ESTES WINTER 1990

MODEL ROCKET NEWS

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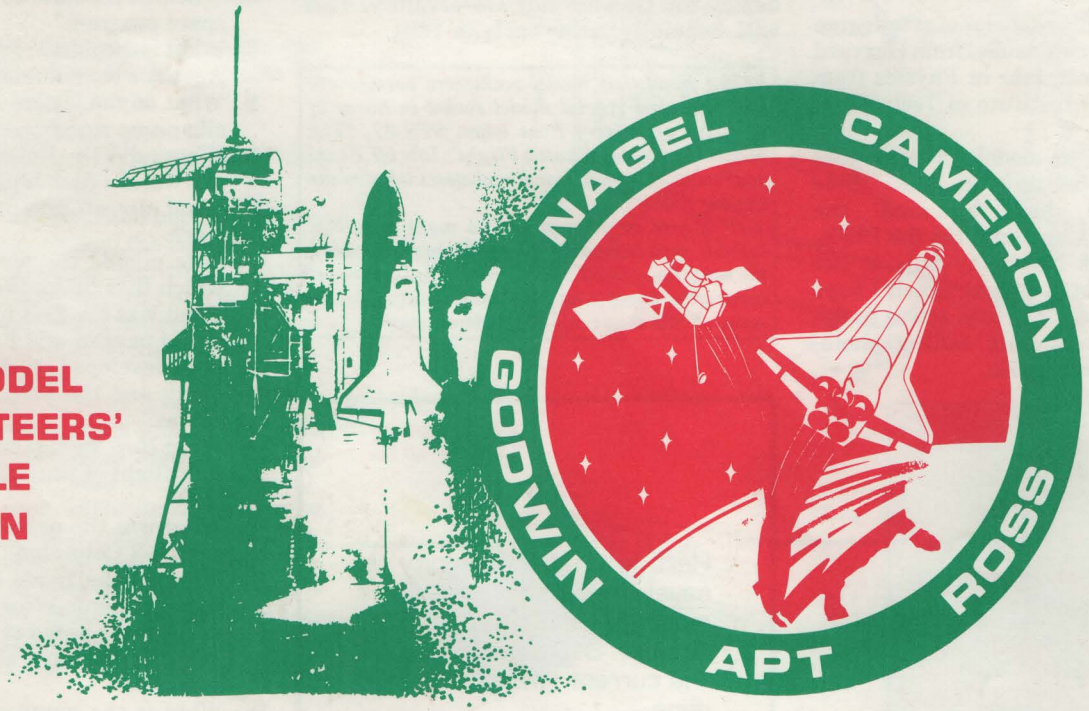
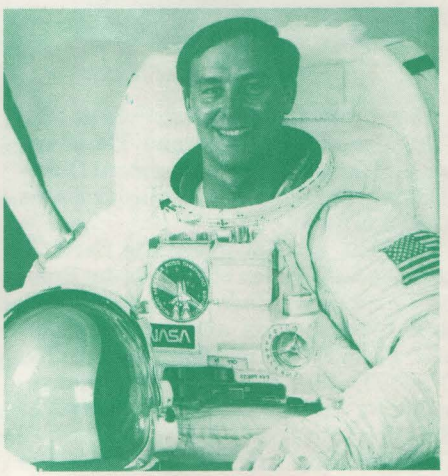
DEDICATED TO AND PUBLISHED FOR ESTES ROCKETEERS, AMERICA'S FUTURE IN SPACE

THE MODEL ROCKETEERS' SHUTTLE MISSION



Astronaut Dr. Jay Apt PhD



Astronaut Lt. Col. (USAF) Jerry Ross

STS-37 CREW INSIGNIA---The principal theme of the STS-37 patch, designed by astronaut crew-members, is the primary payload---Gamma Ray Observatory (GRO)---and its relationship to the Space Shuttle. The Shuttle and the GRO are both depicted on the patch and are connected by a large gamma. The gamma symbolizes both the quest for gamma rays by GRO as well as the importance of the relationship between the manned and unmanned elements of the United States space program. The Earth background shows the southern portion of the United States under a partial cloud cover while the two fields of three and seven stars, respectively, refer to the STS-37 mission designation.

JAY APT

Jay Apt was born on April 28, 1949 in Springfield, MA. He graduated from Shady Side Academy in Pittsburgh in 1967. He considers Pittsburgh, PA as his hometown.

He received his bachelor of arts degree in Physics (magna cum laude) from Harvard in 1971, then a doctorate in Physics from the Massachusetts Institute of Technolgoy in 1976.

His interest in model rocketry goes back at least to his days at Shady Side Academy where he originated the Pittsburgh Spring Convention in the 1960s. His official NASA biography fails to list model rocketry (An oversight which I hope he will correct—Editor). He is active in flying, scuba diving, camping, sailing, photography, and amateur radio.

Photo courtesy of NASA

From 1976 to 1980, he worked at MIT and the Center for Earth and Planetary Physics at Harvard. He was Assistant Director of Harvard's Division of Applied Sciences from 1978 to 1980.

In 1980, Dr. Apt joined the Earth & Space Sciences Division of NASA's Jet Propulsion Laboratory. He worked on projects involving Venus, Mars, and the outer solar system. From STS-5 in 1982 through STS 51-D in 1985, he was a flight controller responsible for Shuttle payload operations at NASA's Johnson Space Center.

He and his wife Eleanor have one daughter, Sarah, who was born on July 19, 1988.

He has logged over 2,200 hours flying time in about 25 different types of airplanes, sailplanes, and even manpowered aircraft.

In June 1985, NASA selected Jay as an astronaut. He has worked on several missions, but his first flight into space will be as part of the crew of STS-37 which will deploy the Gamma Ray Observatory. This will, hopefully, occur early in 1991.

I hope that model rocketeers everywhere will launch a special model rocket in honor of Jay Apt and Jerry Ross when STS-37, "The Model Rocketeers' Shuttle Flight", lifts off. Show your support for two model rocketeers who "made the big time!"!

If you or your group do make a special launch, and hopefully hold a ceremony to mark the occasion, please send a report and some pictures of the event to us for possible use in a future issue of this magazine. Thanks—Editor.

TRIVIA HUNT

This is reprinted with permission from the July-August 1990 Spacelog published by the Space Center, Alamogordo, NM. The questions are used by their tour leaders at the International Space Hall of Fame to encourage student study of the exhibits. Most of the questions may be answered without visiting the museum. Minor alterations have been made in the questions. If you ever get anywhere near that area on a trip, be sure to visit the Space Center. In addition to a very nice space museum, they have an IMAX theater and a very interesting gift shop. This organization also sponsors the annual Flight Fest as well as many other model rocket activities.

1. Who was the second man to walk on the moon?
2. What are the names of the American astronauts killed on January 27, 1967?
3. Who was the first man in space?
4. Who was the first woman in space?
5. What aircraft set a world speed record of Mach 6.7?
6. Who was the chief designer of the Soviet space program?
7. What is the name of the European Space Agency's commercial launch vehicle?
8. What do the letters in the HAWK missile name stand for?
9. Where did Dr. Robert Goddard launch the world's first liquid fuel rocket?
10. What aircraft first broke the sound barrier?
11. Who piloted the aircraft on the flight which first broke the sound barrier?
12. What was the first rocket engine to use liquid oxygen and liquid hydrogen?
13. Who developed the V-2 missile for Germany and the Saturns for the United States?
14. What New Mexico astronaut flew on the first flight of the Space Shuttle Discovery?
15. What was the name of the landing site of STS-3 Columbia?
16. What is the name of the person who rode the Sonic Wind I to 630 mph?
17. What is the name of the antenna which was designed to track early Vanguard satellites?
18. What is the name of the silver rocket standing outside on the northwest corner of the International Space Hall of Fame?
19. What are the names of the seven astronauts who died in the Challenger tragedy of 1986?
20. What is the third planet from Sol (the sun)?
21. What space event occurred on July 20, 1969?

Answers may be found on page 15.

Merry Christmas

JERRY ROSS

Jerry Ross was born on January 20, 1948 in Crown Point, IN.

He graduated from Crown Point High School in 1966. He received bachelor of science and master of science degrees in Mechnical Engineering from Purdue University in 1970 and 1972.

He and his wife, Karen, have two children, Amy, born on March 30, 1971, and Scott, born on April 27, 1972.

USAF LtCol Ross lists softball, racquetball, woodworking, photography, flying, and model rocketry as hobbies in his official NASA biography.

He was a member of the Air Force ROTC while at Purdue and received his commission upon graduation. He entered active duty after he received his master's degree. He has worked in the Ramjet Engine Division of the Air Force Aero-Propulsion Laboratory at Wright-Patterson AFB, OH and on the ASALM strategic air-launched missile. He graduated from the USAF Test Pilot School Flight Test Engineer Course in 1976. He has worked at Edwards AFB on several projects, including the B-1 aircraft.

