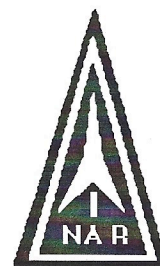


Newsletter of the Huntsville Area Rocketry Association

MAX-Q

Vol. 2 No. 2 February/March 1988



1987 Section Reserve National Champions

ARMY BUMPS EXPLORER LAUNCH



In a speech to the reunion of the Explorer 1 team, Retired General Medaris talked so long that he forced the cancellation of the HARA commemorative launch intended to honor the team and the thirtieth anniversary of America's first satellite. The launch window closed on George Gassaway's G powered Juno-1 when the mist turned to rain an hour after the scheduled firing time.

HARA members were disappointed by the circumstances after a week of climatic preparation and testing for a single critical launch. But the twenty modelers were honored to attend the ceremony with some of history's most famous rocket scientists. The idea to celebrate the thirtieth Explorer-1 anniversary came to HARA early in 1987. It so happened George was gathering scale data on the Juno-1 at the time. At a July contest George revealed an E powered model that encouraged the project. With the anniversary in mind, he scaled up to a G model that was flown at the Rocket City Classic last October. (see Max-Q Vol 1, No 6)

With this design in hand, Vince Huegele approached the Space and Rocket Center with an offer to launch on January 31, 1988. SARC was very interested and met with Vince and Matt Steele in early December. Initially SARC suggested a reception and night launch at exactly thirty years to the minute, but reconsidered. It might be inappropriate to expect elderly Germans to step outside on a January night to watch a model rocket flight at 9:48 pm (particularly on Super Bowl day.) The plan was finalized to be a 12:30 lunch and a 2:00 launch.

Matt had intended to build several copies of George's large model and fly one, but as the day approached, complications arose. SARC wanted a dress rehearsal of the launch operations. Matt had a rough boilerplate version available so that was selected for the test. SARC also wanted to use the Space Camp launch system which was unfamiliar to the launch crew.

HARA arrived that Saturday afternoon at the SARC launch site following a morning building session. (see other story) Jimmy Williams erected the modified launcher while Ed Stluka and the McCains covered the area on ham radios. The launcher was placed in the middle of the rocket park with all the display vehicles standing watch. Matt and Wayne Hendricks prepped the model. The wind was blowing in a good direction and the weather was otherwise mild for January.

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- Inertial Guidance Testbed for Model/Experimental Rocketry
- Countdown: 1988 Contest Schedule and Events
- NARAM-30 information
- March Spring Fling Contest Results

and much more!!!

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Wadding Scraps

Meeting Notes

Meetings in the Space and Rocket Center are held back in the cafeteria area. They start at 7:30 so if you're late you have to smile at the guard and explain who you are. Please try to be on time so we can expedite the business.

Dues Reform

At the February meeting, HARA voted to amend the dues collection procedure. Effective now, all members' dues are due at the first of the year. Whatever dues paid last year will be applied toward part of this year so you just pay the difference to even up everyone. Treasurer Wayne Crocodile Hendricks will tell you what you owe and take your money. In the long run, this will be a better policy than the previous "subscription" type where you have to remember when you joined.

Decatur Demo Planned

The committee for the Alabama Jubilee has requested HARA to stage a launch for them at Point Mallard on Memorial Day weekend. The Alabama Jubilee is an annual holiday celebration with hot air balloon races, craft shows, and other activities. After the balloons take off Saturday morning, May 28, HARA will present an hour long program of rocketry beginning at 10:00am. We also will set up a display similar to the booth at the MSFC picnic to educate the world about model rocketry. All HARA members are encouraged to come and bring your best models for the show.

MAX-Q Staff

Editor:	Vince Huegele
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From the President's Pad

When you join the NAR, the first thing you find out is that it seems there's no such thing as just shooting rockets. When you go to fly, you are flying in either a 'contest', a 'demonstration', or a 'sport' launch. Any rocket taking off seems to be required to have a purpose or identity to fit into one of these categories. Some overly serious modelers would even diminish sport flying in saying such things as "it didn't get a qualified flight, but I flew it again as a demo," as if sport flying didn't accomplish anything. It is reported the Europeans are the worst about this in that they have only 'practice' and 'contest' flying, like they don't fly for fun.

What kind of flying a modeler does depends on what kind of modeler he is. The competitive person will be attracted to the contests to find out how good he is or can be. Someone with exhibitionist traits will want to entertain and inform spectators at demo launches. And the laid back modeler is at ease to fly whatever he's got for the fun or sport of it. In reality, rocketeers have a little of all of these characteristics.

