when carried back to school classrooms and laboratories.

VanWagner says, "We could find out from books in a minute what may take us days to learn in the desert. But that's no real achievement. Besides, we may come up with something accidentally that can benefit rocketry in general."

The RRS has been experimenting, for example, with rocket mail; a field which, if properly exploited, could someday become as common as airmail.

The RRS site, about 22 miles northeast of the steaming desert town of Mojave and about 120 miles from Los Angeles, sprawls along sagebrush-covered terrain from a range of hills on one side

(Continued to page 240)

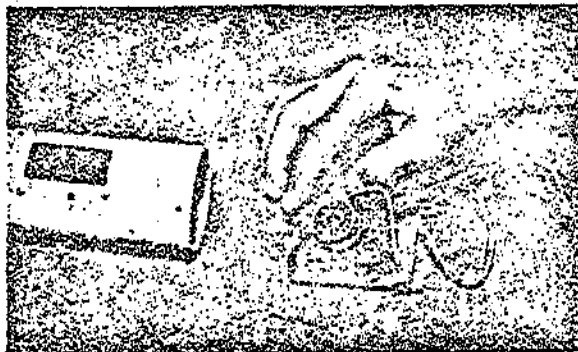


Inside the blackhouse, crewmen watch the rocket breaching through slit windows. Rockets are triggered from this building. Recorder, used for research, picks up sounds of breaching.



Tracking-team member sights falling rocket and records bearing. Location of the burst rocket can be found by triangulation.

Minutaire engine is inserted in second stage of three-stage rocket. Burning fuel burns away string, clicking the shifter.



These Rocketeers Fly Safe

(Continued from page 77)

to the lower desert floor on the other. A 10-foot launching stand and an even more elaborate static-test stand have been set up in the center of the site. The launcher, constructed of heavy-grade steel tubing, pivots on a concrete base and can be adjusted to varying angles. By changing the "pitch" of the launcher, and computing expected thrust of a rocket and its fuel, the landing area of a missile can be pinpointed to within a few feet.

But because a rocket upon launching can suddenly become a wild, uncontrollable weapon, due to wind drift, uneven fuel charge or for many other reasons, additional protective steps are taken.

Spectators are confined to slit trenches, fronted by earth mounds. Actual triggering is done by remote control from a concrete blockhouse 60 feet away. A system of green, yellow and red flags—visible anywhere in the firing area—signifies whether a rocket is fueled, armed or in storage.

Visitors Given Instruction

Visitors to the area are given detailed instruction sheets and must sign waivers of liability. A strict firing procedure goes into operation 15 minutes before a rocket is triggered, ending with a siren's wail and a 10-second countdown.

Only at the conclusion of a day's firing, when rockets have been retrieved and volatile materials locked up, are spectators permitted in the rocket compound area to inspect the amateur missiles, take pictures and ask questions.

The average RRS rocket is three to four feet long, constructed of steel or aluminum tubing $2\frac{1}{2}$ to 3 inches in diameter and carrying either three or four fins. Most nose cones are machined steel, although some made of cork or other experimental materials have worked successfully.

The average rocket, powered with a properly tamped fuel, propels itself to an altitude of between 2000 and 5000 feet. Highest altitude an RRS missile has reached is approximately 20,000 feet and the record for amateurs, set a year ago by a group in Inglewood, Calif., is 22,500 feet.

Tamping Fuel Is a Skill

Though solid propellants are actually rapid-burning fuels, they appear to be explosive. Packed too loosely in a rocket shell, they fizzle. Tamped too tightly, they explode. Finding the right firmness between these extremes is a skill which RRS members strive for.

(Continued to page 102)

POPULAR MECHANICS

Powdered fuel burns at the rate of one foot every tenth of a second in the rocket tube; the average rocket is spent in less than one second. It is the thrill of achieving this split-second of perfection, watching his rocket whoosh gracefully from the launching pad without wavering, toward which an amateur rocketeer of the RRS often works for weeks, even months.

Sometimes the work is in vain.

At a recent Mojave RRS launching, the most elaborate homemade missile of the day was a 16-foot, three-stage affair carrying a miniature camera and a parachute. Its builder spent more than two months in planning and building.

In less than 17 seconds, the rocket smashed into oblivion when the parachute failed to open and the rig crashed into the desert soil at more than 500 miles per hour.

Most of the RRS rockets are recoverable, and the total losses are rare. Tracking teams stationed in trenches around the impact area follow the airborne missile with special instruments which automatically record its compass bearing upon landing. The rocket can be located by triangulation.

Whether the RRS and its sister societies can maintain their excellent safety record depends, of course, on enforcement of its safety rules.

Some rocket experts, such as Capt. Robert C. Truax, of the Department of Defense's Advance Research Project Agency, think such precautions are adequate but recommend even safer rockets in the hands of amateurs. Truax, in fact, has designed a steam-propelled rocket which he says would be safer.

Equipped with a safety valve, Truax's missile is capable of hurrying itself to altitudes of more than 10 miles—more than five times the present amateur record.