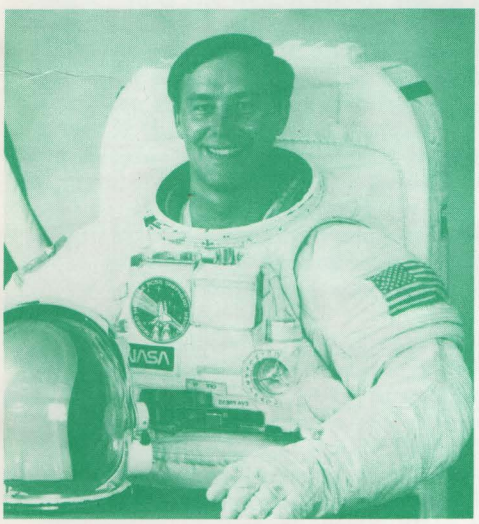


Photo courtesy of NASA

Jerry has flown in 21 different types of aircraft, holds a private pilot's license, and has logged more than 1,800 flying hours, most of it in military aircraft.

In February 1979, he was assigned to the Payload Operations Division at Johnson Space Center. He was selected as an astronaut in May 1980. He has served in many capacities, including being CAPCOM on five Shuttle missions. He flew on STS 61-B, a night launch from Kennedy Space Center on November 26, 1985. The crew deployed three satellites and conducted two six-hour spacewalks to demonstrate construction techniques for the Space Station, plus numerous other experiments. He has had extensive experience on the Space Station assembly concepts and EVA operational design. In December 1988, he flew on STS-27.

With the completion of the STS-37 mission, he will have logged 270 hours in space, including over 12 hours on two spacewalks.

SPACE NEWS

Although it is not always apparent, there is a lot happening regarding space. NASA has asked Rocketdyne of Canoga Park, CA; Aerojet of Sacramento, CA; and Pratt & Whitney of West Palm Beach, FL to pool their resources in a cooperative effort on the ALS (Advanced Launch System) project. The goal of the program is to develop a new family of boosters capable of lifting massive payloads to Earth orbit or beyond at a lower cost than is presently possible.

In Japan, 77 companies are forming Rocket Systems Inc. This new company includes aerospace corporations, banks, insurance companies, and others. The new company will place bulk orders for the H-2 rocket. This rocket is under development for launches to begin in 1993. NSDA (National Space Development Agency) is responsible for the development of this rocket. The current Japanese budget is limited to annual budgets so the new organization will permit bulk purchases over longer periods of time to lower the cost of each vehicle. The Japanese are aiming for a cost of $52,000 (8 million yen) per kilogram (2.2 pounds) placed in orbit.

Five Japanese companies are under contract to the Japanese NSDA to develop plans for a space station that can be occupied by three astronauts for three months at a time to service satellites and conduct experiments. Japan plans to contribute a pressurized module to the international space station in 1998.

South Korea plans to place its first spacecraft into orbit and to start development of an independent launch system. They plan to spend $100 million through 1993 in this effort.

Global Outpost, Inc. has signed an Enabling Agreement with NASA and has begun negotiations with NASA for specific Space Shuttle flights. The company plans to use the External Tank and convert it into a simple space platform using a package which will be transported to the tank by the Space Shuttle.

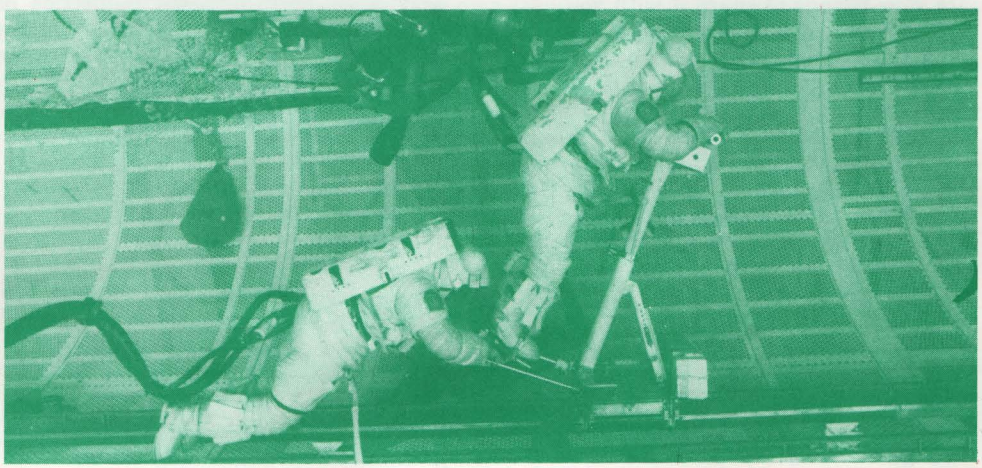
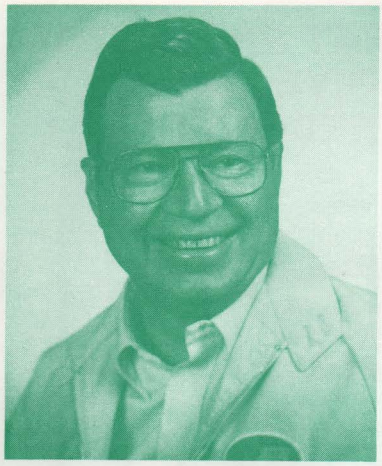


Photo courtesy of NASA

In JSC's Weightless Environment Training Facility pool, astronauts Jerry Ross and Jay Apt practice one of the experiments they will do in space aboard shuttle mission STS-37. The experiment uses an electrically powered version of the Crew and Equipment Translation Aid (CETA), a cart designed to move astronauts up and down the Space Station Freedom truss. Apt is pulling Ross along to test the cart's ability to carry one person plus cargo.



MESSAGES FROM LAUNCH CONTROL

The Model Rocketeers' Shuttle Mission

The launch of STS-37 with Jay Apt and Jerry Ross as mission specialists is scheduled for sometime this spring. In this issue we bring you some more information about this mission which will launch the GRO (Gamma Ray Observatory). In previous issues, we have provided additional information.

Jay and Jerry are eager and willing to go as soon as NASA gets to their mission in the schedule. The recent delays due to technical problems are irritating, but contribute to improved safety for succeeding missions.

Trying to keep up with progress toward this mission? If you are on Compuserve, NASA's Spacelink, or another computer net, you should be able to receive updates more frequently than the newspapers supply.

Why not make a special launch of one of your model rockets in honor of the Model Rocketeers' Shuttle Mission when it finally lifts off? I believe that Jay and Jerry would appreciate such a symbolic launch. And invite your friends to share it with you.

If you and your friends feel that you have the experience and time to do it right, why not make it into a special program and invite the local newspapers and TV stations out for it. Incorporate a little of the history of manned space flight and the background of these two astronauts. Tell what the GRO is designed to do. Relate your launch "in miniature" to theirs. Don't forget--model rockets obey the same laws of physics as their full-sized relatives.

Estes Space Program

Good news! You may now secure your Achievement Awards for only $1 each. This is half of the previous price. And thanks to the thousands of you who purchased the Estes Space Program Membership Packet #1443 last year!

Wear with pride the awards you have earned. You worked hard and learned a new model rocketry skill to earn each Achievement Award.

Survey

Sorry, but we have not had time to tabulate your responses to our survey in the summer issue by the time this column is being written. We will provide you a summary of the results as soon as it is ready.

New Scale Models!

We now have available for you the Apollo-Little Joe II, Saturn 1B, and Saturn V all in the same scale!

And notice the prices on these kits now!

DOM Winners

Thanks for your continued interest in our Design of the Month Contest. Despite our little advertising of it, it is still active.

We have not kept complete records, but I suspect that some of you have entered at least 50% of the contests during the past five years. Or longer?

Next issue we hope to include some more names of winners. And our apologies for being so slow to judge the contest and send the winners their awards, but we have been extremely busy. You should be aware that our company was purchased February 1, 1990. I can't give you a lot of information now, but in the coming months you will be hearing a lot more about Estes and the things we are doing.

Thanks for your continued support of Estes Industries. We appreciate it! And we will continue to work hard to provide you with the best in model rocket kits and supplies.

Sale

See page 2 for a special sale on a number of kits.

Best Wishes of the Season

During the Christmas and Hanukkah season is an excellent time to stop and think, to appreciate our blessings, to share our good fortune and happiness with others. And to share that special feeling with our friends and neighbors.

Let us here at Estes Industries be among the first to wish you A Very Merry Christmas, A Very Happy Hanukkah, And A Happy New Year!

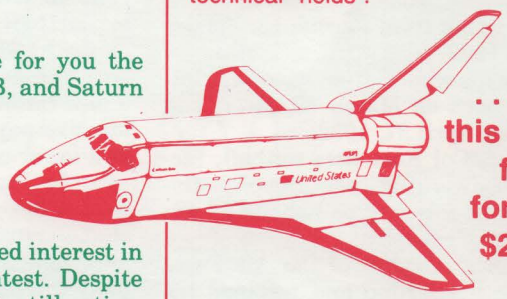
Bob Cannon

SEASONS GREETINGS...

and thank you for all your business and support in the past year.

SPACE SHUTTLE

Have you made your regular Space Shuttle launch this month? This beautiful 1/162 scale model flies on your schedule, every time, with few, if any, annoying technical "holds".



. . . Add this to your fleet for only $23.49

Build this Skill Level 4 model as the Pride of Your Fleet. Then "go for orbit" with Estes C5-3 (First Flight) or C6-3 engines.

Orbiter glides smoothly back while your ET and SRBs descend safely under a big 18" 'chute.

Space Shuttle™ #1284

BLAST-OFF FLIGHT PAK

The perfect stocking stuffer!