The point here is not to try to find your category or suggest one is better than the other. The point is to get out and fly rockets! With all the contests scheduled this year and last, it may look like HARA exists just to score points for the twenty members that are competitive flyers. There's more to the club than that. We want to accommodate the interests of all members so everyone can get the maximum enjoyment from the hobby.

When you see the launches on our calendar designated as contest, sport or demo, think of them as a club launch for everyone. The range is set up every month, so bring out your rockets and let's fly! You don't have to fly for points if a contest is in progress, just fly. Being in NAR and HARA is to enhance the art and science of model rocketry, not complicate it.

Vince Huegele

HARA T-Shirts

A second order of club T-shirts has come in. A good selection of sizes is available now, so call the McCains at 536-2241 to place your order.

Special thanks to Pat Saucier and Dave Dooling of the Alabama Space and Rocket Center for providing a meeting place for our monthly meetings. We are the envy of clubs everywhere!

"Army" cont. from pg 1

When all was ready the button was pushed. The G motor ignited and hissed with the characteristic composite sound. But it didn't move. Something was wrong. Finally the rocket limped off the pad to an unsatisfactory altitude, and the ejection charge went off much too late. SARC officials were HARAFied.

"The engine ignited at the wrong end of the core," the Steele Commission declared. "The thrust curve did not build up correctly so the energy was not applied to driving the rocket." The model was still flyable so a second attempt was made with another engine.

Several more countdowns revealed other glitches in the firing system. Eventually Matt carefully sheathed the internal leads of the igniter that extend inside the motor core. This time it worked. The G lit up and roared above the exhibit area. The wind vector was good and the model missed the trees and returned to the launch site. Not only did it come back conveniently but landed by the LM on the simulated lunar surface. Therefore HARA claims to be the first to land a model rocket on the moon. Although now successful, the engine malfunction had everyone unsettled. What if this happened Sunday with hundreds of people, reporters, and cameras watching? Would Huntsville be blamed for this failure, too? Would we lose space station funding? At least we hadn't lost the will to fly. "But do you ever know until you push the button?" said Vince. "Besides, if it always works the first time, nobody appreciates how difficult it is."



Matt hooks up the 'G' motor to the boilerplate Juno-1 model. The jet deflector in this launcher belonging to Jimmy Williams is from a military rocket nozzle.

HARA's Juno-1 takes off between a Juno II and a Mercury Redstone on display at SARC (below) photos courtesy Vince Huegele



Super Sunday arrived with low clouds and rain forecast. George and Randy Kelling came up from Birmingham bringing the original Juno-1 model, now the prime flight vehicle. Following lunch, the reenactment firing crew adjourned from the assembly to prep the rocket while the speeches were made. The reunion of the Explorer 1 team was an historic moment itself and "worth the price of admission," according to Matt, to be in the same room with all those original rocketeers. Actual footage of preparation and launch of the missile was shown on a big screen TV. Beside the TV at the front of the dining hall was the firing panel used for the mainstage ignition. At one time the controls were part of the SARC exhibits where visitors could 'push the button that launched Explorer 1', but the panel stays in storage now.

The video showed an interesting fact about the launch and countdowns in early rocketry. Explorer 1 did not launch at T 0:00. Rather at 0:00 the terminal firing sequence began of : pressurization, turbopump start, valve release, ignition, etc. Not until T+:13 does the liftoff really occur. Although the firing panel was present, the person who pushed the switch is not clearly identified.

More important than that booster firing technician was the finger of Erst Stuhlinger, the first speaker of the day. Stuhlinger was the scientist responsible for

Recovery crew David & Mark Atkinson, John McCain and Ed Stuka mark the lunar landing on the LM's pad.



the critical fourth stage ignition. With only a slide rule and stopwatch, (because computers hadn't been invented in 1958) he had to push the button at exactly the right moment the satellite was at the proper attitude to stage it into orbit. "It was exciting," he said. The reunion committee had considered letting Stuhlinger's finger push the original firing switch to launch HARA's Juno, but that would have been too much.

The program was already behind schedule when General John Medaris stood. A few drops of rain were falling but not enough to deter spectators if we launched soon, we thought. The retired general was now a priest, and the Reverend General gave us a Sunday sermon of war stories. He told about the political climate then and how Von Braun called him 'Boss', and that Medaris boss was God. He said during the Explorer 1 countdown at T-08 seconds a signal indicated a fault in the fin unit. He gave the go for launch and later found out the signal was false. Medaris was most happy when he heard "Goldstone has the bird" meaning the satellite had achieved orbit. These comments were fascinating but delaying. Wayne McCain said "I had heard Medaris before and expected this." It was impressive to see a man in his mid eighties be so full of breath.

