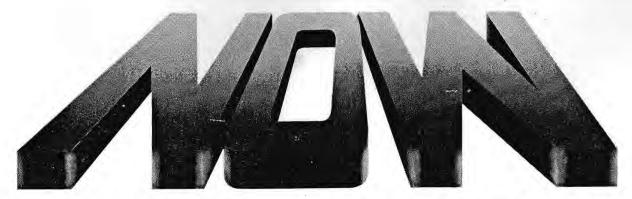
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Vol. XIV No. 9

5

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COVER PHOTO

On the first day of NARAM, a rocket streaks into the scorching sun. (Photo by Mark Bonin)

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EDITOR'S NOOK

Well, NARAM-14 is over, and the Seattle people showed us that they know how to run a meet. The motel facilities were excellent, and the Holiday Inn staff was most cooperative. Frankly, with 122 participants from 25 states (Alabama, Arizona, California, Colorado, Connecticut, Florida, Georgia, Illinois, Iowa, Kansas, Maryland, Massachusetts, Minnesota, Montana, Nevada, New Jersey, New York, Ohio, Oregon, Pennsylvania, Rhode Island, Texas, Virginia, Washington, and Wisconsin), the meet was somewhat larger and more representative of the NAR than expected. Because the range was organized well and there weren't too many contestants, the launching ran smoothly. We only wish that our Model Rocketeer duties would have let us see more of Seattle.

The Model Rocketeer congratulates Jess Medina, Jim Worthen, Hazel Gerhart, Dick Berg, and the rest of the South Seattle Rocket Society

for running an excellent meet.

We'd like to thank all the many people who helped with the Rocketeer's NARAM coverage: Jay Apt, for writing, photographing, and staying up all night developing picutres; Jan Blickenstaff, for writing, typing, proofreading, taking pictures, and otherwise being helpful; Mark Bonin, for developing film, printing pictures, letting our photographers use his darkroom, and for staying up all night with them; Phil Engelauf, for proofreading and showering the staff with Riverside, California bottle caps; Dave Klouser, for writing, proofreading, and developing film; Ron Wright, for helping Phil; all the reporters who covered events and discussion groups; and the NARAM-14 staff for supplying a typewriter and being helpful in too many ways to list. Thanks!

Samo

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:

Robert Mullane NAR in Action Editor 34 Sixth Street Harrison, New Jersey 07029

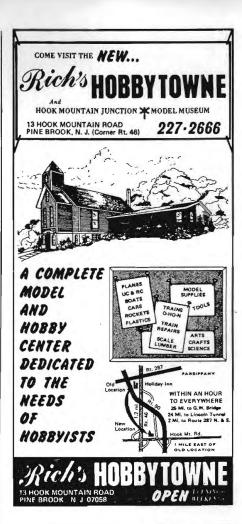
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this was NARAM 14

NATIONAL CHAMPIONS

TEAM

INDIVIDUAL

SECTION

South Seattle Rocket Society

Norm Wood - Titan

1341 pts.

A. Wayne Gerhart SSRS CSAR 1658 pts.

1381 pts.

B. Kerry-Mechtly C. Randy Thompson NOVAAR 1506 pts.

SSRS

1269 pts.

D. Jim Pommert

RESERVE NATIONAL CHAMPIONS

TEAM

Trip Barber - MIT

INDIVIDUAL

YMCA

A. George (Billy) Stine

MASER

B. John Langford C. Peter Covell

THOR CSAR

D. John Mechtly

NOVAAR

SECTION

8103 pts.

9731 pts.

MEET CHAMPIONS

A. Wayne Gerhart-SSRS-455 pts.

C. Randy Thompson-NOVAAR-205 pts.

B. Marc Nagasawa-SSRS-410 pts.

D. Norm Wood-Titan-350 pts.

DISTINGUISHED SERVICE AWARD

GREGOREK MEMORIAL AWARD

LAC NEWSLETTER AWARD

SPORTSMANSHIP AWARD

Manning Butterworth

Don Perko

NOVAAR Free Press

Robert W. Lewis

The launch site, a 40 acre field, was located just north of the Boeing Space Center in Kent, Washington, a suburb of Seattle. The center of range operations was a shelter of construction scaffolding roofed with black plastic. This provided the shade for safety check-in, return and launch control. The launch system used was a modified misfire-alley consisting of two wings or satellites controlled from one central location. Each wing had its own launch panel and 12 individual pads which were spaced far enough apart for immediate launching of models without endangering contestants loading their rockets on adjacent pads. Each pad was mounted on a camera tripod adjusted to about 18 inches and had both 1/8" and 3/16" rails plus an adjustable tower, thus eliminating any confusion over special rail assignments. There was a separate check-in for each wing but only one return table. Data reduction calculations were done at the Holiday Inn as the data was received from the field.

The other center of operations on the field was the concession stand manned by the Civil Air Patrol. Pancakes, ham and eggs, hot dogs and hamburgers were among the menu attractions.

The CAP also provided the four tents used for the prep area and manufacturers' (AVI, Centuri, Cox and Estes) display range stores. A parachute awning served as shade for the picnic tables and "Model Rocketeer Field Headquarters"

Tracking for Eggloft, Design Efficiency, and various altitude record attempts was done with two bubble level tube sight tripod scopes on a 300 meter base line. A hard line headset system was used for communication with the launch area.



Manning Butterworth was the recipient of this year's Distinguished Service Award. Manning has served the NAR well for many years.



All first place winners posed for the photographers: (front row, I. to r.) Bruce Williams, Norm Wood, Rein Stolz, Steve Fentress, Rick Grossberg, Robert Lewis, Mike Burzynski, Randy Thompson; (second row) Wayne Gerhart, Marc Nagasawa; (third row) David O'Neal,

Jim Pommert, Chris Flanigan, Chuck John, Don Perko, Mark Wargo, Mike Medina, Richard O'Hara, Mike Dawe, Pat Drewery; (back row) Carl Larson, Mark Ellefson, Bill Merryfield, John Langford, Helmut Reda, Tom Estes, Jim Backlas, Don Beadle.

... the scene

SUNDAY, AUGUST 6

NARAM-14 began on Sunday night when Contest Director Jess Medina called the 122 participants together for a meeting. Staff members, discussion group leaders, and other officials were introduced. Hazel Gerhart and Dick Berg were given recognition for the fine jobs they did with pre-meet arrangements. Jess Medina also thanked those who helped set up the range. Range set up had been delayed until Sunday afternoon because of a model airplane contest held on the flying field. The rocketeers managed to get things in order in only two

MONDAY, AUGUST 7

On Monday, the range was officially opened with a brief ceremony. This was highlighted by the arrival of Brigadier General Robert King of the Air National Guard in a helicopter at 8:20 A.M. Dignitaries, including Col. Kirshner of the CAP, Isabel Hogan (the Mayor of Kent, Washington), the Kent Fire Chief, NAR officials and model rocket manufacturers. After the raising of the U.S. flag, Washington state flag, the NAR flag and section flags a salvo of fourteen Patriots was fired and the range was officially declared open. On Monday Class 2 Parachute Duration and Design Efficiency (results and description on page 9) were flown.

After everyone had cooled off from a hot, HOT day on the range, a NAR meeting was held to enable those present to vote on the 26 By-laws amendments (see August Model Rocketeer for the list). Time was allotted for both discussion and voting. The minutes of the meeting appear on page 17. All of the amend-

ments passed.

TUESDAY, AUGUST 8

The hot weather continued on Tuesday with SEA-TAC Airport reporting 93 degrees and high humidity. Swift Boost/Glide (see page 9) and Sparrow Rocket Glider (see page 12) were flown.

Tuesday's evening activities began with the Trustees' Open Forum (see page 14 for details). After the Forum, NARAM participants could attend lectures on B/G construction techniques (page 14) and winning R&D (page 14) followed by discussion groups on RG (page 15) running contests, calculating CP and stability, and newsletters.

The evening concluded with an hour of modroc movies and Cineroc films. Those left at the end of the film session adjourned to the Night Activities Chairman's room for a pillow

WEDNESDAY, AUGUST 9

Wednesday morning was, for a change, cold and cloudy. Rocketeers donned sweaters, jackets, coats, and even blankets, guzzled coffee and cocoa, and shivered a lot. Open Spot Landing (see page 12 for results) was flown first, using a scale model of Seattle's Space Needle as the spot. The temperatures rose in the afternoon, and soon Mt. Rainer (and the sun) could be seen through disappearing clouds. At 1:00 P.M. Pigeon Eggloft (highlighted on page 12) flights began.

Wednesday evening was left free so that the NARAM participants could explore Seattle, visit the Space Needle and Pacific Science Center, ride the Monorail, eat at one of the waterfront restaurants, sleep, or put together the Model Rocketeer. The South Seattle Rocket Society's Modroc Flyer staff had thoughtfully provided everybody with a map and a "How to Survive in Seattle" guide.

THURSDAY, AUGUST 10

At 9:00 a.m. Thursday, R&D presentations

began. (See page 13 for details).

Thursday afternoon was lett free to allow rocketeers to view the city. Some rocketeers, however, wanted to take advantage of this time and the excellent range to fly demonstrations and test birds. Therefore, Jess Medina and several other people manned a three position range, which was quite sufficient for the number of flights.

The extent of the thermal activity was proven when a hand launched glider slowly disappeared after 18 minutes and an attack by a group of birds. Taking advantage of this activity, Paul Vandall put up his modified Bumble Bee rocket glider employing a fixed pod with an A engine. The model turned in an amazing 8 min. 45 sec. flight, an unofficial national record. (Plans for this model will appear in a future Model Rocketeer issue.)

Peter Pretzer experimented with a new type tracking powder-Star Dust! He loaded his model with the glitter used to decorate candles and launched it, hoping to pick up reflections from the sun. The silver particles, however, were not large enough to give the desired reflection. With some investigation, though, this idea could be used for an impressive demo bird.