Two dozen of your favorite Estes model rocket engines
+ A package of recovery wadding
+ 30 Igniters! (six extras!)
Buy now to stock your range box for lots of high-flying fun!

BLAST-OFF™ FLIGHT PAK #1672 . . . . . $26.19

MODEL ROCKET NEWS

Bob Cannon . . . . . Editor
Charles Webb . . . . . Photographer
Bob Pacheco . . . . . Graphic Design
Karen Oelschlager . . . . . Typesetter

Unless otherwise stated, all the model rocketry kits advertised in this magazine are hobby kits requiring assembly. Launch system, engines, glue, and finishing supplies are not included. Recommended for ages 10 through adult. Adult supervision suggested for those under 12 years of age. Prices subject to change without notice.

A BUSY YEAR FOR HARA

By Vince Huegele, President of HARA (NAR Section 403), Editor of MAX-Q, Huntsville, AL

HARA (Huntsville Area Rocketry Association), NAR Section 403, has completed a very busy year of leading students into the future with model rocketry. Demonstration launches, building sessions, and classroom projects have been the emphasis of this rocket club in "Rocket City".

The biggest model rocketry occasion in the state of Alabama is HARA's annual Rocket City Classic held in October. Directed by Wayne McCain, this novice contest with four simple events attracts modelers from throughout the area. At least 200 people attended, a number consistent with prior Classics. The registration sheet listed 30 contestants entering 60 rockets making almost 100 official flights. Including the sport and demo launches, the range had a busy day.

As always, HARA's prizes were worth the effort. Competitors ranking third received an Estes Space Program™ kit. Those reaching second took a Comanche-3™. First place winners received a Mercury Redstone™ plus a trophy. The Champion Rocketeer won a trophy and an AstroCam™.

Project STAR (Students Training in Astronautics and Rocketry), another HARA program directed by teacher Jayne Russell where older students train the younger, continued in its mission to team together students of all ages for rocket building and launching.

STAR had a major session during the winter. Whoever said launching 27 rockets in 30 degree temperatures isn't fun? Just ask the Astronomy class that Jayne teaches at Johnson International Education Magnet School. Or better yet, ask Mrs. Milton's seventh grade class at Ed White Middle School. The Johnson "STARs" helped the Ed White School students put together their Alpha III™ kits and then get them flying.

As active as HARA usually is, this year was special. Because of the proximity to Marshall Space Flight Center (MSFC), HARA found a unique opportunity.

NASA is now appealing to its scientific personnel to volunteer as teacher aides, academic consultants, and community tutors. Taking a "show and tell" to the schools is not an effort to advertise NASA, but an attempt to stimulate interest in school science and technology studies.

HARA president Vince Huegele made contact with MSFC with the organizers of this program, called Project LASER (Learning About Science, Engineering and Research) to see how model rocketry can be involved. HARA agreed to assist NASA in the school activities.

The first involvement of HARA with NASA's Project LASER was completed the first week in December. Vince Huegele was at Bob Jones High School for three days addressing Karen Widenhofer's aerospace class on the subject of model rocketry. A student rocket launch and a visit to a MSFC test stand to witness a static firing of a shuttle engine concluded the study. Karen is also Project LASER's education consultant.

Also, through Project LASER, HARA completed teaching a ten hour, once a week rocketry class at Davis Hills Academy for Science and Foreign Language. Robert Burdine, Dana McCain, and Ed Stluka were instructors. Eleven sixth graders successfully learned to build and fly an Alpha III™, and then a Hercules™ kit. The class was part of Davis Hill's SPACE (Special Programs for Academic and Creative Enrichment) coordinated by teacher Nina Pearson and parent chairman Pat Johnson.

As spring returned, the class at Bob Jones wanted to fly again. Karen and Vince developed an egglofting experiment to illustrate the roles played in an actual space mission. The student built an Eggspress™ rocket which carried an egg up and back down unbroken.

The Young Astronaut Club at Brownwood Elementary in Scottsboro, AL hosted a May first Rocket Day that rivaled any school launch held in the Huntsville area that year. Brownwood's fifth grade launched over thirty models in the school field to the delight of all the students watching.

Teacher Barbara Harris assists a Young Astronaut.

Through Project LASER Scottsboro teacher Barbara Harris contacted HARA for assistance in launching the rockets. Members were dispatched to supervise the operation.

This May Day was more than just a school rocket launch. It was the climax of several weeks of study of rocket science and history. The school year was set up with five different Young Astronaut activity booths explaining different aspects of rocketry.

Rocket lectures were given by students to students.

Westlawn Middle School was the last Project STAR of the school year. The Johnson High students were looking forward to getting outside on a nice spring day to visit a class of excited seventh grade students who were equally thrilled. Another successful building and flying session completed this year.

Photo by Jack D. Ray

Johnson High School girls assist Vince Huegele to teach two sixth grade boys.

Altogether, HARA made fourteen presentations to student, teacher, and civic groups this past school year. From these efforts may come the next generation of model rocketeers as well as rocket scientists.

DESIGN OF THE MONTH CONTEST WINNERS

MAY 1989 WINNER: Thomas E. Beach, Los Alamos, NM (1940 Exploratory Planetary Cargo Ferry). **HONORABLE MENTION: Brett Torpe,** Provost, Alberta (Top Spinner). **Mike Hood,** Mineral Ridge, OH (The Blade). **John Lee,** Elkhart, IN (Yellow Bird). **Hiroto Kiguchi,** Hinsdale, IL (Eclipse). **Thomas J. Powers,** Redford, MI.

JUNE 1989 WINNERS: Peter Kodis, N. Dartmouth, MA (Sprint). **Thomas Beach,** Los Alamos, NM (Stackware software). **HONORABLE MENTION: Lee Duane Tobie,** The Dalles, OR (Alliance). **Louis J. Jiardina,** Marion, IL (F-20 Tiger, Trans-Am & Genie Nuclear Rocket). **C.P. Prikle, Jr.,** Cartersville, GA (B3-A). **Nathan Derr,** Littleton, CO (Dragon). **Keith Kobelia,** Baldwinsville, NY (Discovery). **Peter Dein,** Springfield, NJ (Rocket standoff).

JULY 1989 WINNERS: Joel Swota, Gansevoort, NY. **Vince Huegele,** Huntsville, AL (Shuttle-C). **Scott Mealhow,** Waterloo, IA (Launch Pad). **Rod Thomas,** Newton Centre, MA (Bat Wing). **HONORABLE MENTION: Jeff Brammer,** Shreveport, LA (New Launch Lug System & New Rocket Design).

AUGUST 1989 WINNERS: Bill Zimmerman, Jr., Buffalo, MN (Tigré). **Nate Chronister,** New Paltz, NY (Raging Obnoxious Headhunter). **Brett Torpe,** Provost, Alberta (Formula 1). **HONORABLE MENTION: Brett Torpe,** Provost, Alberta (Airwolf V & Snowbird II). **Kenny Pierce,** Fresno, CA. **David Mullholland,** Littleton, CO (The Sting Ray). **Andrew R. Bernat,** El Paso, TX (Nighthawk). **Louis J. Jiardina,** Marion, IL (Fire Fox Defender).

SEPTEMBER 1989 WINNERS: Kenneth Campion, Pritchett, CO (Phantom). **Dan Hoggard,** Crystal Lake, IL (Top Gun). **HONORABLE MENTION: FTB1/SS Gary E. Cowart,** Goose Creek, SC (Big Boost). **Louis J. Jiardina,** Marion, IL (Lunar Colonizer). **Jonathan Wickham,** Cutchogue, NY (The Pleiades). **Ross Winston,** Warsaw, NY (Loft-1). **Barb Blaise,** Newtown, CT (Catamaran).

OCTOBER 1989 WINNER: Andrew R. Bernat, El Paso, TX (Overkill). **HONORABLE MENTION: Aaron Newman,** Millersville, PA (Terran Scout). **Bill Derge,** Carbondale, IL (The Spinning Payloader 4 S-P4). **Brian Leininger,** San Antonio, TX (Pit Viper).

NOVEMBER 1989 WINNER: Louis J. Jiardina, Marion, IL (The Noma).

DECEMBER 1989 WINNER: Dave Petney, Portage, PA (Rocket with Payload ejection). **HONORABLE MENTION: Louis J. Jiardina,** Marion, IL (The Princess' Shuttle). **George Coulouris,** Catskill, NY (Apocalypse Now). **David Taylor,** Brunswick, MD (Sling Shot).

Continued on page 9

Model Rocket Test Facility #5
Measuring the Velocity of Model Rockets

By Douglas Kirk, Canyon Lake, TX

I. BACKGROUND

In order to reach Earth orbit, a rocket must accelerate its payload to a speed of 17,500 miles per hour and push it to an altitude of about 150 mile above Earth's surface.

America's Space Shuttle lifts its 65,000 pound payload to 150 miles altitude in about 8½ minutes. With a total liftoff weight of 4,432,000 pounds, it is clear that the amount of power necessary to accelerate the Shuttle and place it into orbit is enormous. In fact, the combined thrust of the Shuttle and its boosters is 6,325,000 pounds. That's in the neighborhood of the thrust that would be delivered by 702,778 Estes D engines!