While the RRS hasn't yet tried steam, it's hard to predict what may be on the drawing boards of its young members. Meanwhile, it's a job of experiment and fail, try again and succeed.

Successes and Fizzes

On a typical RRS launching day, only about half of the 10 to 15 missiles launched can be rated as complete successes. Some smoke awkwardly on the launching pad. Others fizzle a few feet from the stand and occasionally one explodes in mid-air.

But if only one goes off perfectly all day—and it's a rare occasion when the record is that bad—the young scientists of the RRS are happy.

Parents and friends, watching from the protective cover of slit trenches and barricades a thousand feet away, get a kick out of it, too!

POPULAR MECHANICS



Boy Builds Do-It-Yourself Rocket in Basement

EAGLE Scout James Blackmen of Charlotte, N. C., startled Army rocket experts when he explained that the nose cone of his six-foot rocket was a five-dollar metal lampshade. Although 17-year-old Jimmy's plan to fire the missile on a farm was balked by CAA rules, the project did win him the American Rocket Society \$1,000 science-youth award.

(Rocketry in the Fifties, continued)

G. Harry Stines, and Vern Estes
that developed model rocketry. Perhaps
after you read the Popular Mechanics
article you will feel as I. Maybe all
of us should stop for a moment and re-
flect on how good we have it, and then
vow that "rocketeers play safe" in that
future as they have in the past.

INTERESTED IN
MODEL ROCKETS?

JOIN THE MODEL ROCKETRY
AND AEROMODELER'S CLUB.

The only club in busy down-town
Festus, Missouri.

Enjoy such events as:

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or suggestions. Please send them
to us, care of the "Impulse" offices,
long with any articles, plans, or car-
toons that you may wish to contribute.
Due to the financial nature of this pub-
lication, we regret that we cannot pay
for any submitted material.

Model rocketry meets
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Travel to distant cities
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Contact:

Rob Cayse - 937-4451
401 Rose Lane
Festus, Missouri

ANNOUNCING -

NARGASM '74

The second meet sponsored by the Model
Rocketry and Aeromodeler's Club of Festus, Missouri.

The Events:

- GNAT B/G
- EAGLE B/G
- MERCURY DUAL EGGLOFT
- CLASS 00 PARACHUTE DURATION
- CLASS I STREAMER DURATION
- CLASS I ALTITUDE
- PEEWEE PAYLOAD
- SWIFT BOOST GLIDE

Contact:
Don Carlson
Rout 1 Box 407
Festus, Missouri 63028

(Capsule Communications, continued)

The 1/19 scale V-2 and the 1/10 scale Pershing are going to be fantastic demonstration rockets. Due to their weight, lift-offs under the recommended D12-3s are going to be impressively slow. Undoubtedly, launches under E and F power are going to be even more impressive.

Hats off to Estes for these gems!!

- BEEP -

Here is some early information on two up-coming meets:

The National Association of Rocketry Gateway Arch Super Meet '74 (NARGASM '74) will be held April 20 and 21 in Festus, Missouri. The events are: Mercury Dual Egg Lofting, Gnat Boost/Glide, Eagle Rocket/Glide, Class 00 Parachute Duration, Class 1 Streamer Duration, Class 1 Altitude, PecWee Payload, and Swift Boost/Glide. The host section will be MORAC.

WORM-2 will be held May 4 and 5 in Oconomowoc, Wis. The events are: Class 00 Parachute Duration, "Superroc" Parachute Duration, Class 0 Streamer Duration, Gnat Boost/Glide, Hornet Boost/Glide, Gnat Rocket/Glide, Sparrow Rocket/Glide, Hawk Rocket/Glide, and Scale. The host section will be the Omega Rocket Society.

Complete information about NARGASM '74 and WORM-2 will appear in the next few issues.

Solution to the Logic Test

PAD # 1

The red rocket was on pad 1, was powered by a "B" class engine, used a "pop" launch lug, lifted a standard payload weight, and had the perfect recovery.

PAD # 2

On pad 2 was the green rocket, powered by an "E," used a c-rail, carried a parasite glider, and landed in a lake.

PAD # 3

On pad 3 was the "C" powered black rocket that carried the egg capsule. Unfortunately, the engine ejected after a perfect lift-off from a piston tower.

PAD # 4

On four was the orange rocket, powered by an F-100. It was breech-launched and meant to carry a transmitter, but it exploded soon after ignition.

PAD # 5

Pad 5 held the white rocket, powered by a "D." It used standard launch lugs and lofted a camera, but impacted down range due to no delay charge.

(Editorial, continued)

2. Duration models need not be returned. However, to encourage skill in successful recoveries, official flights will be penalized by dividing the total points awarded the contestant in that event by a common factor.

3. In cases of engine failure or questionable flight, the judges have the right to physically examine the model to determine the validity or cause of engine failure or unusual flight characteristics.

Of course, these are only general provisions, but they convey the essence of a return system that I feel would satisfy both the staunch supporters and the vehement opponents of the return rule.

The return rule as it stands today must go! It is regressive, unfair, and oppressive to competition. I welcome any comments from opposing viewpoints.