Yet his strongest statements were directed at SARC, his hosts. "Nowhere in this museum," the general

said, "does the Army get any credit for the Explorer-1 launch. It suggests NASA did it and NASA didn't even exist then. It was the Army Ballistic Missile Agency (ABMA) that I commanded that did it." The ABMA formed the nucleus of MSFC when NASA was formed.

Ed Buckbee, the SARC director and M.C. had the last word after Medaris quit. "General, you have talked us through the launch window and into the rain. We'll have to cancel the commemorative launch."

Well, that was that. A steady drizzle was soaking the launcher outside although the panel was covered. With umbrellas, the disappointed flight crew collected the equipment. The rocket was fully prepped but had remained in Crocodile's range car. Maybe it would see better days.

As the old and new rocketeers left the ceremony, no one would ever know if the reenactment model would have worked or not. "We may have been saved," said Wayne McCain. "What if it had crashed?" said Wayne Hendricks. "I built it to fly as a demo," said George Gassaway. "I'm tired. Let's watch the game," said Matt Steele. Whether the Juno would have soared like the Washington Redskins or crashed like the Denver Broncos, HARA's hopes to honor this group of rocket heroes were encroached by its leader trying to get more recognition.



No problem! says Wayne McCain examining the model tail after flight.

March Spring Fling Results

Name Performance Points

PREDICTED DURATION

A Division

1) David Atkinson	(55/55) 0%	100
2) Matt Sias	(32/45) 40.6%	60
3) Colin Reasoner	(55/30) 45.5%	40
4) Derek Nolin	(20/34) 70%	20
Q) Mark Atkinson	(36/90) 250%	10

B Division

1) Marty Williams	(38/41) 7.9%	100
2) Jason Haynes	(51/30) 41.4%	60
3) Kathy Kmetz	(23/35) 52.2%	40

C Division

1) Jimmy Williams	(35/35) 0%	100
2) Wayne Hendricks	(49/48) 2%	60
3) Zunofark Team	(31/32) 3.2%	40
4) Randy & Robyn Team	(37/34) 8.1%	20
Q) Vince Huegele	(57/46) 19.3%	10
Q) Wayne McCain	(25/30) 20%	10
Q) Rob Demopoulos	(46/75) 62.6%	10
Q) John Kmetz, Sr.	(6/53) 883%	10

A HELICOPTER

A Division

1) David Atkinson	106 (49/57)	180
No other qualified, returned flights		

B Division

1) Kathy Kmetz	99 (51/48)	180
2) Lee Olyniec	83 (23/60)	108
3) Marty Williams	44 (19/25)	72

C Division

1) Wayne Hendricks	158 (78/80)	180
2) Zunofark Team	138 (71/67)	108
3) Jimmy Williams	68 (68)	72
4) Randy & Robyn Team	55 (55)	36
Q) John Kmetz, Sr.	41 (41/DQ)	18
Q) Rob Demopoulos	19 (19)	18

A INT BG

A Division

1) Matt Sias	65 (65)	240
No other qualified flights		

B Division

1) Marty Williams	145 (87/59)	240
2) Lee Olyniec	42 (42)	144
3) Kathy Kmetz	40 (DQ/40)	96
4) Jason Haynes	93 (61/32)	48

D INT BG

C Division

1) Zunofark Team	507 (237/MAX)	280
2) Wayne Hendricks	118 (44/74)	168
3) Jimmy Williams	86 (86/DQ)	112
4) John Kmetz, Sr.	74 (37/37)	56
Q) Rob Demopoulos	43 (19/24)	28
Q) David Babulski	33 (33)	28

1/2A INT BG

A Division

No qualified flights

B Division

1) Marty Williams	48 (23/25)	240
2) Lee Olyniec	44 (32/12)	144
No other qualified flights		

C Division

1) Zunofark Team	180 (MAX/MAX)	240
2) Wayne Hendricks	176 (MAX/86)	144
3) Rob Demopoulos	90 (1MAX/DQ)	96
4) Jimmy Williams	41 (22/19)	48
Q) Randy & Robyn Team	27 (27)	24
Q) John Kmetz, Sr.	26 (26/DQ)	24
Q) Vince Huegele	26 (26)	24