It is unlikely that any model rocket will ever reach Earth orbit unless an astronaut takes one with him on a Shuttle mission. Model rockets just don't develop the kind of speed that is required for orbit. That doesn't mean that a solid propellant rocket can't go into orbit. NASA uses the Scout, a 75 foot long solid propellant rocket that weighs 47,190 pounds and which is capable of placing a 425 pound payload into low Earth orbit. But model rockets are far too small, and even if you clustered thousands of D engines together, developing orbital velocity of 17,500 miles per hour would be the big problem.

Large rockets reach orbit by burning for a long time and by dropping off stages as the propellant in each is consumed. As one stage is released and the next one ignited, the speed increases. When an upper stage is fired, the rocket is already traveling fast, and the upper stage boosts the lighter upper portions of the rocket faster and faster.

But even if a model rocket were multi-staged, it still would not develop the kind of speed necessary for orbit. How do we know? It is a matter of measuring the speed of a rocket and showing that this speed is far less than the required orbital velocity of 17,500 miles per hour.

Speed is measured simply by determining how much time it takes for a rocket to travel a given distance.

Often the word "velocity" is used instead of the word "speed" to specify rate of movement. Technically, velocity is speed of movement in a given direction. But since we are measuring speed in the vertical direction, we can use velocity.

If you measure the peak altitude of a rocket and use a stopwatch to measure the time from liftoff to apogee, then you can calculate the average velocity by dividing the altitude at apogee by the time required to reach that altitude. The problem with this approach is that obtaining the peak altitude is sometimes difficult. This method is always subject to some degree of error which can greatly affect the velocity calculation.

Fortunately, there is an easier way of determining the velocity of a model rocket. Rather than try to measure peak altitude, a simple apparatus can be set up which allows you to establish a given distance so that you can then concentrate on measuring the time it takes the rocket to travel that distance.

In this experiment, such an apparatus will be built and two rockets will be flown in order to demonstrate that velocity can be measured and that velocity will vary from one model to another. Knowing which rocket actually travels fastest is important if you ever decide to design a model that might be able to break the sound barrier (exceed the speed of sound). The speed of sound is about 750 miles per hour, depending upon your local atmosphere. (The speed of sound is dependent upon the density of the surrounding air.)

Do you think a model rocket could exceed the speed of sound?

II. OBJECTIVE

Measure the velocity of two rockets and then see if increased power will increase the velocity of one of the rockets.

III. EQUIPMENT

Required:

- 1 Big Bertha™ or similar rocket
- 1 Ranger™ or similar model rocket
- Estes launcher and electrical ignition system
- 3 B8-5 Estes engines
- 3 C6-5 Estes engines
- 3 D12-5 Estes engines
- 1 AltiTrak™ instrument
- 2 Stopwatches
- 1 Tape recorder with tape
- 6 5 foot lengths of 1 inch PVC pipe
- 2 2½ foot lengths of 1 inch PVC pipe
- 8 1 inch 90 degree PVC elbows
- 1 Gram scale
- 1 Metric measuring tape

Optional:

- 1 Camera (still or video)
- 1 Set of weather instruments
- 1 Extra Big Bertha™ and Ranger™ or similar rockets as back-ups

IV. PROCEDURE

This experiment is divided into two phases. During Phase One, the velocity of one rocket will be measured. A simple apparatus will be used to assist in the velocity measurement. Two separate methods of timing the flight will be employed.

In Phase Two, the second rocket will be flown with two different engines to see if an increase in overall power will affect the velocity attained by the rocket.

Phase One:

Step 1: Build the Ranger™ and the Big Bertha™ rockets.

Step 2: Using the PVC pipe and connectors, construct the apparatus as pictured. This is to be referred to as an Altitude Marker since it will be used to "mark" a point in space which will be used as a "finish line" for your tests. To construct the Altitude Marker, cut six lengths of 1 inch PVC pipe, each measuring 5 feet in length, and two pieces of 1 inch PVC pipe that measure 2½ feet. Connect each of these with PVC elbows as shown in the picture. It is better not to glue the appratus, since gluing would restrict the portability of the device. If the pipes do not fit snugly, a piece of masking tape can be applied to hold them.

Photos by Douglas Kirk

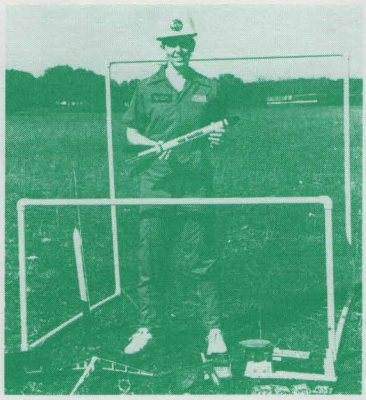
This Altitude Marker was developed at Morton Falls, TX and was first used successfully at Stoepler Field on February 24, 1990.

In order to use this apparatus, measure 75 meters from the launch pad and then set up the apparatus where the tallest portion is right on the 75 meter mark.

Next, with the AltiTrak™ in hand, back away from the Altitude Marker and sit or lie down on the ground so that you can view the two horizontal bars of the Altitude Marker. Close one eye and move your head so that the lower bar obstructs the view of the higher bar. This will establish an angle that "marks" an imaginary point in the sky.

How high is that point? Use the AltiTrak™ to measure it. Sight along the angle established by the two horizontal bars. Squeeze the AltiTrak™ trigger, release it, and take the reading. This altitude will be the distance the rocket will travel during the timed phase of the flight. Write down this figure.

To use the Altitude Marker, the idea is to launch the rocket, start the watches at liftoff, and then stop the clocks when the rocket visually passes the horizontal portion of the Altitude Marker. If you sit or lie in the exact position each time, at the same point, and if you stop the watches as soon as the rocket appears to pass the "finish line" of the Altitude Marker, then you will have a fairly accurate means of measuring the amount of time that the rocket requires to fly a given distance. That given distance was measured with the AltiTrak™ and is visually fixed in the sky by the stationary Altitude Marker.



Dr. Valerie Kirk with equipment for this experiment.

$$\text{Average Time} = \frac{\text{Time Measured in Seconds (watch one)} + \text{Time Measured in Seconds (watch two)}}{2}$$

$$\text{Speed} = \frac{\text{Distance Covered in Meters}}{\text{Time Elapsed in Seconds}}$$

In calculating the velocity with Method One (using stopwatches), use the "average time" as the "time elapsed". In Method Two, the "time elapsed" is measured from the tape recording. (Is there an advantage to this?) The "distance covered" is the altitude distance fixed by the Altitude Marker and measured by the AltiTrak™.

DATA TABLE: MEASURING VELOCITY

DATE

NAME OF EXPERIMENTER:

	ROCKET	FLIGHT	ENGINE	Pre-Flight Weight (Grams)	Time Method One (Stopwatch)			Time Method Two (Tape) (sec)	Velocity Method One (m/sec)	Velocity Method Two (m/sec)	WEATHER		
					Watch One (sec)	Watch Two (sec)	Average (sec)				Temp °F	Humidity %	Barometric Pressure
Phase One	Ranger	1	D12-5										
		2	D12-5										
		3	D12-5										
Phase Two	Big Bertha	4	B8-5										
		5	B8-5										
		6	B8-5										
		7	C6-5										
		8	C6-5										
		9	C6-5										

Step 3: During each flight, you are going to have to time the rocket from the instant of liftoff to the point at which the rocket visually crosses its finish line as indicated by the Altitude Marker. You will need to assemble a crew of three time-keepers and one altitude observer. Two time-keepers will use stopwatches and one will be equipped with a tape recorder. The stopwatch time-keepers will simply start their watches when the rocket lifts off and will then stop the watches when the altitude observer calls out the fact that the rocket has crossed the finish line. The tape recorder time-keeper starts the recorder and records the entire flight, including countdown, launch, the altitude call-out of the altitude observer (He or she says "cross" when the rocket crosses the horizontal bar of the Altitude Marker.), the touchdown, and recovery operations. It is difficult to measure time intervals this short without special instruments, so be very careful and do your best. Times measured will be entered into the data table. The tape recorder time will be measured later using a stopwatch, by listening for the "swish" of the launch and the call-out for the finish line.

Step 4: Load the Ranger™ with a D12-5 engine and weigh it. Then, with all crew members in place, launch the rocket. Measure the time from launch to the point at which the rocket crosses the finish line.

Launch the Ranger™ twice more for a total of three flights. Make certain that the pre-flight weights are the same for each flight. (Add or subtract recovery wadding to equalize the weights.) Record this data on the data table.

Phase Two:

Step 1: With the same setup as used in Phase One, load the Big Bertha™ with a B8-5 engine and launch it, recording the time data. Be sure to measure the weight prior to launch and equalize weights with wadding before each launch. After recovery, launch the Big Bertha™ twice more for a total of three flights.

Step 2: Next, load the Big Bertha™ with a C6-5 engine and launch it. Weigh the rocket prior to launch. Record the time data. Launch two more flights using C6-5 engines and equal pre-launch weights.

V. RESULTS

Complete the data table, using the following formulas for calculations.

VI. CONCLUSION

What can you conclude from this experiment? Is it possible to measure the velocity of a model rocket?

If a rocket must travel 17,500 miles per hour to reach orbit, can you determine how many meters per second would be required? (Hint--If you multiply miles per hour times 1.609, the result will be kilometers per hour. How many meters are there in a kilometer?)