Other highlights were the launching of an F7 powered bird, a three stage D powered Cineroc that worked and a two stage F100 powered Cineroc that didn't. The lower stage explosion ignited the upper stage, which resulted in a looping flight. Impact caused the model to disintegrate leaving a pile of plastic on the ground.

On Thursday night the Manufacturers' Rap Session (see page 16) was held, followed by more discussion groups (see page 14).

FRIDAY, AUGUST 11

Scale was flown on Friday morning, along with a lot of demonstration birds.

Only part of the spectators' interest Friday was directed to the Scale flights, for some of the meet's most interesting demonstration and record flights took place in the morning.

Flying early, without the benefit of thermals, Jim Pommert set a new unofficial US and world Condor B/G record of 9 minutes 21 seconds. The old world's record of 2 minutes 23 seconds was set by Otakar Saffek of Czechoslovakia. Bob Del Principe was unable to equal Pommert's time in an attempt an hour later using a parasite glider on an Enerjet F rocket.

The Enerjets showed their mettle during the morning, though, as a three-engine Eneriet cluster climbed to 4150 feet, and another Eneriet model's fins blistered during boost.

Doug Malewicki's (Cox) crew from Southern California put on a spectacular "Snoopy vs. the Red Baron" show, in which Snoopy's doghouse was attacked by a model airplane, and Snoopy (in B/G form) valiantly flew forth to defend his home. Doug also demonstrated a flying scale model of the motorcycle-rocket that Evel Knievel will use next July 4th to jump the Snake River Canyon.

Thermals make quite a difference: because the air was calm in the morning, Paul Vandall's Sparrow RG was unable to equal the time it got on Thursday. It stayed aloft only 1 minute 5 seconds. Jim Pommert entertained the spectators by collecting quite a flock of birds around his Sparrow B/G; unfortunately he failed to collect a record.

A more successful assault on the records was made by NAR Honorary Trustee Les Butterworth, who is now filing for US and FAI records in Class O Altitude with 333 meters.

One of the few slipups in safety checking allowed the flying of a 3-stage Cineroc-carrying model powered by seven B.14s, one D, and one F, which provided a great multi-piece, independently thrusting, smoking prang.

A spectacular underwater launch from a five-foot depth was marred by tip-off problems, which appear to be a common difficulty in aqueous starts.

Estes' new experimental G-class engine was demonstrated again, this time under a Cineroc, but vehicle vibration difficulties under the high boost velocity separated the Cineroc at the end of the thrust phase. Another Estes demo, this one a Transroc with a thermal sensor, indicated a temperature inversion some 2000 feet above the field.

The final launch of the meet clearly epitomized the spirit of NARAM this year, as Dolores Medina and Judy Worthen launched a salvo of 14 "flower power" models, with brightly painted flower-shaped cutouts for fins, put together by the Centuri/Enerjet people.

Friday's activities concluded with a banquet held in the Holiday Inn's revolving rooftop restaurant. CD Jess Medina thanked all the NARAM participants for their cooperation during the meet. He said that this meet had been the way a meet should be-fun for people from all over the country. Then he introduced the MC for the awards presentation, Harry

Mr. Stine called for recognition of all those who helped make NARAM-14 possible. The group gave them a standing ovation.

The first awards were the "fun" ones, starting with AVI's Fickle Finger of Fate, given annually to "the person without whom NARAM would have been a lot quieter." This year it went to Walt West, who was the firing officer and manned the PA during most of the meet.

Vern Estes was presented with a black stovepipe hat and shawl in recognition of his new beard. He graciously modeled his new clothes for the photographers.

Larry Brown presented two awards for the Centuri/Enerjet people. The first was an autographed "flower power" rocket (like the ones fired in the closing salvo that morning) to Elaine Sadowski. The second went to G. Harry Stine and was an eraser (so that he can erase the MPC logo from AVI products) and jelly bean capsule. Grant Boyd presented the third Centuri award, the "Little Carp" starter outfit,

(Continued on page 8)

NARAM-14 Contest Director less Medina wishes to extend his thanks to all those who helped make NARAM the great success it was, especially to Jim Worthen, Assistant Contest Director, Hazel Gerhart, Secretary, and Dick Berg, Public Relations, all of whom did extraordinary amounts of work and without whom the meet could not have taken place.

RECORDS FILED

AT

NARAM

DESIGN EFFICIENCY

A DIVISION Richard O'Hara NAR 20650 174 m/NS B DIVISION 203 m/NS Don Perko NAR 18887 C DIVISION 217 m/NS Don Beadle NAR 17970 D DIVISION NAR 2508 256 m/NS James Backlas

CLASS 2 PARACHUTE DURATION

 B DIVISION

 Helmut Reda
 T152
 1370 sec.

 D DIVISION

 Rick Grosberg
 T166
 1847 sec.

SWIFT BOOST / GLIDE

C DIVISION
Patrick Drewery NAR 20646 495 sec.
D DIVISION
James Pommert NAR 16908 363 sec.

CLASS O ALTITUDE

A DIVISION

Richard O'Hara NAR 20650 174 m. D DIVISION

L. H. Butterworth NAR 3520 333 m.

CLASS OO ALTITUDE

D DIVISION

James Backlas NAR 2508 159 m.

SPARROW BOOST / GLIDE

D DIVISION

James Pommert NAR 16908 201 sec.

ROC EGG LIFT

C DIVISION

Randy Gilbert NAR 15345 474 m.

CONDOR BOOST / GLIDE

D DIVISION

James Pommert NAR 16908 561 sec.

THE SCENE-con't.

containing everything needed to get started in rocketry, and featuring a rocket that "returns to earth on its own firey comet", to Vern Estes.

Jon Robbins, last year's Bumble Bee Award winner, chose Jim Pommert of the South Seattle Rocket Society as the person who has done the most for the advancement of Boost/Gliders during the year and presented him with the traditional huge cardboard Bumble Bee glider. () on modified it during the year he'd had it though—he added swing wings.)

Ed LaCroix presented the Outa Sight Section's Crash Gordon Award to Wayne Hazlip for his Nike-Hercules disaster.

Larry "Enerjet" Brown and Bob Del Principe were given a Pterodactyl for their boost/glide activities during the meet.

After the lighter portion of the ceremony, the special awards were given out. First came the Gregorek Memorial Award, presented to the Junior member whose rockets show the best workmanship. An unannounced event is chosen, and all the Jr. models are examined. This year's event was Eggloft and the Trustees decided that Don Perko of Colorado was deserving of the honor.

The LAC Newsletter Award was presented next. The winner was the "NOVAAR Free Press", with "Modroc Flyer" (SSRS) getting an honorable mention for its cover artwork and design, Riverside Rocket Center's (California) newsletter receiving one for showing the most improvement in the course of the year, and the "Rover" (Phillipsburg, N.J.) being honored for

its highly informative feature articles. Judges for the contest were Jim Backlas, Dr. Edna Hinman, and Tom Pastrick.

Jim Barrowman presented the Distinguished Service Award, the greatest expression of thanks the organization can give, to Manning Butterworth, who has been faithfully serving the NAR in many capacities (Trustee, Mid-America Regional Manager, By-Laws Revision Committee Chairman, to name just a few) for a long time.

Jess Medina presented the Sportsmanship Award to Robert W. Lewis, who reported an error on his contest card to the officials and thereby gave up a place.

The contest awards were given out to National champion individuals, teams, and sections, as well as meet champs (a new award). The winners received lots of goodies from the manufacturers in addition to their trophies.

In appreciation for his efforts, Jess Medina was presented with the NARAM-14 sign from the range, to which everyone had affixed his signature.

Jim Barrowman announced that he had appointed Jess Medina to fill Harry Stine's unexpired term on the Board of Trustees. Medina is the first NAR Trustee from the West Coast.

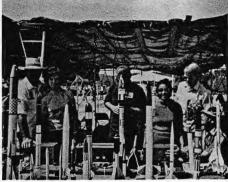
The banquet came to an end with Jim Barrowman reading the results of the LAC election sent to him by Connie Stine. Over 75 Leader and Senior members voted, electing Doug Ball, Connie Stine, Charles Russell, Alan Stolzenberg, Richard Malecki, Mark Barkasy, and David Scott.



NARAM participants were kept informed of the times and places of activities by means of notices on the blackboard.



Hazel Gerhart and Dick Berg greeted all NARAM participants and gave them their packets.



Judy Worthen and Dolores Medina (each accompanied by her husband) launched the closing salvo of "flower power" rockets. Also in the photo are Larry Brown of Centuri/Eneriet (center) and Walt West (behind Dolores Medina).



Jess Medina was presented with the NARAM-14 sign which all the participants had autographed.



Les Butterworth and Chris Pocock were among the timers for Monday's and Tuesday's duration

CLASS 2 PARACHUTE DURATION

The weather couldn't have been more perfect for the first event of the 14th National Meet. Temperatures in the 90's and a dead calm air over a hyperactive thermal field was the reason for the fantastic half hour and quarter hour flights in Parachute Duration. The people who thought they were taking the chance with Minijet B's were taking the chance only in windy weather. The engines were the reason for the pretty good flight times. For almost every place in the four divisions, Minijet B's were used. If the wind had been up a bit, maybe the normal sized engines could have been used, but in the ideal conditions that prevailed Monday morning and part of Monday afternoon, the Minijets really cleaned up. What else did the winners use? Boattails, in almost every case, and awfully large chutes, in the neighborhood of 30 inches and above.

or 50 menes and ab		Mike Medir
A DIVISION		
1. Richard O'Hara		362 sec.
2. Wayne Gerhart	SSRS	289 sec
3. Bryon Bradbur	n Star Rove	rs 236 sec.
4. Ricky Piester	Ind.	217 sec
B DIVISION		
1. Reda/Vedder	Tri-City C	osmo-
	tarians	1370 sec
2. Kerry Mechtly	CSAR	320 sec
3. Marc Nagasawa	SSKS	293 sec
4. John Langford	Maser	282 sec
C DIVISION		
1. David O'Neal		
2. Rick Meikle	CMRCW	424 sec
3. Bill Kenney	Midwest R	cocket
	Research	Asso.
		394 sec
4. Bart Hunter	Titan	393 sec
D DIVISION	1	
1. Fentress/Grosb	erg Southland	1847 sec
2. Douglas Frost	SSRS	889 sec
3. Al Gerhart	SSRS	-650 sec
4. Norm Wood Te		646 sec

DESIGN EFFICIENCY

Design Efficiency is obviously not a great spectator event (i.e. rare prangs, etc.), however the results at this year's national meet were truly outstanding. Design Efficiency numbers above 200 meters per Newton-second were not uncommon, and it took a mark of 256 m/Nsec to win D Division. The overwhelming majority of rocketeers flew some sort of BT-5, 1/2A6-2 combination. Since tower launchers were an integral part of the SSRS launching system, most competitors chose to utilize this drag saving device. The winning models were beautifully polished. Some thrust augmenting devices were used, but their value was somewhat dubious. The major problem faced by most modelers was achieving optimum weight. The longer models were the winners, as dynamic stability became a major problem.