B SD

A Division

1) Colin Reasoner	131 (66/65)	120
2) Mark Atkinson	85 (27/58)	72
3) David Atkinson	35 (35)	48
4) Matt Sias	26 (DQ/26)	24
Q) Derek Nolin	25 (25)	12

B Division

1) Marty Williams	110 (35/75)	120
2) Jason Haynes	76 (30/46)	72
3) Lee Olyniec	62 (62)	48
4) Kathy Kmetz	43 (DQ/43)	

C Division

1) Rob Demopoulos	132 (60/72)	120
2) Zunofark Team	118 (93/25)	72
3) John Kmetz, Sr.	112 (64/48)	48
4) Wayne Hendricks	74 (74/LT)	24
No other qualified, returned flights		

SPORT SCALE

A Division

1) Matt Sias (Nike-Apache)	660	220
2) Colin Reasoner (Nike-Apache) 600	132	

B Division

1) Marty Williams (Nike Apache) 730	220	
2) Kathy Kmetz (Bullpup)	675	132
3) Lee Olyniec (Black Brant II)	650	88
4) Jason Haynes (D Region Hawk) 620	44	

C Division

1) Zunofark Team (Juno-1)	970	220
2) Wayne Hendricks (Honest John) 925	132	
3) Randy & Robyn Team (Asp)	855	88
4) Vince Huegele (V-2)	720	44
DQ Jimmy Williams (Santa Maria)	No Return	
DQ John Kmetz, Sr. (Black Brant II)	No Return	

POINT TOTALS:

A Division

1) Matt Sias (HARA)	544
2) David Atkinson (HARA)	328
3) Colin Reasoner (HARA)	292
4) Mark Atkinson (IND)	82
5) Derek Nolin (IND)	32

B Division

1) Marty Williams (HARA)	992
2) Lee Olyniec (HARA)	532
3) Kathy Kmetz (HARA)	472
4) Jason Haynes (HARA)	176

C Division

1) Zunofark Tm	960
2) Wayne Hendricks	708
3) Jimmy Williams	332
4) Rob Demopoulos	272
5) Randy & Robyn Team	168
6) John Kmetz, Sr.	156
7) Vince Huegele	78
8) Dave Babulski	28
9) Wayne McCain	10

1) HARA

5738

Club Point Leaders 1987-88 Season

A Division

1) Matt Sias *3	2256
2) Colin Reasoner	1072
3) John Anglin	436
4) John McCain	360
5) John Kmetz, Jr.	330
6) David Atkinson	328
7) Scott McCain	148
8) Mark Atkinson	82
9) Derek Nolin	32

B Division

1) Marty Williams *1	3634
2) Lee Olyniec *2	2424
3) Kathy Kmetz *5	1100
4) Jason Haynes *4	898

C Division

1) Wayne Hendricks *2	2794
2) Vince Huegele	1028
3) John Kmetz	862
4) Jimmy Williams	596
5) Dana McCain	280
6) Wayne McCain	278

Teams

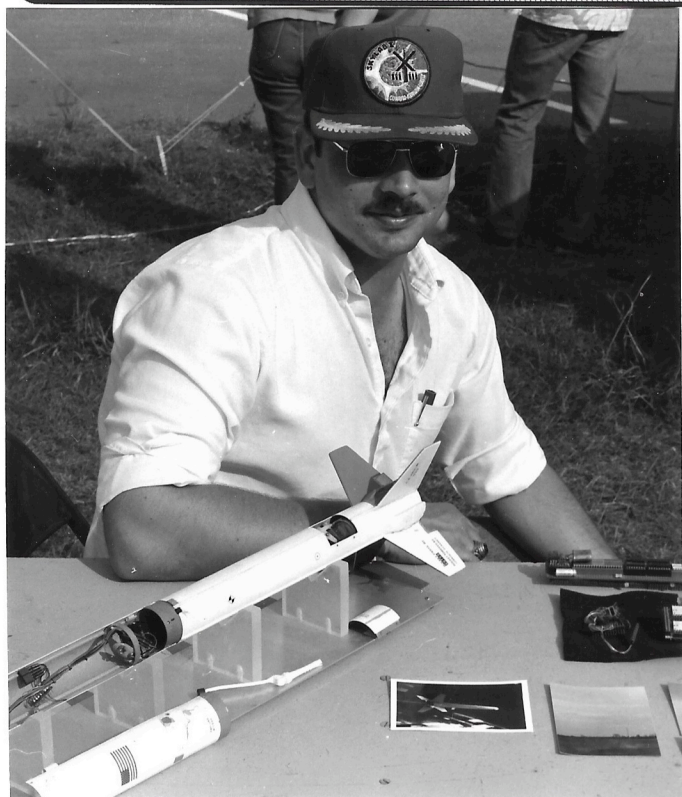
1) Zunofark Tm *2	3522
2) Randy & Robyn Tm	168