Once you know how many meters per second a rocket must travel in order to reach Earth orbit, can you determine how much faster your model rockets would have to travel in order to go into orbit?

Did one rocket travel faster than another? Why or why not?

Were the results for the flights with each type of engine consistent?

When you increased the power of the engines loaded in the Big Bertha™, what happened to the speed of the rocket?

Given that your rockets traveled at a certain speed, how much more power do you think would be required for each to travel fast enough to reach orbit?

Are we measuring the model rocket during the maximum velocity portion of its flight? When is this maximum velocity reached?

How many extra Estes engines would be required for your rocket to reach orbital speed? Would it make sense to cluster these engines all together, or should they be staged? Why do you think so?

Of what practical value is it to be able to measure the speed of a model rocket?

Does it make any difference how far the time-keepers are away from the person doing the tracking?

Could differences in the reaction times of different people affect the results of the time measurements? Were your results for each flight consistent?

Could use of a videotape of each launch permit you to achieve greater accuracy in recording times?

How can you improve this experiment so that you can learn more from it? Can you think of other ways to measure the velocity of a model rocket?

WIND TUNNELS

Technical Report TR-5, "Building A Wind Tunnel", was written by Vern Estes in 1961. It is one of the many technical reports and technical notes collected in The Classic Collection, #2845, $3.50.

A wind tunnel is very useful in determining the drag experienced by your model rocket or in locating the Center of Pressure. Construction of a wind tunnel is a major effort for an individual, but is much less work and more fun if undertaken by several people. The basic design Vern worked out nearly 30 years ago is still a good one, and you can easily modify it to take advantage of currently available blowers and construction materials.

Dave Babulski asked us to ask our readers to get in touch with him if you are working with a wind tunnel. He is primarily interested in working with educators who use it with their classes, but will be happy to correspond with anyone involved in wind tunnel work. Dave is involved in integrating the experimental data with a computer. If you are involved in wind tunnel work and would like to work with him, please write to:

Dave Babulski
2677 Colony Cricle
Snellville, GA 32078

JOIN THE NAR

If you are not yet a member of the National Association of Rocketry, **now** is the time to join.

Not only do you receive all of the membership benefits of NAR membership including the chance to compete in a variety of contests, take part in the NARTREK program, and order supplies from the NAR Technical Services, you will receive six big issues of the official magazine, American Spacemodeling. This magazine has really been upgraded beginning with the July 1990 issue.

Junior Membership (under 16 as of January 1) costs $12 per year. Leader Membership (under 21 as of January 1) costs $15. Senior Membership (21 or over as of January 1) costs $25.

For more information and membership application, write to:

National Association of Rocketry
1311 Edgewood Drive
Altoona, WI 54720

Achievement Awards now only $1

Thanks to the tens of thousands of rocketeers who have joined the Estes Space Program. To make it easier for you to earn your Achievement Awards, you may now receive these Awards for half-price, only $1 each. You must earn each award by qualifying for it in the usual way, but you need send in only $1 with your Award request and ESP seal, effective immediately!

How many of the ten awards so far available have you qualified for?

CONTEST SPECIAL

AN EASY WAY FOR YOUR CLUB TO HOLD ITS FIRST CONTEST!

Here is what your group needs to put on a successful contest.

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NARHAMS ACTIVE IN COMMUNITY

By Ed Pearson, Seabrook, MD

This article has been edited by Ye Olde Editor to provide you with a better insight into what this NAR section has done. Their activities are a great example of how a model rocket club can help its community.

The NARHAMS club celebrated its 25th anniversary in the spring of 1990 with a bevy of activities. NARHAMS (National Association of Rocketry Headquarters Astro-Modeling Section) is located near Washington, DC. It is noted for its support of the twice monthly model rocket demonstrations at NASA's Goddard Space Flight Center. NARHAMS helped NASA commemorate the fourteenth year of the program by supplying launch equipment, personnel, and safety checking expertise for approximately two dozen young rocketeers.

Another spring program had the club providing instructors for Maryland's Montgomery County Interagency Board. Club members taught a six week, once a week, after-school class in rocketry for 12 5-6th graders at Belmont Elementary School in Olney, MD.

Several NARHAMS members who attended the Pearl River Model Rocket Seminar in New York drove most of the night to return to the Washington area to support another program. They helped inaugurate the Rockville, MD Earth Day/Science Day celebrations. They gave one of the 60+ presentations at Montgomery College. The event was co-sponsored by the Rockville Consortium for Science and the Foundation for Health Education. Club members helped 20 youngsters build Alpha IIIs. Other activities included presentations on electricity, satellite remote sensing, kite making, and much more. The event brought in several hundred local participants. The finale was a rocket launch by the 20 youngsters in the rocket building class.

The following weekend, NARHAMS members helped another community event--SCIENCE TREK--an annual event which attempts to foster interest in science at the elementary school level. The event was held at the Prince Georges Community College and was co-sponsored by the school system. Each school sent two children with their parents for a one-day science extravaganza. In addition to the NARHAMS rocketry presentations, activities included programs on Antarctic expeditions, dinosaurs, and much more. The rocketry presentation was made three times with a brief launch culminating each presentation. More than 1,100 people attended the TREK.

During the week, more NARHAMS members took time from work to help a rocketry workshop held at Galudette College, Washington for the Model Secondary School for the Deaf.

Two weeks later, the club put on a demonstration at Carrol Intermediate in Lanham, MD at the request of teachers and parents. Several rockets were launched before the assembled classes who had earned the right to attend based on good school behavior.

NARHAMS also recently help two model rocketry contests sanctioned by the National Association of Rocketry. They also put on a model rocket display at the Greenbelt, MD public library.

NARHAMS, a section of the NAR, has entered its 25th year with a full agenda. The club provides a great example of how educators can use the services of a local NAR section to further science objectives through hands-on experiences in model rocketry.

Ed Pearson received the National Associations of Rocketry's Presidential Award from Pat Miller at the 1989 NARAM #31 in Manassas, VA—Editor.

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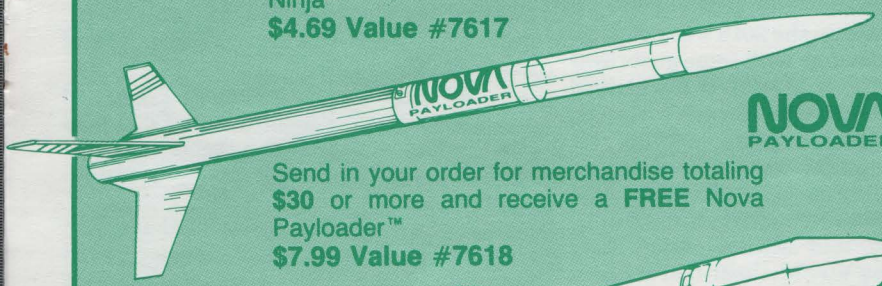

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See page 64 of the 1990 Estes catalog for a more complete description.
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Continued from page 5

JANUARY 1990 WINNERS: Louis J. Jiardina, Marion, IL (Maned Satellite Killer). **Doug Freitog,** Worth, IL (Jetta). **HONORABLE MENTION: Mario Alves,** Ludlow, MA (Zephyr). **Mike Cartmill,** Holts Summit, MO (Piranha). **Merrill Ford,** West Valley City, UT (Ultimatum). **Bobby Whipple,** Pennellville, NY (The Whipster). **Jeff Geniesse,** Denver, CO (The Space Carrier). **George J. Bajnok,** Regina, Saskatchewan (Iron Man II).
FEBRUARY 1990 WINNERS: James Doering, Wis. Rapids, WI (Shuttle War Hawk). **Steve Hengst,** Silver Spring, MD (Mercur MX-19). **HONORABLE MENTION: Keith Kobelia,** Baldwinsville, NY (Zowiee). **Steve Hengst,** Silver Spring, MD (The Orion, the Tomahawk, Interstellar Ambulance, & Battle Ax). **Thomas Heisler,** Hawesville, KY (Star Seeker II). **Jeremiah Covington,** Kent, WA (Lightning). **Mat Zalk,** Great Falls, MT.
MARCH 1990 WINNER: Aaron Newman, Millersville, PA (H.A.S.T.E.-high altitude storm tracker explorer). **HONORABLE MENTION: Aaron Newman,** Millersville, PA (Zaxon). **Brett Torpe,** Provost, Alberta (Formula I).
APRIL 1990 WINNER: Jack C. Long, Madison, AL (Dino-Roc).
MAY 1990 WINNERS: Louis J. Jiardina, Marion, IL (Navy Flyer). **John Price,** Lincoln, NE (The Hornet II). **HONORABLE MENTION: Mark K. Berman,** Englewood, NJ. **Steve Hengst,** Rockville, MD (The Alien Interceptor).

Continued on page 12

HELP!!!

We need your articles, photos, reports on successful model rocketry activities, etc. Help keep this your magazine. Send in articles about neat things you have done in model rocketry. SHARE your favorite stories involving model rocketry. Maybe you know an astronaut or movie star who has used model rocketry, maybe you had a fabulous experience with your rockets.

Articles carried in school or local newspapers often are excellent for Model Rocket News. When sending articles, provide the exact name of the publication, its address, and the date the item appeared and written permission from the proper person to reprint.