-Rick Grosberg

A	DIVISION			
1.	Richard O'Hara	SSRS	179	M/NS
2.	Mike Turtora	NOVAAR	156	M/NS
	Wayne Gerhart	SSRS		M/NS
3.	Tom O'Hara	SSRS	140	M/NS
4.	Bryon Bradburn	Star Rovers	114	M/NS
В	DIVISION			
1.	Donald Perko			
		Rocketry	203	M/NS
2.	Gregg Hedman	Star Rovers	189	M/NS
3.	Marc Nagasawa	SSRS	168	M/NS
4.	Marc Nagasawa Earl Brabandt	Ind.	167	M/NS
С	DIVISION			
1.	Don Beadle	SSRS	218	M/NS
2.	Peter Covel!	THCR	203	M/NS
3.	Chuck Jahn	Pueblo Assoc	c, of	
		Rocketry	198	M/NS
4.	Ned Prichard	Arevalos	190	M/NS
D	DIVISION			
1.	James Backlas			
		Club	256	M/NS
2.	Fetress/Grosberg	Southland	212	M/NS
	Douglas Frost			M/NS
4.	Barrett Bailey	Mickey Mou		
			185	M/NS

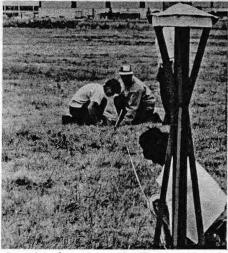
SWIFT BOOST GLIDE

The second day of NARAM proved to be the hottest, with temperatures in the mid-90's. By the time the range opened, many contestants were out trimming their gliders in the parking area. Due to a change in the schedule, both Boost/Glide and Rocket Glide were flown together.

Swift Boost/Glide had by far the biggest variety of kits or published designs. Michael Dawe of SSRS used a Long lack for first place in A Division with 128 seconds.

Although many contestants decided to wait until mid-morning before flying to increase their chances of catching a thermal, the longest timed flight was flown soon after the range opened. Pat Drewery from Oregon put up his Space Dart into a weak thermal which dropped his model 495 seconds later only slightly downwind. This was easily the longest timed glider in the event.

In B Division the fight was for second place. John Langford of MASER easily beat the other B Division entries by more than three minutes. His time was 283 seconds, James Rea of the Mickey Mouse Section edged Kerry Mechtly of CSAR by one second for 2nd place.



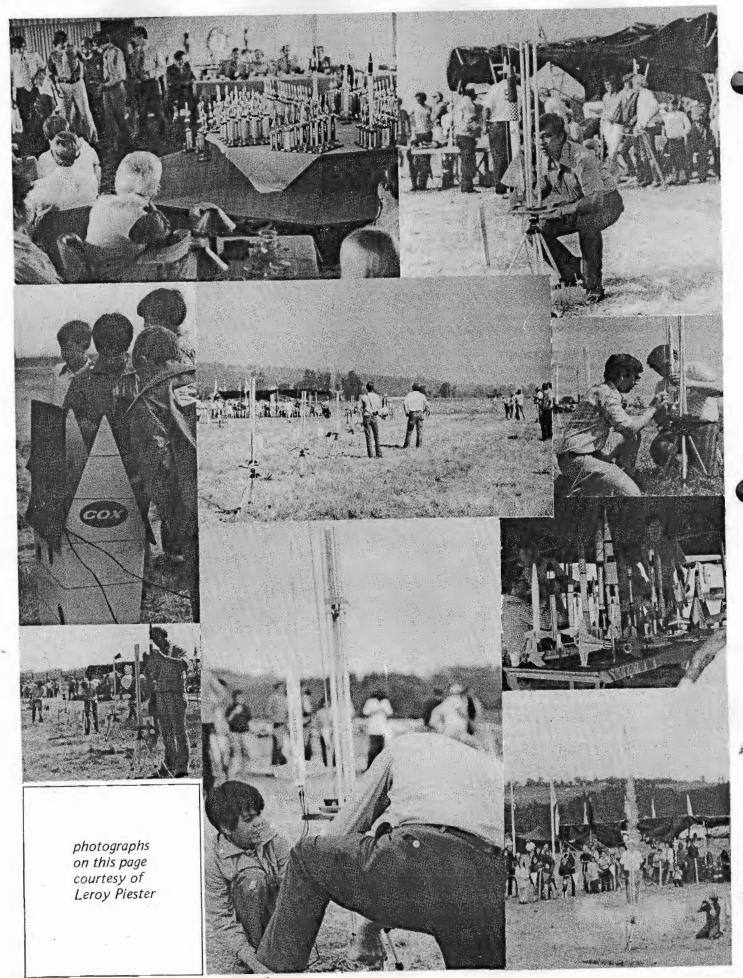
A model of the Space Needle was used as the Spot Landing spot.

Harry Stine, who developed the Delta Katt for AVI, proved that it could turn in a good flight with a B engine. The well-trimmed model turned in 137 seconds for a 7th place in D Division. Jon (Fly Groundhogs) Robbins flew his Swift RG model in B/G. The boost was one of the best but the weight of the engine brought his glider down.

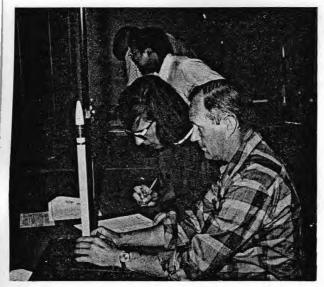
D Division was dominated by Jim Pommert's Hunter design. Jim flew his to a 1st place. The elliptical design was flown with an AVI B3-5 and was still going up when it separated from the pod for one of the highest boosts in the meet. The glider settled into a thermal and was timed for 363 seconds before the timers lost it, but Jim followed it for almost 23 minutes before the model landed nearly two miles down range. Chris Pocock (also of SSRS) flew his Hunter and tied for second with 272 seconds. With Chris was Orin Pierce of CMRCW flying a modified foam wing Super Glider.

Over all, the models seem to be being designed smaller to gain more altitude, and more good original designs are showing up. Few

_		-Jin	n Pon	nme
A	DIVISION			
1.	Mike Dawe	SSRS	128	sec
2.	Richard O'Hara	SSRS	101	sec
3.	Steve Richmond	Ind.	100	sec
4.	Mike Turora	NOVAAR	81	sec
	Jack Allingham	SSRS	81	sec.
В	DIVISION			
1.	John Langford	MASER	283	sec.
2.	James Rea	Mickey Mous	se 91	sec.
3.	Kerry Mechtly	CSAR	90	sec.
4.	Earl Brabandt	Ind.		sec.
С	DIVISION			
1.	Pat Drewery	Ind.	495	sec.
	Wayne Hazlip	Ind.	416	sec.
3.	Peter Covell	THOR	146	sec.
4.	Ross Iwampto	NOVAAR	145	sec,
D	DIVISION			
1.	Jim Pommert	SSRS	363	sec.
2.	Orin Pierce	CMRCW	272	sec.
	Chris Pocock	SSRS	272	sec.
3.	Manning Butterwo	rth		
			201	sec.
4.	Darrell Bradburn	Star Rovers	199	sec.
		(Continued	on pag	ne 1



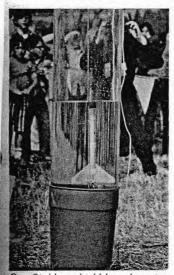
MODEL ROCKETEER



The scale judges worked long and hard for much of the week.



Section Championship winners were SSRS (back row) represented by Jim Worthen and Jess Medina, and NOVAAR Reserve Champs, represented by Dan Meyer, Randy Thompson, and Paul Shelton.



Don Stai launched his underwater rocket on Friday morning.



John Mechtly catches his scale rocket.



Championship winners were the following: (front) Kerry Mechtly, John Langford, Wayne Gerhart, Bill Stine; (back) John Mechtly, Jim Pommert, Chris Flanigan, Norm Wood, Pete Covell, Randy Thompson.



The Civil Air Patrol supplied tents used as prep areas.



The winners of special awards posed: (front row) Don Perko (Gregorek), Don Larson (Newsletter), Richard Lewis (Sportmanship); (rear) Mike Burzynski, Randy Thompson, Dan Meyer, Paul Shelton (all Newsletter).



NARAM-14, like any other meet, was not without its prangs.



Jom Robbins checks in his Groundhog. Note the racks for keeping contest cards in order.

ROCKET GLIDER

Gosh, there were a lot of Groundhogs. It's too bad most of them didn't work too well, at least when compared to those gas-passing, nothing moving RGs. The people watching the event from the sidelines wouldn't have been too impressed if it hadn't been for the successful flights that broke the monotony. This was certainly one of the poorest events flown by the group at this NARAM. With only a few exceptions, most people flew well under a minute. Those who did pass the one-minute mark had to do well over a minute to get the first place spot. The people who placed weren't, for the most part, using anything elaborate. If you haven't noticed it yet, the trend is going towards simplicity. That follows the logic: if there's nothing to break, malfunction or fail, how can it? At any rate, this is what rocket gliding is coming to.