Sections

1) HARA *1	22,156
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* Denotes National Point Standings as of 3-15-88

An Inertial Guidance Testbed for Model/Experimental Rocketry



Author shown with computer roll controlled model rocket displayed at Rocket City Classic #5

[Ed. Note: High powered rocketry has expanded the capability of model applications. HARA member Chuck Hall reports here his work on an onboard guidance computer. This abstract is a summary of his doctoral dissertation published for his Phd.

For more information, write Dr. Charles E. Hall, Jr., 3120 Andros Dr., Huntsville, AL 35805. We may get Chuck to give us a demonstration at NARAM-30!]

Abstract

Inertial guidance systems are no longer relegated to the realm of professional rocketry, as these systems are now in use in model rockets. This paper presents a low cost inertial guidance system for use in model and experimental rocketry. These rocket systems can be designed, developed and flown by either a motivated student or a team of aerospace and electrical engineering students. These projects teach valuable engineering principles to the students as they work from concept formulation to postflight analysis.

The design constraints of model rocketry, in particular the gross lift-off mass of less than 454 grams, place numerous demands on the engineering of the rocket sys-

tem. These rockets are constructed with paper, wood and plastic without any metal as structural parts. The engines are commercially made, with particular interest in safety and quality. Experimental rockets are constructed with the same techniques as model rockets, but the gross launch mass must be less than 1.5 Kg and the total impulse of the engines are limited to 320 N-s. Following these and some other common sense rules allows for safe rocket flights. In addition, the material and size limitations keep the cost of the rockets low and allow for easy handling. These rockets contain a recovery system to return the rocket safely to the ground and thus they are capable of reuse.

An inertial roll attitude control system has been built and successfully flown, with the gross launch mass of 433 grams. The control system consisted of a gyro sensor, a microprocessor, and a servo actuator. The gyro was a small electric motor, spinning a disk, which was mounted in a double-gimbled frame. Roll orientation data was obtained via two IR diode/transistor pairs using shaft encoding. The raw data was translated into an eight bit, signed integer number by the gyro interface electronics. The onboard microcomputer system then read the roll orientation number and performed the calculations required to determine the control flap setting. The onboard computer consisted of an eight bit, CMOS microprocessor, with 4 KB of ROM, 2 KB of RAM, eight bit input and output ports and a real time clock. The rocket flight status was inputted through three external flags. An eight bit number was supplied to the servo interface electronics, which fed a corresponding time pulse to the servo. The servo controlled flaps, located on two of the four stabilization fins at the base of the rocket, which produced a torque about the longitudinal axis of the rocket. The microprocessor was programmed with a position and rate feedback controller, and a table of a desired orientation. The roll maneuvers were selected to demonstrate positive control of the rocket's roll orientation. To insure that the system would perform as designed, numerous tests were performed. These tests ranged from servo performance measurements, to wind tunnel tests, for verification of design roll moment coefficients. The design, development and flight of this system resulted in the author being awarded a Master of Science degree in physics from Ohio State University.

Experimental rocketry combined with the unused computer time allows for an upgrade to a full inertial guidance system. The launch design study for this new rocket has been completed, with a launch mass of 1.2

Kg. Instead of using aerodynamic control surfaces, a freon-based gas thruster system was designed. Freon was chosen for safety in handling, storage and use. Liquid propellant, from the propellant tank, is gated to the the nozzles by a set of solenoid valves. Solenoid valves were chosen for simplicity and cost. There are six sets of thrusters, to create positive and negative moments for control of roll, pitch and yaw. Sensors for this system are three gyros, of the same design used in the inertial roll control system. The same onboard computer system is used. With the roll rate controlled to zero, there is no coupling between pitch and yaw, thus the control system for pitch and yaw is the same as that for roll but with different constants.