Send contributions to:

Editor
Model Rocket News
1295 H Street
Penrose, CO 81240

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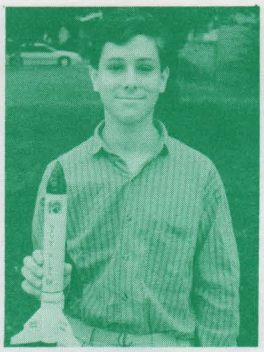


APOLLO-SOYUZ COMMEMORATIVE LAUNCH

By Robert Turner, Assistant Curator, Space Center, Alamogordo, NM

On July 19,1990, a very special rocket was launched at the White Sands Missile Range. The flight was an official mission on the National Range Schedule. At 9:00AM on that date, a special Estes Super Big Bertha™ named the FREEDOM 1 was launched.

The launch commemorated the USA-USSR Apollo-Soyuz space project. The launch was arranged by the White Sands Missle Range Youth Services Division and the Space Center of Alamogordo, NM. The Space Center is a division of the New Mexico Office of Cultural Affairs.

One fin of the large rocket was autographed by WSMR Youth Services Director Jim Salvador, Space Center Assistant Curator Robert Turner, and Las Cruces (NM) Mayor Tommy Tomlin. After the flight, the rocket was given to Mayor Tomlin for delivery during an upcoming visit to the city of Batumi in the Soviet Republic of Georgia. Batumi is the sister city of Las Cruces. It is hoped that a Soviet-flown rocket will be given to the mayor for return to Las Cruces.

Goddard Day Launch Receives TV Coverage

This article is based on information contained in a couple of letters from Michael Kramer of Suffolk, VA, some photos he sent, and a video of the TV coverage of a special activity.

Michael Kramer, a 15 year old from Suffolk, VA, made a very memorable Goddard Day launch. He wrote a letter to WAVY, Channel 10, about a Goddard Day rocket launch. The station could not fit in on March 16, but proposed that he do the launch on March 20, 1990 instead. He agreed.

The weather on the 20th was not good. The wind was blowing, with some gusts over 20 miles per hour. A Live 10 truck arrived at 4:30PM at a local school for the coverage. After the cameraman was set up, we launched a few model rockets for practice.

A few minutes after 6:00PM, Don Slater, the station's weatherman, arrived by heliocopter. He told Michael what they would do on the air. Michael had made a special rocket with the Channel 10 wave symbol on the side and named "Rocket 10".

He was interviewed about model rocketry. He launched "Rocket 10" live on TV. After a short break, he launched his Mean Machine for the camera. The time was near unset, and the launch was impressive.

He was covered for six minutes and thirty-nine seconds out of a thirty minute newscast. The article by Larry Shenosky reprinted in the Winter 1989 Model Rocket News helped him tremendously. He encourages other rocketeers to try to get on TV. "It is not as hard as you might think", he reports.

Message From A Special Rocketeer

By Bill Cooper, Freeport, PA

Let me tell you a story. My name is Bill Cooper. I'm 31 years old, and I've been building and flying model rockets for the past 18 of those years.

Science has always been one of my favorite topics. So my father started me off by sending away for my first catalog. As a raw beginner (I was raw with a capital "R"!), my first attempt at cutting out fins resulted in my needing to go to the hobby store to buy balsa for a second try. I painted my first two kits with brushed on semi-gloss house paint. Still, I can't tell you how proud I was of those models.

As I gained experience, I learned about Center of Pressure and Center of Gravity and what makes a stable or unstable rocket. I've taken some great photos with my AstroCam™.

I was a member of the EAC and had attained Craftsman level before it was changed to the ESP. I have become a member of the ESP. I won the Design of the Month for November 1987. I have had a ball flying rockets over the years.

Now I know this will seem off the subject, but bear with me. There's a method to my madness. I've been an insulin-dependent diabetic for almost as long as I've been a rocketeer. After having diabetes for 17 years, I've developed diabetic retinopathy. This is an eye disease. Because of it, my eyesight isn't what it used to be. To get around this problem, I've designed big, easy-to-track rockets and special tracking methods.

The whole point is that I would like to hear from anyone else who has a problem they have had to overcome.

I will share my knowledge with anyone who wants it. If you have suggestions, send them, and I'll pass them along to those who need them. Let's help each other out. You don't need to have a problem to write, either. Maybe you just like big rockets and want to trade ideas. Let's give something back to a great hobby--Model Rocketry!

Drop me a line!

Bill Cooper
972 Lyn Road
Freeport, PA 16229

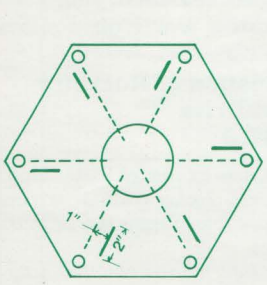
Photo by Rick Allred, Space Center Photographer

From left to right are shown: Robert Turner, Mayor Joseph Jojola of the White Sands Missile Range, Mayor Tomlin, and Jim Salvador, Director of Youth Services for WSMR. The sign reads: "This model rocket was launched at White Sands Missile Range, New Mexico, U.S.A. on July 19, 1990 to commemorate the 15th anniversary of the Apollo-Soyuz Test Project. During this mission, American astronauts and Soviet cosmonauts linked up in space."

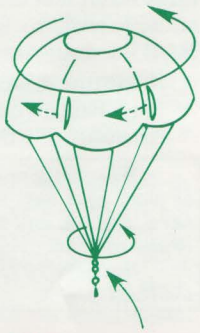
IDEA BOX

SPINNING PARACHUTE

To add a little extra action to your next rocket launch, try this technique for making your parachute spin during descent! Don't forget the swivel, or you may find your shroud lines a bit tangled. This idea originated with our sixth grade rocketry class.
Contributed by Greg Yarbenet, science teacher at Rice Middle School in Girard, PA



6 slits, 2" long, 1" from center line


SWIVEL - good quality for least amount of friction

DECALS

To make your decals fit exactly, it is often helpful to trim off all or part of the clear portion around the colored portion. This permits the decal to fit into tight spaces perfectly. Trim off the "extra" clear before soaking the decal in preparation to application. Also, wash your hands before working with the decals to avoid getting dirt or oil on them.
Contributed by Shane Anderson, Elgin, IL

EASY MASKING FOR PAINTING

Ever paint a beautiful rocket only to have the second color chip or peel when you remove the masking tape you used to mask for the second color? There are several ways you can minimize this problem. You can place the sticky side of the tape on your forehead or other surface (not the one you are about to paint!) to reduce the "tack" of the adhesive.

Or you can skip the tape and use strips of newspaper which have been soaked in water. Apply the straight edge of the wet newspaper to the area you are to paint. Then spray on the second color to your heart's content. (But don't get so carried away that the paint runs—Editor). After spraying, put the rocket aside so the paint can dry a little, then remove the newspaper to leave a clean, "unchipped" edge.
Contributed by Robin Sharpe, Panhandle, TX

FAST WAY TO ROUND FIN EDGES

This simple device has really helped in quickly and neatly rounding the edges of fins. The 75+ youngsters in the 14 4-H clubs I work with each year as "specialty" leader have found this gadget very useful.
Contributed by Harlan Glanzer, Battle Creek, NE

TRACK THAT ROCKET ON CLOUDY DAYS

Tired of trying to track your model rockets? Try taping aluminum foil or tinfoil on the body of the rocket or sticking bright yellow tape on it.
Contributed by Clay Clary, Aiken, SC

ADDING A BIT OF "CLASS" AND CONVENIENCE TO YOUR LAUNCHES

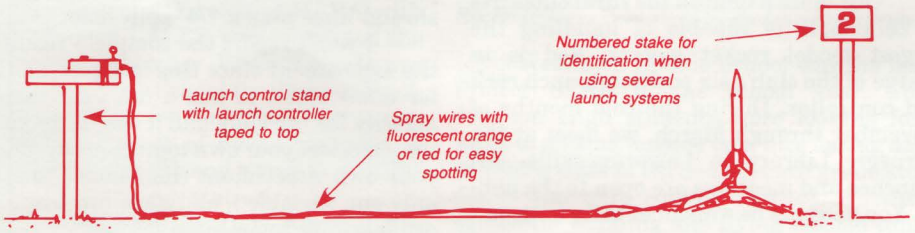
In northeast Tennessee, we often have to launch model rockets in grassy fields. To make it easier to see all the parts of the launch system and not trip over the wires, try making a few things to make it more convenient for yourself. You can make a support to hold your launch controller by attaching a 6-8" length of wood bolted to one end of a two to three foot length of 2" or larger wood. Hammer the other end of the wood into the ground. Tape your launch controller to the piece of wood as shown.

Spray your launch controller wires with fluorescent orange or red for easy spotting.

When several launch systems are set up, provide each launch pad with a nearby numbered stake, also painted flourescent orange, of course.

To direct spectators and rocketeers to a launch site, make directional signs in the shape of large rockets cut from cardboard and painted in bright colors.
Contributed by Dr. Lovett P. Reddick, NAR #44721, Kingsport, TN

And thanks to Staffel Baron Dan "Von" Hobbs, Howe, IN for separately contributing the idea about making the wire from the controller a bright color.