		-Ton,	y Me	dina
A	DIVISION			
**				
1.	Merryfield Team	SSRS	46	sec.
2.	Wayne Gerhart	SSRS	33	sec.
3.	Mike Turtora	NOVAAR	27	sec.
4.	Karl Runge	Mickey Mouse	20	sec.
В	DIVISION			
1.	Marc Nagasawa	SSRS	90	sec.
2.	John Langford	MASER	79	sec.
	Earl Brabant	Ind.	73	sec.
4.	Kerry Mechtly	GSAR	71	sec.
С	DIVISION			
1.	Mike Burzynski	NOVAAR	159	sec.
2.	Alan Jones	Hawkeye	121	sec,
3.	Ross I wamoto	NOVAAR	111	sec.
4.	Tony Medina	SSRS	103	seć.
D	DIVISION			
1.	Jim Pommert	SSRS	115	sec.
2.	Norm Wood Team	Titan	98	sec.
3.	Charles Zettek	MARS	95	sec.
4.	Ion Robbins	Evanston	89	sec.

OPEN SPOT LANDING

It wasn't raindrops that fell at the Boeing Space Center on Wednesday. Falling rockets ripped from the sky on the morning of that day. The event was Spot Landing.

Aiming at a scale model of the Space Needle (built by CD Jess Medina the day before), the contestants put all their skill and knowledge into getting their birds as close to it as they could. But the shifting winds that morning kept our frenzied flyers from all but directly hitting the spot. The third place overall distance was obtained by Dan Meyer of NOVAAR (C Division). His 24 feet 71/2 inches was only 71/2 inches greater than the second place overall distance turned in by Mike Medina (SSRS), also of C Division. The best flight of the day was turned in by A Division's Wayne Gerhart (SSRS), when his little thingy landed only 12 (Count 'em, 12!) feet 9 inches from the base of the needle! Well, there wasn't much to speak of after that, only Eggloft. No more excitement-but that was only Wednesday, NARAM lasted till Friday.

-Mike Medina

A DIVISION

1.	Wayne Gerhart	SSRS	12'9"
2.	George (Billy) Stin	e YMCA	48'7.5"
	·Tom O'Hara	SSRS	78'11''
4.	Steve Richmond	Ind.	93'1.5"

B DIVISION

1.	Robert Lewis Star	Star Rovers	48'1"
2.	Andy Jackson	Ind.	80'8"
	Gregg Hedman	Star Rovers	62'1"
4.	Lawrence Bell	Ind.	80'8"

CDIVISION

1.	Mike Medina	SSRS	24'0"
	Daniel Meyer	NOVAAR	24'71/2"
	Bruce Kimball	SSRS	31'11/2"
1	Pick Maickle	CMRCW	38'6"

D DIVISION

1.	Williams/Stolz lear	n Arevelos	20
2.	Doug Frost	SSRS	35'11"
3.	Jim Pommert	SSRS	45'10"
4.	LaCroix/Lindgren		
	Team	Outa Sight	46'21/2'



Eggloft was flown on Wednesday. Here is a "fisheye" view of the check-in area for that

PIGEON EGG LOFT

The Pigeon Eggloft event got under way at 1:00 p.m. The event was originally scheduled for that morning, but Seattle's record breaking heatwave was replaced by low clouds and

cooler temperatures. Jim Worthen, after gazing into his crystal ball, forecasted that the weather would be more favorable to tracking in the afternoon. Sure enough, the sun popped out as predicted, and the clouds lifted.

As the contestants began filing out to the pads, it was apparent that the Kuhn capsule by CMR was to be the mainstay of the event. A few people, however, did venture to be original. The most notable was Bill Dowe's "under the dome special" capsule which was made from two Ban antiperspirant can lids. One two-stage teardrop was seen, but unfortunately it was unstable. Several Easter egg designs were seen.

Two battle plans emerged as the day wore on, single stage and two-stage. The strategies being D-powered single stage vehicles for stability and ease of tracking, against two-stage vehicles (two C engines) for increased efficiency and altitude.

The results suggest that the single stage entries fared better than the two-staged models. There was a breeze blowing across the field which caused weather cocking problems for the staged rockets. George Coleman placed first in D Division with an altitude of 453 meters. First place in C Division was taken by Chuck Johnn's two stage model powered by two C engines with an altitude of 464 meters. Thomas Estes took first in B Division with an altitude of 385 meters using a single stage D and a CMR capsule. Wayne Gerhart won in A Division with an altitude of 458 meters, also using a single stage D.

As usual, the prangs in this event were interesting. Several entries using paper shrouds to adapt the CMR capsules to the body tubes fell apart in mid-air. Evidently, the paper shrouds were not constructed properly and began vibrating, ripping off in flight. The second stage of Don Larson's model failed to ignite, supplying the ingredients for a good omelet.

All in all, the event went very well. Everyone had the opportunity for a second flight. Surprisingly enough there was only one catastrophic D engine, and Vern Estes was seen walking around with a grin. One contestant whose model ended up in the corn field to the north of the range remarked that the average density of this corn field was greater than that of the one at NARAM-13.

SSRS

SSRS

Ind.

-Ron Wright

458 m.

433 m.

385 m.

1. Wayne Gerhart 2. Jack Allingham 3. Steve Richmond

A DIVISION

4. George (Billy) Stir	ne YMCA	359 m.
B DIVISION		3*
1. Tom Estes	Birch Lane	385 m.
2. Earl Brabrant	Ind.	337 m.
3. Steve Bryson	EMRA	312 m.
C DIVISION		
1. Chuck John	Pueblo	464 m.
2. Jim Jakeman	SSRS	463 m.
3. Jim Marco	Tri-City Cos	mo-
4. Ross I wamoto	NOVAAR	451 m.
D DIVISION		
1. George Coleman	CMRCW	453 m.
2. Al Gerhart	SSRS	438 m.
Gil Haines	CMRCW	438 m.

3. Norm Wood Team Titan

Barber Team

MIT

427 m.

418 m.

RESEARCH & DEVELOPMENT

For the first time in two years, R&D at the NARAM counted toward national championships. However, the event weighting factor was reduced to five from its normal value of ten.

The R&D judging team consisted of Jim Barrowman, Howard Galloway, and Norm Wood. Of the eighteen projects entered, the judges selected eight to be presented Thursday

The two projects selected for presentation in A Division were both entered by members of the South Seattle Rocket Society. Jack Allington described the boost/glider jig he designed to provide rapid and consistent glider construction. The jig was essentially a group of wooden blocks constructed to provide support and alignment for the glider boom, wings, stabilizer, and rudder.

Wayne Gerhart flew a series of small design efficiency birds, varying the weight and fin area of each. Although the number of flights wasn't extensive, Wayne felt fin shape and area on small light rockets can have a major effect on

their performance.

The single entry in B Division was judged with the C Division entries. John Langford from Atlanta, Georgia gave an extensive report on lifting bodies and gliding boosters. After presenting data on a series of lifting bodies from NASA reports he related this to his own filmed drop glide tests. Gliding boosters (essentially body tube-fin combinations flying fin end forward) were flight tested to develop versions that would be stable and work reliably. John observed that gliding boosters generally fly best when the center of gravity and center of pressure coincide during descent.

C Division had the largest number of entries giving presentations. Bill Kenny of Kansas City developed an igniter that worked every time using a nichrome ribbon with a short light bulb filament soldered to the top. Bill's ignition tests

showed complete reliability.

Dan Meyer from NOVAAR investigated how model rocket engines live up to the specifications given in the manufacturers' catalogs. The maximum recommended lift off weight, propellent weight and time of ejection were checked in a series of over eighty flight tests. Based on the criteria of ejection at 15% of the delay time before impact, one quarter of the engines tested would not safely lift the weight specified. The other two factors weren't conclusively tested.

Russell Rasmussen of California investigated a Rogallo wing ejected from a regular rocket as a way to improve boost glider performances through boost phase drag reduction. By flight time comparisons with regular pod type gliders, Russell showed that the performance gained by boosting to a high altitude far outweighed the loss due to poor glide characteristics.

Randy Thompson of NOVAAR developed a technique for delayed second stage ignition in two stage models. Randy used under-water fuse passing through flameproof wadding stuffed in the second stage nozzle. His technique for estimating the proper time delay and fuse length was proven by his series of flight tests. When compared to flights of the same model having normally delayed second stage ignition, his got 10% higher altitude.

Two teams gave the D Division presentations. Chris Flanigan represented the Barber team from MIT Section. Their experimental investigation of the dynamics of the closed breech launcher provided pressure and flight data. The pressure data was compared with a

theoretical analysis and showed that the actual performance of a closed breech launcher was much lower than what might ideally be expected. The flight altitude of a rocket fired from a 2.5 inch diameter breech launcher was compared with the altitudes reached when firing it from a tower. The closed breech launcher caused a 40% reduction in altitude. Chris said they have concluded that breech launchers having a diameter only slightly larger than the rocket body diameter can potentially increase performance; but that those with diameters considerably larger than the body will definitely degrade performance.

Gary Lindgren of the Fanwood Section spoke for himself and his teammate Ed LaCroix from the Outa-Sight Section. Their extension of Gary's previous design work on silo launchers yielded an improved version of that device. The new silo launcher is a nine inch long tube, sealed at one end, and having fin slits cut down about two-thirds its length from the open end. In use, a rocket having about the same length and a slightly smaller diameter is launched out of the tube without use of a launch rod. Gary's flight tests showed that the silo launcher provided a reliable technique for successful

After each presentation there was an opportunity for questions and comments. When there were no more questions for Gary the audience scattered-some off for sightseeing; others for lunch (or breakfast) or out to the range to fly demos or test flights.