All of the components can be obtained from hobby shops and small electronics supply houses, thus the total costs of these inertially guided model/ experimental rockets are quite low. The available computer time during the flight can be used for other student experimentation such as optimal estimation, optimal control, or accelerometers can be installed in the system for additional control of the rocket. For a successful flight, the design, both hardware and software, must be thorough. This requires that the design must be well thought out, and the construction must be accurate. The programming needs the same rigor. The control algorithms need to be determined and simulators run. The individual components must be be integrated together, and components and assemblies must be tested to insure performance. The students take more away from working on these projects than can be taught in the classroom. The students must research, design, develop, test, discuss and think. During development of the inertial roll control system, unexpected test results were answered from papers on the Sparrow missile to the Saturn V rocket.

Control theory, in engineer curriculum, tends to be basic theory with lab applications confined to servo-mechanisms. These inertially guided rocket projects make exciting and challenging learning opportunities for the students. More than just the control system being developed is learned by the student.



Effects of Rocket Flight On Artemia Nyos (Brine Shrimp)

HARA member Scott McCain recently finished his rocket-related science project and took Grand Prize and First Place at the Monte Sano Elementary School competition. Scott wanted to combine his favorite hobby (model rocketry, of course!) with meaningful biological research. Brine shrimp (*Artemia Nyos*) eggs were divided into two groups, one control, one experimental. The experimental group was launched by the McCain D12-5 powered "Ranger Payload Rocket". Approximately 5.5 G's and a 30 second flight resulted. Scott then placed both groups of eggs, each in it's own separate tank, to "hatch" and begin their life cycle. After several days, it was obvious that the experimental group had suffered.

"The group that flew developed more slowly and in fewer numbers", Scott said. He examined the two groups under 10X and 20X magnification and seemed to detect minor differences in the experimental group. After about three weeks, a noticeable lag in the number of experimental group was apparent.

"I hope to continue my research next year", remarked Scott. "This has been great fun!"



Scott proudly shows off his First Place ribbon and rocket at his display at the Monte Sano Science competition. (photo Wayne McCain)

Trajectories

• HARA would like to welcome Cody David Steele (below) who arrived February 25, 1988, to proud parents Matt and Robyn. The "Babe of Steele" is already scoring points by dethermalizing the stork to come in right on his due date (predicted duration or spot landing ?) He is a scale model of Matt, without the beard and glasses. What do the cats think about all this?

• The McCains are still expecting their stork delivery in June. They're hoping for a girl.

(This definitely puts the pressure on Vince and Sharal Huegele now to start their own scale model!)

• Wayne Hendricks is hoping for a girl, too.

• John Kmetz Sr. was seen leaving WalMart with modeling clay. He said it was for glider ballast but who knows.

• Colin Reasoner has just completed a successful season in school wrestling.

• From Scottsboro, Lee Olyniec has been awarded a four year AFROTC scholarship to Texas A&M. He will be leaving right after NARAM-30 to start classes. Is this what model rocketry does for people?

• Richard Chambers of RC's hobbies has joined HARA. Remember he gives a 20% discount to club members. That should go a long way on the new Ener-tech products RC's will be stocking.

• Besides flying rockets, Marty Williams plays in a country music band. Look out Hank !!!

• HARA member Ed Stluka was also on the Explorer 1 team. His group tracked the satellite's radio signals as it orbited thirty years ago.

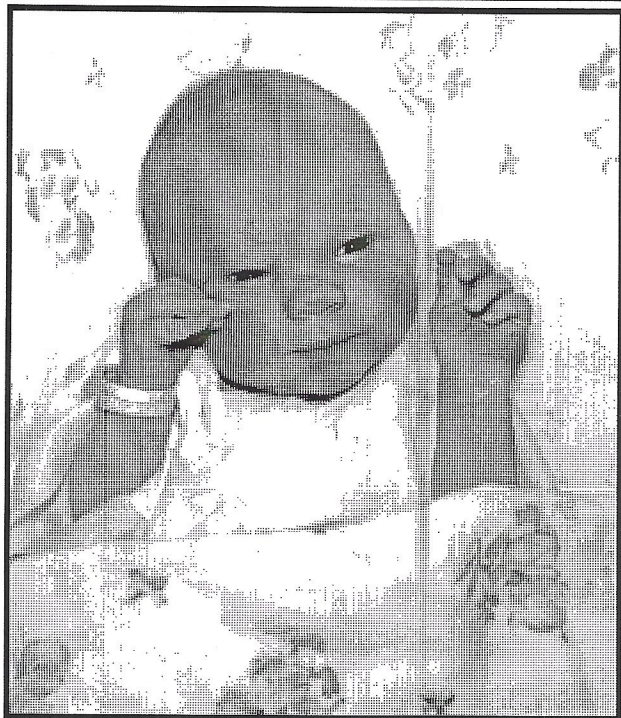


Scott McCain and Colin Reasoner assemble their helicopter rockets.