A NICE PHOTO DISPLAY

Take a photo of each of your rockets and put the pictures in one of those "Family Photo Frames" that hold many pictures in one frame. It makes a nice decoration for your room.

You can do the same with your best AstroCam™ photos or action shots of your rockets at takeoff or in flight.
Contributed by Bill Cooper, Freeport, PA

A SPARE IGNITER

To have an igniter handy for the next time you experience a misfire, carefully tape a spare igniter to the bottom of your launch controller. This way you will always have a "spare" for use when needed.
Contributed by David Max, Hickory, NC

COST SAVING TIPS

The construction and launching of model rockets is a very important part of my semester Space Science class. I believe that other teachers and club leaders can benefit from these cost saving tips I use with my students.

1. Buy white glue when it is on sale in small, 4 oz. bottles during "Back to School" sales in the fall. It is often half-price.
2. Buy "cutter blades" (single edge razor blades) from the local supermarket manager. Clerks in the store use them to open cardboard boxes.
3. Buy sandpaper during "Spring Fix It Up" sales. Cut the large sheets into 1/4 sheets using a paper cutter. Limit the amount of sandpaper available so students share the available pieces.
4. Let the students use any color spray enamel they have at home to paint their rockets. This avoids the cost of supplying paint and the mess that somethimes goes with painting.
5. Buy engines in Bonus Packs because it saves money and you get wadding and extra igniters.
6. Use a small piece of wadding (thumbnail size) and the end of a paper clip method to secure the igniters in place in the engines. Have the students follow your example as you demonstrate this method during pre-launch procedures. This works much better than just using masking tape.

Contributed by Glyn Brice, Whitford School, Beaverton, OR

THE PITTSBURGH SPACE COMMAND

By Art Nestor, NAR #29623, Zelienople, PA

The thrill of a model rocket launch is something that I still enjoy very much. The satisfaction gained from our hobby is multiplied when you fly with friends. Since 1966, my involvement in model rocketry has given me valued friends, great memories, and endless hours of fun. My most memorable moments were those shared with a fellow rocketeer. That is why, in 1986, I decided to organize a club. It wasn't hard, and the friends I gained as a result made it all worthwhile.

In 1978, I joined the NAR (National Association of Rocketry). This is an organization of serious model rocketeers of all ages from across our nation. NAR has provided me with benefits and help to start a club. Local clubs belonging to the NAR are called Sections. A Section consists of at least five NAR members, one of whom must be an adult (over 21).

In the early days of model rocketry, Pittsburgh was very active and was known nationally for its PITTSBURGH SPRING CONVENTION hosted annually by the Steel City Section #157. This section was founded in 1964 by Jay Apt, currently a NASA Space Shuttle Mission Specialist.

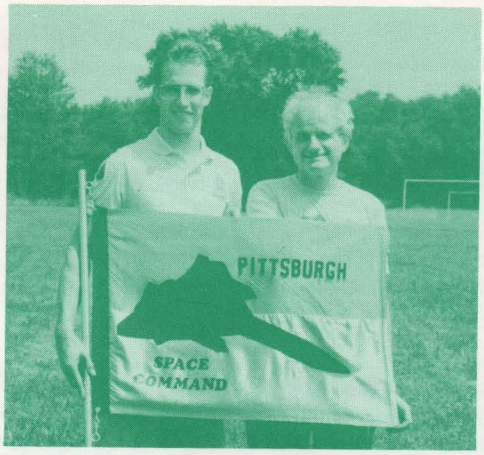
As the hobby grew here, another group formed the Three Rivers Section #172. The South Pittsburgh Area Rocket Klub #399 folded in 1979 after only two years. I never participated in these clubs. All three disappeared in the 1970s.

The NAR has its entire membership roster on computer. I obtained a printout of all current NAR members with a western PA zip code from NAR headquarters. I wrote up an application and letter of introduction to create a club. Both were typed, signed, photocopied, and mailed to everyone on the list. These costs all came out of my pocket. It was worth it. Three applications came back immediately. Within a week, five more responded. On May 5, 1986, we were chartered as NAR Section #473.

While I was forming the club, I decided to name it, also. The name was derived from a proposed new department of the Armed Services I had read about in the Pittsburgh Press--the United States Space Command.

At our first club launch, we elected a President, a Vice President, and a Section Advisor. Later, we added a Treasurer and a Competition Committee of three. Annual dues are $4 for those 16 years and under. Dues for those 17 or older are $8. From that first launch, we have grown from a group of strangers to a family of friends. We have never missed a monthly meeting.

Everyone pitches in to make our Sectin a success. One member, Rod Schafer, took the initiative to create a club flag. We had previously decided to adopt red, black, and silver as our club colors and the SR-71 as our emblem. Rod purchased the materials and coaxed his cousin, a seamstress, into sewing up the flag. We proudly display it at every launch.



PSC Flag being held by Rod Schafer on left (who created the flag) and Mort Binstock

Each September, Drew Gray and his parents in Brookville, PA host the Brookville Bash and picnic. This meet is the highlight of our summer launch season. Nearly 40 people enjoy flying and great food in a quiet country setting.

Mort Binstock is one of the main drives of our group. He was the first to respond to my letter and has become a close friend and supporter. Some of Mort's ideas to enhance the club were contests, a parachute research project, and PSC bumper stickers.

Our newsletter, Team Pittsburgh, has had several editors. But it was the work of Mike Hardobey in obtaining a professional look that set it aside from all others. The logo is in red ink on gray paper with the text in black. Our newsletter exchange trades Team Pittsburgh for other club newsletters from across the U.S.

Photos courtesy of Art Nestor

I designed the club T-shirts and newsletter logo. A local print shop and custom T-shirt store were happy to work with my ideas. The creation of a silkscreen, including artwork, cost about $20. I took a photo of the SR-71 to the store, selected a letter style, and discussed the layout. Our shirts are, of course, gray with red and black paints.

Our launch field on the rural outskirts of Zelienople is capable of handling the largest model rocket motors. Rod is in charge of the club's six position launch rack and controller. During the cold months of November through March, we meet at the Carnegie Library in Lawerenceville. All launches and meetings are open to the public. You need not be a member to fly with us.

What we have accomplished is not extraordinary. Other clubs have done this and more. But the good spirit we share rivals the best of clubs. For more information, model rocketeers in western Pennsylvania can contact me at:

Art Nestor
230 Arthur Street
Zelienople, PA 16063

I am Section Advisor.

Pennsylvania is **rocket territory.**

Details of many NAR Section activities can be found in the "Section Highlights" column of American Spacemodeling, the NAR's official magazine. Those interested in meeting rocketeers in your area or who wish to form a new club, contact NAR headquarters at:

National Association of Rocketry
1311 Edgewood Drive
Altoona, WI 54720

Why not join a nearby model rocket club or start your own model rocket club? It is not hard, and you will have lots of extra fun in your model rocket activities.

See page 10 for information about joining the NAR.

Continued from page 9

JUNE 1990 WINNERS: Aaron Pulver, Platteville, WI (Launch device). **Doug O. Erickson,** Thomaston, ME. **Dean Pilato,** Warren, MI (Wayward II). **HONORABLE MENTION: Kevin Cole,** Swift Current, Saskatchewan (Trooper). **Scott Liker,** Chesterfield, VA (Flaming Falcon). **Chad T. McMullen,** Colorado Springs, CO (Thunderbird).

AUGUST 1990 WINNER: Shane Anderson, Elgin, IL (Ogre II).

SEPTEMBER 1990 WINNER: David Shaw, Dayton, OH (American Red Fox).

OCTOBER 1990 WINNER: Dean Pilato, Warren, MI (Hammerhead Rocket).

BIG BERTHA PARACHUTE STUDY

The information for this brief article was furnished by Mort Binstock of the Pittsburgh (PA) Space Command, NAR Section #473.

During May through July 1989, the Pittsburgh Space Command conducted an interesting experiment. The group conducted a series of flights with Big Berthas utilizing different types and sizes of parachutes to determine the type of parachute which provided the longest duration flights. The entire club was involved.

We utilized standard techniques in constructions and built all models apporoximately the same so that variations in duration would be determined primarily by the type of parachute used. They tested 30" 'chutes with six 60" shroud lines, 26" 'chutes with eight shroud lines, 18" standard 'chutes, standard 'chutes with 36" shroud lines and spill hole, 18" eight panel hemispherical 'chutes, and 12" chutes with 33" shroud lines plus a 1/4" spill hole.

I won't report the complete results of the experiment since this is a good activity for other clubs. It was a fun and learning activity for the club, and it can be for yours, too. So select your own topic to study, design your own experiment (Remember to study only one variable.), and have fun while you are learning something!

A STEP BEYOND

By Nate Chronister, New Paltz, NY

Model rocketry is the world's most rewarding hobby. But to get the most out of it, you can make it even more interesting by going **a step beyond** the usual.

To fully appreciate model rocketry, you need to experience the thrill of seeing a model rocket of your own design take to the air! It is easy to get started in designing your own rockets, and there is no end to what you can create.

For those of you who have yet to design and build your own model rocket, start with a few simple, basic models. Build them using the usual construction techniques with typical Estes parts. Before you fly your new model rocket, you must test it for stability to make sure that it will fly safely.