James Barrowman

A DIVISION

SSRS 1. Wayne Gerhart

B DIVISION

only one entry, which was combined with C Division

C DIVISION

_	511151011	
1.	Robert Thompson	NOVAAR
2.	Daniel Meyer	NOVAAR
3.	Russell Rasmussen	Titan
4.	Bill Kenny	MRRA

D DIVISION

MIT 1. Barber Team

SCALE

Although the overall quality of the Scale entries was not up to that of previous years, there were plenty of good models, and the entries in the lower age divisions showed substantial improvement.

Rocketeers from West Covina, California's Titan Section made a strong showing with their four-foot models of Celesco (formerly Atlantic Research) sounding rockets. Bart Hunter produced a well-detailed and good-flying Argo D-4 lavelin that placed fourth in C Division, Second in C was taken by Russ Rasmussen with his ambitious Athena H. This model featured excellent detailing on the difficult fin roots and interstage sections and flew nicely on a single F100 engine. Norm Wood, representing the Wood-Domen team, took first place in D Division with a Trailblazer II that had consistently fine detail and finishing work, especially on the

tricky tapered nose section. Norm had enough substantiating drawings and photos to fill a small metal file box.

Another strong section in the Scale event was NOVAAR. Randy Thompson, Howard Kuhn (entering by proxy), and Don Larson all showed up with Nike-Tomahawks. In C Division, Randy Thompson took third place, while Howard Kuhn was edged out by Don Larson for second in D Division. Both Howard's and Don's models were excellent, but Howard fost points for a rather wobbly flight.

Some "spice" was added to D Division by the "Scale" entry of Barrett Bailey. He submitted a one-to-one model of his own model rocket "In Nubibus 5b", completely substantiated with color photos and "manufacturers' drawings" illustrating every detail on the "prototype". Apparently a protest against the ambiguity of Pink Book rules defining appropriate subjects for scale modeling, Barrett's model was disqualified. It did, however, make an unsuccessful demonstration flight on six-

engine power.

A DIVISION

1. Wayne Gerhart

The most spectacular scale models in A and B Divisions were Kerry Mechtly's British Skua and Wayne Hazlip's Nike-Hercules. The Skua was a one-half scale model (about 41/2 feet) that included the big, clunky, draggy booster that goes with the real rocket. Kerry's model rated high in the static judging, but lost all flight points when the fragile model came apart and crashed. However, there were still enough points to put Kerry in second place in B Division. Wayne Hazlip's two-foot Nike-Hercules was severely underpowered and stuck nose-first into the ground, earning him the Crash Gordon Award for the best prang at NARAM-14.

The top placers in the two lower age divisions were both D-Region Tomahawks; the A Division winner was built by Wayne Gerhart, while Mark Nagasawa's model copped the trophy in B Division. Both rockets showed workmanship and flight characteristics that were exceptional for the age groups of their builders.

Thus, hence, Scale certainly was an event, excuse the pun, here at the Nats, and an event that I am sure it is safe for me to say was enjoyed by all here in Seattle.

Steve Fentress

SSRS

2. George (Billy) Stine	YMCA
3. Mike Turtora	NOVAAR
4. Rick Piester	Ind.
B DIVISION	
1. Marc Nagasawa	SSRS
2. Kerry Mechtly	CSAR
3. John Langford	MASER
4. Andy Jackson	Ind.
C DIVISION	
1. Mark Wargo	Apollo/NASA
2. Russ Rasmussen	Titan
3. Robert Thompson	NOVAAR
4. Bart Hunter	Titan
D DIVISION	
1. Norm Wood Team	Titan
2. Don Larson	NOVAAR
3. Howard Kuhn	NOVAAR
1. LaCroix/Lindgren	Outa Sight

the discussions

TRUSTEES' OPEN FORUM

More than 25 people were there to quiz NAR Trustees Jay Apt, Jim Barrowman, Manning Butterworth, and Howard Galloway. Jan Blickenstaff started off the questions by asking how much money the NAR made on TRANSPO 72. Jim Barrowman replied that the NAR got about \$400 from the exposition. In addition to the financial profit, the NAR gained an improved image since many people came away from TRANSPO with a newfound knowledge of modroc's safety and educational value.

Vern Estes asked how present NAR membership compares with that of last year at this time. Jim Barrowman said that we have 3400 members, as compared with about 5000 last year. The number of sections this year is over 100, whereas there were only about 90 last year. The dropping of Model Rocketry magazine was the major cause of the decreased membership. Some of the people who subscribed to MRm instead of renewing their NAR memberships are coming back to the NAR now.

Someone asked what has happened to Model Rocketry. Jay Apt explained that George Flynn overextended himself. George brought the typesetting inside; he hired a secretary, alienated advertisers and authors, and lost his distribution for one month. The last issue of MR m published was January-February 1972; there was no March issue. The magazine has not officially declared bankruptcy because of the difficulty of doing so in Massachusetts. Jay Apt and Gordon Mandell bought all the back issues at auction.

Phil Engelauf asked whether the people who did subscribe to *Model Rocketry* and received no magazines could get their \$6.00 back. He was told that this would be impossible.

Bill Simon asked what plans there are for the Model Rocketeer in the future, e.g., will it be expanded? Jim Barrowman said that expansion of the magazine will take place if the membership grows sufficiently. Elaine Sadowski said that more general interest articles will be included in the magazine if space and availability permit.

Les Butterworth asked if section members should talk to local hobby dealers and ask them if they would like to sell the Model Rocketeer. Jim Barrowman said that this could be done, and if the dealer is interested, he should be told to write to Norm Ward (Rocketeer advertising office) and request more information.

Jay Apt asked what the present plans for distribution of the *Rocketeer* are. Jim Barrowman said that there is no firm commitment, but that direct distribution to hobby dealers is favored at this time because this is less expensive than going through a distributor.

Vern Estes brought up the subject of the first MESS report (Model Rocketeer, July, 1972). He suggested that the engine failures be put into better perspective by determining a ratio for each manufacturer of engine failures to engines fired. Elaine Sadowski said she thought the MESS committee was making an effort to remedy the somewhat misleading situation.

John Langford asked whether or not the Standards and Testing Committee could release the curves from the engines that have been tested. Jim Barrowman explained that we don't have the money to publish them, but Jay Apt'

suggested that they be put into the *Model Rocketeer*. Elaine Sadowski replied that the curves would take up too much space considering the number of readers interested in the subject. Jim Barrowman proposed publishing the curves in *NARlett*, and Manning Butterworth suggested making them available through NARTS.

Vern Estes asked who certifies that a failure reported on a MESS form is actually due to a bad engine. Jim Barrowman told him that nobody does. This prompted Mr. Estes to suggest that malfunctioning engines be sent in along with the forms, to permit the manufacturers to examine them. Jay Apt wanted to know if it would be acceptable to ask that MESS forms be filled out in duplicate—one copy going to the MESS committee and the other, along with the engine, to the manufacturer. These instructions could be printed on the next batch of forms.

Walt West requested information on the origin of the MESS project because he thinks the percentage of engine failures isn't so high that it should cause alarm. Jim Barrowman replied that MESS was originated by the Standards and Testing Committee to provide a means of determining the rate of engine failure and of letting S&T and the manufacturers know about malfunctions.

Ron Wright inquired about the amount of NAR involvement in legal battles. Jim Barrowman said that the NAR gives support to its members in each state, who are the NAR's representatives within states. Dottie Galloway reminded those people with legal problems to contact their Regional Managers for help.

B/G LECTURE AND DISCUSSION GROUP

Jim Pommert and Jim Worthen's B/G lecture and discussion group were held as a single two-hour session and brought out discussions of advantages and disadvantages of various largescale B/G design types as well as construction tips. The approximately thirty participants attending actively contributed ideas and suggestions.

While there is undoubtedly something to be learned from hand-launched gliders, it was pointed out that the gliding characteristics of rocket launched gliders and hand-launched gliders differ because the former spend most of their flight time above the turbulent air which covers the ground to a depth of fifty to a hundred feet. Because of this, boost/gliders should be designed with long booms and large tail surfaces to get large corrective moments.

Jim Pommert had good news for those who are intimidated by the number and intricacy of NACA airfoils. Only five percent of the lift comes from the airfoil, he says, the remaining ninety-five percent coming from the fact that the glider wing flies at an angle of attack of several degrees. However, to prevent destroying the wing's lift because of separation beginning near the leading edge, the leading edge should be rounded, not tapered to a razor edge.

There were several suggestions for improving the durability of gliders, including putting monofilament on wing leading edges and coating the wings with flame resistant glue half an



Vern Estes was presented with a black shawl and stovepipe hat to go with his new beard.

inch on either side of the root joint to prevent scorching. The author, having that morning stripped both wings from his RG (one at a time), was especially interested to learn that shredding is due mainly to torsional vibration rather than simple planar flexing. Bill Simon explained this had been learned from Cineroc flights and the solution is to use thicker wings or somehow prevent the twisting and consequent tearing which begins at the trailing edge and works its way through to the leading edge in about half a second. This is an example of something that, according to Jim Worthen, permeates model rocketry, namely, trading off one advantage to gain another. In this case the modeler is sacrificing light weight for strength. Such trade offs are very evident in comparing Condor B/G design types such as parasites and "monster models", and as Jim stressed, aesthetics can play an important part in making the final choice in such situations.

Manning Butterworth

WINNING R&D

The quality of R&D projects entered in NAR competition has been consistently bad, with only a few projects in each large meet showing the qualities of good project selection, careful understanding of the material, and a proper test program, and a clear report, that earn projects the respect of the judges. On Tuesday night, NARAM-14 chief R&D Judge Jim Barrowman tackled this problem in his lecture titled "Winning R&D".