Building Session Draws Twelve

About a dozen club members assembled Saturday January 30, at the Williams' house/shop/lab for HARA's first ever building session. The model chosen to construct was a George Gassaway RotaRoc helicopter bird. Matt Steele distributed the parts, plans and directions for this ambitious group project. He collected \$4 apiece for the ten "kits" including the critical hinges to connect the rotor blades to the tube. He also supplied glue and a hinge jig and "broke even," he said. Few attendees had ever built a helicopter recovery rocket before, except maybe a Gyroc, so the instruction and examples were essential in learning what's going on. No plans, diagrams or notes could ever be as effective as being walked through the step-by-step process of assembly. Besides verifying each model at each step, Matt was able to answer questions on the spot so that everyone could finish their rocket at the end of the three hour session. "There's no way we could have otherwise built a model this complex so quickly and correctly except as a group," said Vince Huegele. "For Matt's one lecture, now twelve people are 'helicopter qualified.'"

The session wasn't all work, but was interrupted by lunch. Jimmy stirred up some excellent chili that kept everyone going through the afternoon. Modelers weren't able to test the copters that day (see cover story for the other activity) but would be ready when the weather was. Another session is tentatively planned in April. Suggested is a streamer model that can be built and flown the same day.



Countdown 1988 Calendar

MARCH:	17 Mar; Meeting 7:30 PM 19 Mar; Spring Fling II; NAR Open
APRIL:	21 Apr; Meeting 7:30 PM 23 Apr; Sports Launch
MAY:	19 May; Meeting 7:30 PM 21 May; Redstone-1; NAR Open 30 May; Alabama Jubilee Demo, Decatur
JUNE:	16 June; Meeting 7:30 PM 18 June; June Jam II; NAR Open
JULY:	16 July; NARAM SIM. Launch & Range simulation test 21 July; Meeting 7:30 PM
AUGUST:	8-12 August; NARAM-30 Huntsville, Alabama 18 Aug; Meeting 7:30 PM
SEPTEMBER:	15 Sept; Meeting 7:30 PM MSFC picnic demo- TBA
OCTOBER:	8 Oct; Rocket City Classic #7 20 Oct; Meeting 7:30 PM
NOVEMBER:	17 Nov; Meeting 7:30 PM 19 Nov; NAR Open

Meetings are held at the
Alabama Space & Rocket Center
Launches will be held at the Old Airport,
North end by the stadium

Please contact Vince Huegele, HARA President
(881-2904) or Matt Steele, Contest Director (883-6020)
if you have any questions about the schedule or the
contests. *Events subject to change*

"Official" Products of NARAM-30*

Skoal is the official snuff of NARAM-30
Redman is the official chewing tobacco
Rudy's Farm is the official sausage
Macintosh is the official computer
Calvin Kline is the official underwear
Phillips is the official lightbulb
Golden Flake is the official potato chip
Little Friskies is the official cat chow
Orville Redenbacher is the official popcorn
Bartles and James is the official wine cooler
Opus is the official penguin

* A promotional fee may have been paid to the editors
of MAX-Q, but if asked, we don't know anything!

1988 HARA Contest Season Events

Spring Fling-2 Open March 19, 1988

- 1-Predicted Duration
- 2-Sport Scale
- 3-1/2A INT BG
- 4-A Helicopter Duration
- 5-B SD
- 6-D INT BG (C Div)
- 7-A INT BG (A&B Div)

Redstone-1 Open, May 21, 1988

- 1-Predicted Duration
- 2-Sport Scale
- 3-D INT BG (C Div)
- 4-A INT BG (A&B Div)
- 5-A Helicopter Duration
- 6-1/2A INT SD
- 7-1/2A BG

June Jam-2 Open, June 18, 1988

- 1-Predicted Duration
- 2-Sport Scale
- 3-D INT BG (C Div)
- 4-A INT BG (A&B Div)
- 5-1/2A INT BG
- 6-1/2A INT PD
- 7-1/2A SD
- 9-Open Spot Landing

NARAM-30, August 8-12, 1988

- 1-1/2A International Parachute Duration
- 2-B Streamer Duration
- 3-B Eggloft Duration
- 4-A Helicopter Duration
- 5-B Rocket Glide
- 6-D International Boost Glide (flexies & RCs
allowed)
- 7-Predicted Altitude, F Altitude
- 8-D Altitude (A Division only)
- 9-Research & Development
- 10-Sport Scale (A&B Division)
- 11-Giant Sport Scale (C Division),
- 12-Parachute Spot Landing

Friday and Saturday will be the flyoffs for all those
rocketeers interested in trying out for the 1989 U.S.
International Team.