Considering first the question of project selection, Jim squelched the notion that to place in R&D one must discover a new phenomenon or come up with a novel idea. Many of the best projects involve simply gathering and applying data taken on some basic model rocket phenomena. A good project in which a rocket with measured drag coefficient is flown

and tracked many times, with the altitudes used to check the many altitude prediction formulae, has yet to be done. Here the researcher must be careful not to vary two test parameters at once, and to take many data points to average out disturbing influences such as engine thrust variation. Asked whether a rocket design qualifies as R&D, Jim said, in general, simple design projects are disqualified; but that a design project can be turned into real R&D by taking data that shows that the design criteria have been met. This can be achieved through testing against a standard model such as a commercial kit, or testing against some absolute standard, like altitude or duration.

Jim cautioned that the Pink Book requires the project to have application to the real world in which modelers fly. Hence, a project such as Manning Butterworth's analysis of optical tracking systems published in the March 1972 issue of the *Rocketeer'* is a good one, but a computer program for designing rockets that requires huge amounts of computer time would probably not even place.

Turning next to the data taking phase of the project, Jim emphasized that the key to the credibility of the project's conclusions lies in taking lots of data. For a quantitative project, at least three data points must be taken on each parameter change. For an observational project, like finishing techniques, have two or three observers writing down independent observations, and run through the experiment several times. In all projects, it is of the utmost importance to carefully describe the equipment and procedures used in taking the data, permitting the judges to understand precisely the factors influencing your data.

Once the data is in the notebook, analysis begins. The first step is not made with the aid of a slide rule or computer, but with sound qualitative judgment; just look at the data to see if it's reasonable. Can a 1/4A really put your test bird up to 300 meters? Is your CD really 0.2? Next, apply simple statistics to your data points to obtain the mean, standard deviation, and standard deviation of the mean. (And if you don't know what those mean, better read up before taking the first data point.) In the final data analysis for the project, be careful not to introduce new errors by approximations or assumptions. And when analyzing the data from an observational project, have someone who was not involved in the original data-taking look at the written observations and draw his own conclusions to check yours. Finally, be wary of transferring your conclusions from your experiment to other modroc situations: an airfoil that does wonders for your B/G might not work for one a few ounces heavier.

When the time comes to write the report, Jim suggests following the outline given in the Pink Book, as far as it fits your project. Be sure to include the summary as required, or you'll be DQ'd. Repeat the main ideas of your project three or four times in the report so that a judge who is reading 40 reports in a weekend gets the point of what you are trying to do. Jim pointed out that a very common failing that is sure to keep you from placing is a lack of careful thinking about the assumptions made in the data analysis or the entire experiment. These assumptions can range from assuming a linear response on a piece of test equipment to assuming that payload weights are really one ounce.

If you are selected to give an oral presentation, don't simply read an abbreviated form of your report; the judges have already seen it. The idea of the oral presentation is to com-

municate the essence of your project in nontechnical terms to the other rocketeers, stressing the relevance of your conclusions to their daily modeling.

Explain all the terms you use, especially in equations, and label the axes of any graphs you put on the board. The key thing the judges are looking for in the orals is evidence that you thoroughly understand your project; and if you are able to explain it in physical, non-technical terms, you'll have gone a long way towards convincing them.

Touching briefly on the topic of project costs, Jim advised experimenters not to include the cost of their project in the report. In another vein, he said that judges look with disfavor on developments that cannot be utilized by other than affluent modelers.

Jim dealt with a sector of R&D report writing often overlooked: consideration of overworked judges. Above all, judges appreciate a concise, organized report that proceeds logically from point to point. Padding has little place in a competition R&D report, for a judge gets very tired of reading poor English and turgid explanations. Make sure that all apparatus submitted with the report is clearly referenced in the text as Display A, Display B, etc.; and explain in the report what the judge should look for when he examines the apparatus.

Regarding research on the previous work done on your topic and related topics, Jim said that a project rarely wins which does not include the results of a literature search, covering sources both within the hobby and in related sciences. Indicate what you have found (or that you found nothing), and talk about the differences between previous work and yours, noting where the work applies to your project, and stating whether you plan to re-check previous results, accept them, or extend them to a new area. Credit all previous work and aid that you are aware of, and refer to the references in term-paper style, being sure to refer to any texts that were the source of equations you used.

Jim closed the lecture by expressing the hope that efforts directed in careful research programs would result in high quality R&D projects in the coming year, and by reminding experimenters that the single most important feature of a winning R&D project is a thorough understanding of the project and its scientific context.

Jay Apt

ROCKET GLIDER DISCUSSION GROUP

One of the several discussion groups held concerning competition was Jim Pommert's on rocket gliders. Jim, who has been working with gliders for quite some time in the Seattle area, used a comparison approach to the problem of designing a rocket glider by pointing out both advantages and disadvantages of different design types. The resulting chart, arrived at after an hour of discussion and argument, is printed below.

SWING WINGS ADVANTAGES:

high aspect ratio less frontal drag straight boost

DISADVANTAGES:

hard airfoil lower reliability friction drag more complex design SLIDING WINGS ADVANTAGES:

straight boost better and more varied wings

DISADVANTAGES:

no reduction in frontal area weak points

FLOP WINGS

ADVANTAGES:

less drag on boost—no lift better airfoils thickness of wing reduced

DISADVANTAGES:

wings are of necessity square little difference between designs

ENGINE SHIFT ADVANTAGES:

reliability good boost

DISADVANTAGES:

hard to trim must plan for engine shift and engine weight

FIXED ENGINE ADVANTAGES:

strong reliable easily trimmed

DISADVANTAGES:

must switch from boost to glide phase

David Klouser



Larry Brown and Jim Worthen pose with the "flower power" rockets.

MANUFACTURER'S RAP SESSION

Doug Malewicki of Cox got the manufacturers' rap session off to a roaring start by raffling off a Cox Sopwith Camel. Gregg Hedman of California was the winner. Other manufacturer representatives present were Gil Lutz (AVI), Dane Boles (Estes) and Larry Brown (Centuri/Enerjet).

The first question was directed at Enerjet and concerned getting the Enerjet engines approved in California. California is now testing the engines and approval of at least the E and F52 is expected in about a month.

Dane Boles was asked why the reliability of D-12's has been so poor. There have been quite a few ejection charge malfunctions, blowthroughs, and split casings. Dane replied that Estes has been having a problem with the casing

(Continued on page 16)

manufacturer. He then went on to say that two or three months ago Estes began improving their ejection charges by installing the caps with air cylinder presses. The new caps are flat and don't have pinholes. Larry Brown added that the engine-casing problem is caused by insufficient glue in the casing, resulting in expansion during firing.

AVI's Gil Lutz was quizzed about the bulge in the middle of that company's B-3's. He replied that the present engines do not fit into BT-5 and the chucks used in making them were all being changed.

It was reported that several Estes C-6's had developed a small fissure in the casing just above the nozzle. This is believed to have been caused by too little glue in the casing, and the condition was observed in parts of several batches.

Larry Brown was asked about the possibility of a new D engine. He asked people to talk to Centuri's R&D director, Grant Boyd, and indicate interest in a new engine.

When asked why Centuri doesn't sell body tubes that will hold Enerjet engines without engine mounts, Grant Boyd replied that the Enerjets get much hotter than standard black powder engines and need air space around them. Paint on a tube in contact with the engine would probably blister.

Dane Boles, after receiving a complaint about poor quality nosecones, told anyone who has a gripe about merchandise to send it back to the manufacturer.

The possibility of getting an ejection charge to go off in an Enerjet if the nozzle blows was discussed. Larry Brown said that this isn't possible since the blowing of the nozzle causes the pressure to drop, which stops the burning.

Someone inquired as to whether Estes can supply spare parts for the Cineroc. Dane Boles replied that spare parts are available and all those who want them should go through customer services.

Larry Brown was asked why Centuri is using cardboard fins on some models. He replied that very young modelers have an easier time working with cardboard than balsa.

A Centuri F-52 whose ejection charge went off about one second after firing was mentioned. Larry Brown said that such a malfunction is not common.

The Estes G engine that was launched Wednesday was discussed. Dane Boles said that such engines are not yet available, and when they are they will probably be used by universities for scientific work. In thirty states total impulse for model rockets is limited to 80 Nt-sec., so a G engine bird would be an amateur or professional rocket based on model rocket technology. Estes does want to get into the



AVI was among the manufacturers to set up displays in the CAP-supplied tents.

large-engine picture, though. The G, which is similar in composition to an Enerjet, uses a mini-engine mounted in the top to supply the ejection charge.

Norm Wood asked all the manufacturers whether they help people with R&D projects. The manufacturers all replied in the affirmative, and Gil Lutz answered that AVI hopes to be able to offer to run computer programs for rocketeers in the future.

Doug Malewicki, when asked whatever happened to the D-8-0, said that none have been made since a year ago June, but they may come back.

Vern Estes commented on the ejection charge problem. He said that new testing equipment was being put into operation. This will measure the volume of gas produced by the charge and the rate of production. Heretofore very crude equipment was being used.

Colored tracking smoke was then discussed. Dane Boles said that the dyes tend to disrupt the burn rate. Refining the dyes would be too costly.

A C engine that could give a good liftoff without sending a large rocket up too far was suggested. This would be ideal for testing large models in small fields. Larry Brown suggested making a B-14 with a short delay for this purpose.

The manufacturers all stressed that they are interested in hearing from rocketeers about the products they are using or those they would like to see in the future.

CLUBS DISCUSSION GROUP

Manning Butterworth and Dane Boles headed this discussion group. The meeting was delayed about ten minutes in the hope that more people would arrive. Manning began by distributing an outline covering the formation and operation of a model rocket club. This paper suggested several methods for enticing prospective members which ranged from hobby store sign-up sheets to public displays and demonstrations. It also covered inter-club activities along with the benefits of NAR affiliation.

The discussion began with Jan Blickenstaff telling about his efforts to start a club in Bozeman, Montana. Leslie Butterworth mentioned several things the Zenith Section has done to stimulate interest, such as publicity through radio and newspaper followed by public demonstration launches.