FAI Events being flown for tryouts:

- E Radio Controlled Rocket Glider
- A Streamer Duration
- A Parachute Duration
- B Boost Glide

Scale and C Scale Altitude positions will be chosen by
resume

For additional flyoff rules and registration, contact
1989 U.S. Team Manager, Matt Steele, 13011 Bran-
scomb Rd, Huntsville, AL 35803 (205) 883-6020

HARA Members

• Anglin, John 534-7971
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• Dooling, Dave 837-3400
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• Papa, Byron 837-1206

6319 Robin Hood Lane, 35806

• Reasoner, David & Colin 883-7629

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• Stubblefield, Katie 534-5359

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406 Green Acres, 35804

• Wagschal, Dick 837-9325

6206 Rime Village 35806

• Williams, Jimmy & Marty 539-4801

3203 Fairacres Rd., 35803

• Williams, Ron n/a

5637 Crestview Drive , Hixon TN 37343

• Wingate, Jason 539-6707

2908 Azalea Circle, 35805

• Yeager, Carl & Jeff 539-2839

4316 Shelby Ave. 35801

Space Shuttle Missions 26-44

(Oct. 1987 Baseline)

FLT	Launch Date	Orbiter	Payload
26	1988	Discovery	TDRS-C
27	1988	Atlantis	Dept of Defense
28	1988	Columbia	DOD
29	1989	Discovery	TDRS-D
30	1989	Atlantis	Magellan (Venus Radar Mapper)
31	1989	Discovery	Hubble Space Telescope
32	1989	Columbia	ASTRO-1 (Space-lab Astrophysics Science Mission)
33	1989	Atlantis	DOD
34	1989	Discovery	Galileo (Planetary Probe to Jupiter)

35	1989	Columbia	Global Positioning System Navigation Satellite-1
36	1989	Atlantis	DOD
37	1990	Columbia	Global Positioning System Navigation Satellite-2 SYNCOM IV-5
38	1990	Discovery	STARLAB
39	1990	Atlantis	DOD
40	1990	Columbia	Gamma Ray Observatory
41	1990	Discovery	DOD
42	1990	Atlantis	TDRS-E Satellite
43	1990	Columbia	SKYNET 4A EURECA-1L
44	1990	Discovery	Ulysses

and more Wadding Scraps

*Next HARA meeting
April 21st: 7:30*

PICTURE CAPTION CONTEST

The results of our caption contest were somewhat less than expected. Thanks to Crocodile Hendricks, Clay Baggett, Lee Olyniec and anonymous for their contributions. Here are some of the better entries for the picture of the D engine cato and parachute powder cloud.

"This rocket must have had beans this morning."

"How do you spell relief?"

"Never drink and fly rockets."

"Mount St. Hendricks blows again."

"Drug bust!"

"That one screwed the pooch."

"Ah-choo!"

"After this I'll have to wash my truck."

"Stop rocket abuse. Call 1-800-NO-PRANG"

"Make that a Bud light."

"Elevation .3 degrees, azimuth .2 degrees"

"Rocket design by Roger Boujoly"

Several references to baby powder were made since that was what contributed to the expanding cloud, but none of those entries had the right stuff. Max-Q would like to try this again and give readers another chance, now that you see how much fun this is. Consider the photo at lower right and think up a caption for it. We're not going to tell you who, what, or where on this one. The same contest rules apply with the same lack of prizes except for the fame and glory. Deadline is April 30, 1988.

From the Range Box

In the paint supplies department of Southerlands, Wests. and even Walmart, is something for the rocketeer. Sold as plastic 'drop cloth', these thin sheets are excellent parachute material. For less than a buck, you get a 9' by 12' piece to make high performance chutes or covering for flex wing gliders. Be sure to get the .25 mil kind although it also comes in .3, .5, and 1. mil thicknesses.

The place to get dry transfer lettering is Summit Stationary at Madison Mall. They have various size letters and numbers that sharpen up a rocket's appearance. Put on your NAR number or make up decals, these transfers make it look professional.





SPACE CAMP Team Leader Jenny Stewart checks the settings in a realistic Space Shuttle cockpit mockup. Trainees at Florida **SPACE CAMP** near the Kennedy Space Center use shuttle and mission control mockups during a simulated space mission.

(Photo by: Bob Gathany)