Dane Boles said Estes Industries is repeating the special club demonstration offer in which gift certificates are awarded. He also said that club booklets may be obtained from him on request.

Ron Wright discussed some of the problems his club was experiencing with governmental red tape involving launch restrictions. He also told of the demonstration which was put on by the Riverside Rocket Center at the Scout-O-Rama held last May at the Riverside International Raceway.

The group was adjourned almost on time to make way for the next discussion group.

Ron Wright



Propulsion Technology, a new entry in the engine manufacturing field, has been formed in Rantoul, Illinois. Initial production will be in the 20 nt.sec. area with D5, D10, and D25 engines. Delays will be available in 0, 3, 7, 9, and 12 seconds. Casing dimensions will be 18mm diameter x 3½ inches long. These engines should be available in early spring of 1973. Further information on these composite propellant engines can be obtained by writing to Propulsion Technology, Box 274, Rantoul, Illinois 61866.

COLORADO CALLS

All NAR members in the Aurora or Cherry Creek areas wishing to form a NAR section in these areas are invited to call STEVE SANDE at 364-4585 in Aurora for more information.

NAR HQS TELEPHONE CHANGED

NAR Headquarters telephone number has been changed to: Area Code 703 356-8887. The phone is manned from 9:00 AM to 5:00 PM (Eastern time), Monday through Friday. The mailing address remains the same.

REMEMBER 'BOYS LIFE'?

Boys' Life Magazine will carry an article on model rocketry in the October, 1972 issue. The article, written by Stan Pashka, features the Pueblo Association of Rocketry in Pueblo, Colorado. A demonstration launch was held for the press; products from Centuri, Cox, and Estes were flown and displayed. The arrangements for the article were made by Frank Genty, a former employee of Estes Industries.

"Larry Loos asks the NAR membership and model rocket manufacturers to report to him (CMR Box 1792, APO NY 09193) any crank or slander-type letters received mentioning his name, mailed from overseas. Larry, a member of the USAF, was assigned to England in late April. In late July, his briefcase, containing NAR address lists and info, was stolen from his office on the base. Larry requests cooperation in reporting any strange letters."

BRING BACK STAR TREK?

Michael Okuda (NAR 18834) of Honolulu, Hawaii has told the *Model Rocketeer* that NBC is considering production of a 2-hour *Star Trek* movie, which could be a pilot for a new series. Michael asks that those who support this move write to Mr. Julian Goodman, NBC, 30 Rockefelier Plaza, New York, NY 10020.

MINUTES of the SPECIAL N.A.R. MEETING

The Special Meeting of the National Association of Rocketry was called to order by President James S. Barrowman at 8:45 PM, August 7, 1972, in the large meeting room of the Holiday Inn, Seattle, Washington.

The Secretary was directed to take the roll. A total of 39 members was present, of whom 32 were voting members. The President declared that a quorum was present.

Barrowman announced that the sole agenda item of this special meeting of the Association was the discussion of and voting upon the proposed amendments to the NAR By-Laws, and opened the floor for discussion of the proposed amendments

Cody Hinman, referring to proposition 4 of the amendments, asked for a reading of the present Article III, Sections 7 and 8, which was given. He then asked what the present manufacturer dues structure is; President Barrowman replied that no set dues structure currently exists.

Ron Wright questioned how voting by mail would be accomplished by family members, as permitted by amendment 7. Barrowman replied that although only one mailing label will be received by each family, voting ballots will be authenticated by the enclosure of a Xerox of the membership card.

Cody Hinman registered his opposition to amendment 4, the corporate graduated dues structure, stating that he believed it would give the larger manufacturers the upper hand in the Association through the prestige of becoming a patron member or sustaining member. Jay Apt stated that these new subclasses would not increase the influence of any manufacturer on the Association, Edna Hinman stated that she felt the NAR could be influenced by powerful manufacturers if any type of donations to the Association are allowed. Honorary Trustee Leslie Butterworth recalled that the NAR has never been an affluent organization, that we have always relied on the generosity of the manufacturers to some degree, and that this amendment would make it easier for a manufacturer to donate what he feels he should to the NAR. Walt West noted that the amendment follows a well-established formula that has been used by many other organizations. Cody Hinman said that he would prefer a uniform collection from all manufacturers.

Judy Barrowman turned the discussion to proposed amendment 5, the modified procedure for censure, suspension, or expulsion of a member. She asked whether it was possible in all cases to select hearing panel members from the accused member's region. By-Laws Revision Committee Chairman and Trustee Manning Butterworth said that the new procedure did not require this type of panel; however it opens this option, which is not available in all cases under

the present By-Laws. Darrell Bradburn said that the 1 year allowed between the appointment of the hearing panel by the President and the time of the hearing was unnecessarily long. William M. Simon noted that the procedure needed a safeguard: that all actions taken must be promptly reported to the membership. Norm Wood questioned the advisability of suspending the member prior to the hearing. Jan Blickenstaff commented that the procedure as outlined in the amendment will operationally be much faster than the present procedure, which requires the convening of the full Board of Trustees. Walt West said that this procedure would not be used for minor infractions, or personal grievances of one member, since the President may simply refuse to appoint a hearing panel if he feels the infraction is not a serious one. Barrowman commented that only one NAR member had ever been expelled under this clause.

Norm Wood asked when amendment 11, which provides that at least one member from each of the six NAR geographical regions shall be on the Board of Trustees, would go into effect if passed. Barrowman replied that its effective date is January 1, 1973, so that it would apply to the Trustee elections scheduled for next year. Edna Hinman said that this amendment would destroy the one-man-one-vote election system in the NAR. Manning Butterworth replied that it affects only 6 members of the 13-member Board of Trustees, and that it provides insurance of adequate representation on the Board for all regions.

Norm Wood asked what the input to the By-Laws Revision Committee had been on the question of the full Junior members' vote. Manning Butterworth said that the Committee had received no responses from Junior members to the several requests for inputs on this question made in the *Model Rocketeer*, and that the response received from Leader and Senior members was negative. Apt noted that if amendment 22 passed, Junior members would be enfranchised to yote for the LAC.

Ron Wright asked what the rationale for combining the two-year LAC term and the Junior member vote for LAC in the same amendment was. Manning Butterworth replied that this was not deliberate.

Cody Hinman asked what the intent of amendment 9 was; Apt replied that it would provide for annual business meetings of the Association, rather than for the present triennial meetings.

William M. Simon asked why the proposed 2-year terms for the LAC had not been staggered. Butterworth answered that since the LAC is responsible for the election of its successors, and that since in the past this has taken a good deal of time, it was felt that biennial elections would allow more LAC effort to be utilized constructively.

August 7, 1972

President Barrowman asked if there was any further discussion of the proposed amendments, or objections to a vote. Seeing none, he called for the distribution of ballots, and for the presentation and certification of the ballots received by mail.

The Secretary entered into the record his regret that through the fault of the publisher of the *Model Rocketeer* the issue containing the By-Laws ballot had been mailed several weeks later than the contract date of July 1, 1972.

The Secretary reported that thirteen valid ballots had been received by mail, and that 27 ballots had been cast at this meeting. The vote in favor of each of the proposed amendments was:

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Since a 2/3 majority vote is required for amending the By-Laws or a vote of 27 in favor with 40 ballots cast, the Secretary declared that all proposed amendments had been ratified.

At 10:15 PM Elaine Sadowski moved for adjournment, with Walt West seconding. Passed unanimously.

Respectfully submitted, Jay Apt Secretary CANADA — Toronto, Ontario
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ONTEST alendar

The following are contests that have been sanctioned by the National Association of Rocketry: Points earned at these contests are credited toward national standings.

September 23, 1972—Commack, Long Island, New York. Name: PSAM 1. Host: Phoenix Model Rocket Section. Events: Scale, Hawk Boost/Glide, Hornet Boost/Glide, Swift Rocket Glider, Sparrow Rocket Glider, Class 2 Streamer Duration. Contact: Fred Kushner, 8015 Bay Parkway, Brooklyn, New York 11214. Phone (212) 837-3629.

September 24, 1972—Webster, New York. Name: MARS R.T.-II '72. Host: Monroe Astronautical Rocket Society, Section 136. Events: Class 00-Class 4 Altitude, Pee Wee Open Payload, Hornet-Condor Boost/Glide, Eggloft-Robin-Roc, Drag Efficiency, Class 0-Class 3 Streamer Duration, Class 0-Class 3 Parachute Duration, Hornet-Condor Rocket Glider, Design Efficiency. Contact: Michael G. Howell, 244 Inspiration Pt. Road, Webster, N.Y. 14580. Phone (716) 671-7012.

October 8, 1972-Mendon, Massachusetts. Name: NERFAM-3. Host: The New England Rocketry Federation 236. Events: Eagle Rocket Glider, Sparrow Boost/Glide, Hornet Rocket Glider, Condor Boost/Glide, Scale. Contact: Patrick M. Griffith, Legion Street, Milford, Massachusetts 01757. Phone 473-7654.

October 8, 1972-Mountainside, New Jersey. Name: TRAM ROC II. Host: Trailside Model Rocket Club - 300. Events: Sparrow Boost/Glide, Streamer Duration Class 1, Design Efficiency Class 1, Robin Eggloft, Parachute Duration Class 0. Contact: Mark S. Beam, 501 Erico Avenue, Elizabeth, N.J. 07202. Phone 353-5391.

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 O Parachute Duration, Scale, Robin Egg Lofting, Hawk Boost Glide, Class I Streamer Duration. Contact: Howard Galloway, 428 Ben Oaks Drive, West, Severna Park, Maryland 21146. Telephone: (301) 987-4395.

November 4, 1972—Brooklyn, N.Y. Name: NETS-3. Host: Pascack Valley Section. Events: Demonstration launch; R&D report presentations; discussion groups on scale, plastic modeling, rocket photography, building and finishing with uses of common and uncommon materials. Box lunch included. Contact: John Cope, 251 75th Street, Brooklyn, N.Y. 11209.

November 4-5, 1972-Camp A.P. Hill, Virginia (tentative site). Name: The First Annual Blue/ Gray Regional, Host: Virginia NAR Sections. Events (Battles): Bull Run-Class II Streamer Duration, Cold Harbour-Class I Parachute Duration; Chancellorsville-Pee Wee Payload, Gettysburg-Robin Eggloft, Manassas-Predicted Altitude, Seven Days Battle-Swift Rocket Glider, Shiloh-Hawk Rocket Glider, Lookout Mountain-Sparrow Boost/Glide, Battle of Vicksburg-Hawk Boost/Glide. All sections will compete either for the North or South. An entry fee of \$5.00 covers all events entered. A non-contestant fee of \$1.00 is required for those who wish to be given contest packs, results, etc. The emphasis will be on fun as well as sport So y'all come, ya hear??? Contact: Roland Gabeler, 5105 W. Franklin St., Richmond, Va. 23226, (703) 285-3511 (No collect calls . . . ya hear?) P.S. Y'all Yankees come on down and the Rebels gunna whoop y'all soooooo bad!!! We dare you to show! Win trophies, ribbons, and a war-all in one week-

Date To Be Announced—Highland Park, Illinois. Name: ERT2, Evanston-Tiros Regional. Events: Hornet Boost Glide, Condor Boost Glide, Eagle Rocket Glider, Design Efficiency, Class II Streamer Duration, Class 0 Parachute Duration, Pee Wee Payload, Robin Eggloft, Research and Development. Contact: Bob Finch, 415 Lambert Tree, Highland Park, Illinois. Phone (312) 432-8986.

The following are contests that have not been sanctioned and no points are earned at these contests.

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 Streamer Duration. Contact: Doug Cook, 152 Marshall Crescent, Winnipeg, Manitoba, Canada, R3T OR7.

CONVENTIONS, EXHIBITIONS, SEMINARS

October 19-22, 1972—Detroit, Michigan. Detroit Hilton. International Star Trek Convention. Contact: Mr. Al Schuster, Box 95, Old Chelsea Station, New York, N.Y.

Washington's Birthday weekend 1973-New York; New York Star Trek Convention, Commodore Hotel. Contact: Mr. Al Schuster, Box 95, Old Chelsea Station, New York, N.Y.

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TO: NAR

nar news

ADDITION TO THE LIST OF RECORDS

The NAR Records Subcommittee has announced that the following records have been accepted:

Sparrow Boost/Glide-B Division: John Kennedy, 7 May 1972, 25 seconds; D Division: G. Harry Stine, 7 May 1972, 53 seconds.

RECORD FILING FEE CUT

As of the first of July, 1972, the cost of filing for a U.S. record has been lowered from \$5.00 to \$3.00.

NAR HAS SKYLAB STUDENT PROJECT WINNER

Robert Staehle (NAR #10493, JR) of Rochester, New York, was among the 25 winners of the NASA/NSTA Skylab Student Project competition. The project, entitled, "Behavior of Bacteria and Bacterial Spores in the Skylab and the Space Environment", will be aboard the first Skylab mission, to be flown in spring, 1973.

RECORD ATTEMPTS

The following are record attempts; they are not yet records:

Class O Altitude—C Division: Michael Lenhard, 15 July 1972, 373 meters; D Division: Joe Quigley, 15 July 1972, 281 meters; Robin Egg Lofting—C Division: Gary Cole, 15 July 1972, 338 meters; Class O Parachute Duration—C Division: Michael Lenhard, 16 July 1972, 339 seconds; Class I Streamer Duration—D Division: George Meese, Sr., 15 July 1972, 85 seconds; Swift Boost/Glide—A Division: J. Tom Joines, 16 July 1972, 81 seconds; Eagle Rocket Glider—A Division: Michael Joines, 16 July 1972, 62 seconds; D Division: Bill Kenny, 15 July 1972, 111.5 seconds.

PROCEDURE FOR FILING US AND FAI RECORDS

by Howard Galloway
NAR Records Subcommittee Chairman

The NAR Records Subcommittee wants to make sure that all members know the procedure to be followed when filing for records. This procedure is broken down into steps below. Members of the Records Subcommittee include Howard Galloway (Chairman), Kerry and Diane Severn, Allen Gardenghi, and Dottie Galloway.

1) Contestant or local Contest Director calls in record to Subcommittee Chairman (within 3 days for USA).

 Verification form is filled out by Subcommittee per phone call and typed in quadruplicate.

3) Verification forms are mailed to aspirant, Regional Contest Board Chairman, Model Rocketeer editor, and A.M.A. (for FAI only).

4) Color coded (same as Division color) 3 x 5 card is made up and put in file.

5) Procedure for filing records, 3 documents (duration or altitude) and letter clarifying procedures are mailed to the aspirant with the verification form.

 Fee should be mailed immediately to Subcommittee. Fees are \$3.00 per US record.

7) Hopefully, the aspirant will get 3 photographs, 3 plans, and 3 sets of signed documents to Subcommittee before the 60-day deadline, to give the committee an opportunity to check and send back the information to the aspirant for corrections or clarification, if this be necessary.

8) Regional CB Chairman (meanwhile, having received the results from the CD) sends the event card and entry blank to the Subcommittee. These documents should be clearly marked RECORD ATTEMPT by the local CD.

9) Photographs and plans are measured and checked for accuracy by a member of the Subcommittee. If not accurate, plans and/or photos are returned to the aspirant for further clarification. If accurate, 3 dossiers of 1 photo, 1 plan, and 1 document are made up. One is mailed to the *Model Rocketeer* editor and one to the Contest Board. One dossier is maintained in the Subcommittee file.

10) The 3×5 card is noted when the record is accepted. The card file is maintained for easy reference in checking for records.

11) A certificate of record is then sent to the record holder.

SPECIAL INFORMATION FOR FILING FAIRECORDS

The procedure for filing US records should be followed except for the following:

1) Subcommittee must be notified as soon as possible of an FAI record attempt because a cablegram through the Subcommittee must reach Paris within 48 hours.

2) FAI fees are \$25.00 for people 21 and over; \$5.00 for people under 21. Fees are due immediately. Once the record has been called in, there's no turning off of the fee.

3) A total of 6 documents, 6 photographs, and 6 plans are required when filing for both US and FAI (3 each).

4) The dossier for FAI should be in to the Subcommittee within 30 days to allow for the Subcommitte check, AMA check, and forwarding to Paris (all of which must be done within 60 days of the record attempt).

There is no time extension for FAI records. The NAR Subcommittee has no control over these regulations.

Howard L. Galloway, Ig., an Aerospace Physicist, is staff engineer in the Applications Technology Satellite Ground Support Section at the Goddard Space Flight Center. In addition to Howard's work with the Star Spangled Banner Section (he and his wife Dottie are advisors to the group), the Records Subcommittee, and the Board of Trustees, he is active in German Shephard clubs, teaches ceramics classes, is a member of the Goddard Amateur Radio Club, electurer, and an acolyte "mother" at church. He has won awards too numerous to mention for his contributions to education and for his outstanding service.

THOMPSON RESIGNS

Bryant Thompson has resigned as U.S. Team Manager for the World Space Model Championships. Mr. Thompson said that the team's current lack of funds dictated that he resign to open a space to a team member of the NAA plane flying to Europe. This unselfish move underscores Mr. Thompson's interest in the team's welfare.

Jim Kukowski has been appointed to replace Mr. Thompson as Team Manager. Mr. Kukowski will retain his duties as team travel manager and will be traveling with the U.S. observers' tour at no cost to the team.

NEWS FROM CANADA

The Toronto Regional Rocket Meet, held on June 17 and 18, was a huge success. Hillel Diamond, of the Canadian Assn. of Rocketry, reports that 10 contestants from the United States and 30 from Canada were registered, and about 200 spectators were present. In addition to the competition events (Class A Parachute Duration, Class B Streamer Duration, Swift Boost/Glide, Hawk Boost/Glide, Spot Landing, Egg Lofting, R&D, and Scale), there were demonstration launches. Mr. Diamond, who was Contest Chairman, estimated that well over 350 rockets were launched.

Mr. Norm Watson, Assistant to the Mayor of Toronto, the Honorable Robert Stanbury, Federal Minister of Communications, and Mr. Faubert of Ottawa launched the F 100 powered transmitter that opened the meet. The rocket also carried First Flight Rocket Covers with the Canadian Alouette II stamp. A very limited number of these covers are available to rocket philatelists.

The 1972 Diamond Rocketry Trophy was awarded to Fritz Gnass, a Senior rocketeer who won a total of 228 points at the meet. In the Intermediate Division, first place went to 14-year-old Jack Freimanis (216 points) followed by Neil Fairbairn (176 points).

Robert Staehle of Rochester, New York, gave a talk on his NASA/Skylab award. Other lectures and workshops were held on photography, electronics, computer programming, and other aspects of the hobby.

The first place winners in each event (with the exception of Egg Lofting—no tracks closed) are listed below with the Intermediate Division winner's name first: Parachute Duration: Glenn McGall (3:38), Don McDougall (5:35); Streamer Duration: Jack Freimanis (1:09), Saverino Prato (1:26); Swift B/G: Robert Staehle (2:05), Saverino Prato (1:08); Hawk B/G: Jack Freimanis (1:30), Fritz Gnass (2:10); Spot Landing: Jack Freimanis (13'5"), Norman Fairbairn (113'0"); R&D: Neil Fairbairn, Gary Dale; Scale: Jack Freimanis, Peter Cook.



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Leroy Piester

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*If you were at NARAM-14, you know what we mean. Incidently . . . at NARAM-14 an Enerjet Nike Ram using a factory production Enerjet motor exceeded the World Open Payload record by 1000 feet! Records are also pending in the Condor Boost Glide (Pterodactyl) and rocket Egg Loft (Egg Crate).



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