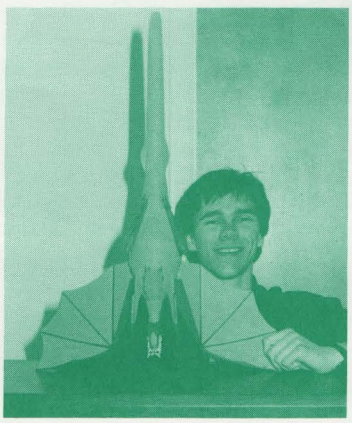
Here is how to test it for stability using the standard "string" or "swing" test. First, put in the largest (heaviest) engine with which the model will ever be flown. Second, tie a loop of string from one end of a six to eight foot long string around the model at its Center of Gravity (point at which it balances, half of the weight on one side of the string and half of the weight on the other side). Tape the string in place in this position with masking tape. Third, carefully swing the rocket around in a large, clear space. If the rocket points forward as it moves through the air, it should be stable in flight. If it does not fly nose-forward, you may be able to make it stable by adding weight to the nosecone or by adding fin area. Retest after making the modifications. If the model now flies properly, it should be stable for actual flight.

Estes publication The Classic Collection #2845 contains Technical Report TR-1 on stability. The Alpha Book of Model Rocketry #2820 also contains helpful information, as does The Rocket Book #2859.

Once you understand the basics of rocket stability, you are ready to use your creativity in exploring some exciting options. For example, the National Association of Rocketry holds contests for members who design and build special high-performance models. Other modelers build and launch payloads which send back scientific information by telemetry. There are many other interesting possibilities, including:

1. Eggshell Models
   This is an interesting variation on egglofting. Build a tiny model rocket using a plastic egg body and nose cone. The model can have breakapart recovery. It could have featherweight recovery. Maybe, once you get really good at this, you could use a real eggshell, extra large. Of course, these would use mini-engine power. Who knows, this might be a new contest category!
2. Backyard Rocketry
   This term applies to any model rocket which requires a minimum area for recovery. It applies to rockets which must not get caught in trees. Having the capability to launch without having to stay far away from even small trees can make it easier to find a suitable launch site. The secret to this technique is using a rocket with featherweight instead of parachute recovery. The rocket should probably have short, broad, triangular fins that will enable the rocket to slip between the branches should it accidentally get into a tree on recovery.
3. Recovery Aids
   Make a homing device from a small buzzer from Radio Shack. A switch, the proper batteries, and some wire can be developed into a nice noisemaker. Putting this device, activated, into the nose cone or payload compartment of your rocket can be a great help in finding it in tall grass or brush.

   In case you get carried away with your launching and find that it is getting dark before your last parachute duration bird has decided to come down, having a light in the nose cone or in the payload compartment can help you find the rocket. A small battery-powered light or a chemical light stick can provide plenty of light to find that errant bird, either in the air or on the ground.
4. Funky-Looking Rockets
   We all know and love the science fiction models (Just wait till you are old and gray and then see what McDonnell Douglas, General Dynamics, TRW, and the other manufacturers are rolling of the assembly line then. You may find that the future is getting here faster than you think!—Editor) in the Estes catalog. But you can develop your own "exotic" ("strange or different in a way that is striking or fascinating") model rockets.

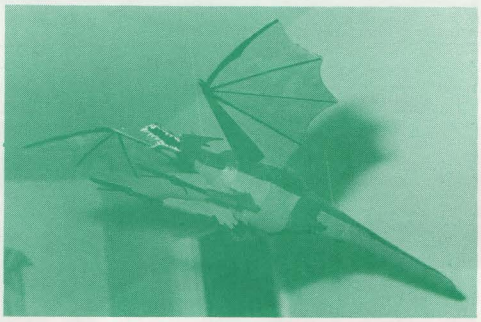


This photo shows my ultimate piece of rocket technology. This dragon really flies. Thanks to an Estes D engine, it really breathes fire through its mouth. It is a very complicated structure of paper, cardboard, carved balsa arranged around two Estes body tubes. A bright red, 28 inch parachute is kept in the nose cone instead of the body tube. Behind this, there is a cardboard disk which protects the parachute by eliminating the need for recovery wadding. Despite its weird looks, this is a model to be heard as well as seen. It is made resistant to damage from repeated flying by plywood reinforcement and rugged attachment of the wings.

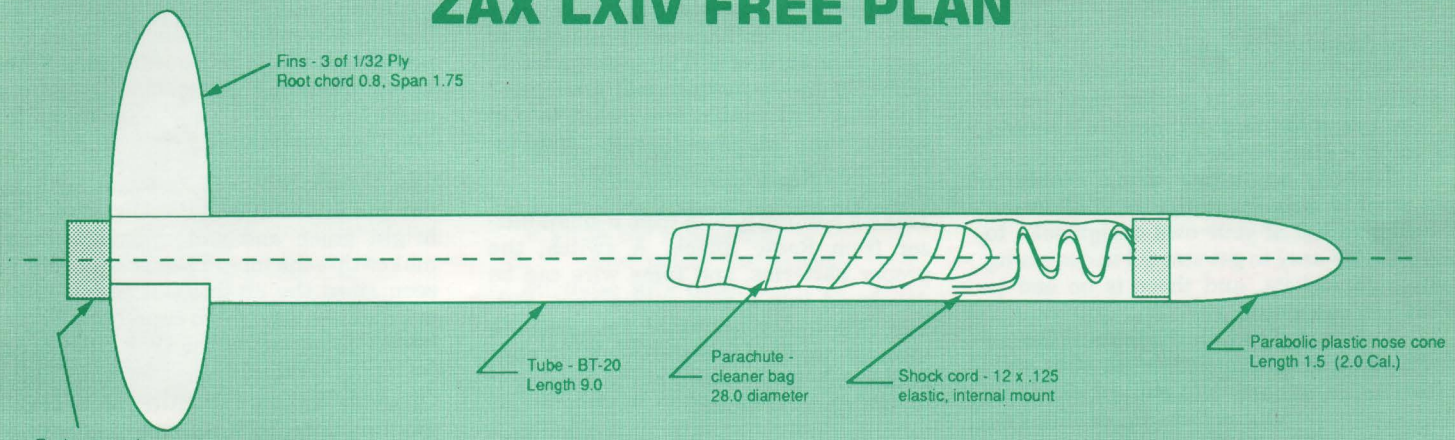
The greatest problem I faced in building the Dragon was how to insure stability with two wings instead of three or four fins. The result is a delicate balancing act between the wings and the structures on the underside, plus a slight downward curve in the tail. This is not a model for less than expert rocketeers.

The Dragon goes up tail-first spewing fire and smoke during its slow liftoff. The bright green and yellow paint scheme makes this the most awesome rocket I've seen since the 20 foot tall rocket made of billions of styrofoam cups and powered by four D engines at the 1989 Pearl River MODROC Seminar.

Of course there are countless ideas I can't mention here, both because of space and because I haven't thought of them yet. But you can have fun discovering some of them for yourself. Something to keep in mind: **Don't get careless, and don't do anything that might be dangerous.** (When conducting research activities with unproven designs or methods I will, when possible, determine their reliability through pre-launch tests. I will conduct launching of unproven designs in complete isolation from persons not participating in the actual launching. Rule 12, Model Rocketry Safey Code.)



ZAX LXIV FREE PLAN



General Data and Notes	
Overall Length:	10.5 in. (w/o engine)
Gross Launch Mass:	35 gm
Mass Minus Engine:	8 gm
Engine Type and Make:	C6-7, Estes
Parachute Design:	28" circ. cleaner bag, 8 s/l
Flight Conditions:	clear, 5mph winds from W
Launcher:	2m tower
Notes:	Launched 15° upwind to maximize time overhead of timers. All dimensions are in inches.

By David B. Cook, San Diego, CA

This model holds the C division Parachute Duration record. This information is reprinted with permission of David B. Cook.

ZAX LXIV
C Parachute Duration - 388 sec
By Dave Cook, NAR 21953
26 February 1989
Lucerne Dry Lake, CA

DO-IT-YOURSELF ROCKET LAUNCHER

By Edward S. Guzdziol, Honored Science Teacher, Worth Junior High School, Worth, IL

This article is based upon personal correspondence and a copy of a talk titled "Model Rocket Launcher Workshop" presented at the Illinois Science Teachers Association convention on November 3, 1989. He presented the program for fellow Honored Science Teachers at Illinois State University during the summer of 1989.

Science teaching is a dynamic process. Changing curricula, varying educational philosophies, and an array of science teaching methods make a teacher constantly reevaluate what should or should not be part of his/her curriculum.

I suggest we all use model rocketry and its many extensions in our classes. The range of activities and diverse applications have made it easy to understand why rocketry has remained such a proven classroom activity.

This testimony aside, there are two areas of concern that teachers should be aware of:

1. Launch system expense
2. Portability and reliability of the launch system

The system presented here allows the rocketry-inclined student the joy of building his/her own personal launching system while learning basic circuitry and inventive uses of readily available materials deserves your consideration for inclusion into your rocketry curriculum.

The launch system presented below has successfully been used with 5th through 8th grade students. Even though soldering of the connections adds another societal, technological, and scientific dimension to the activity, it is not essential to the successful construction of the launch system. The students get equally satisfactory results when using 3/16" quick disconnect connectors. I personally feel soldering opens another area of learning, and I always use this method.

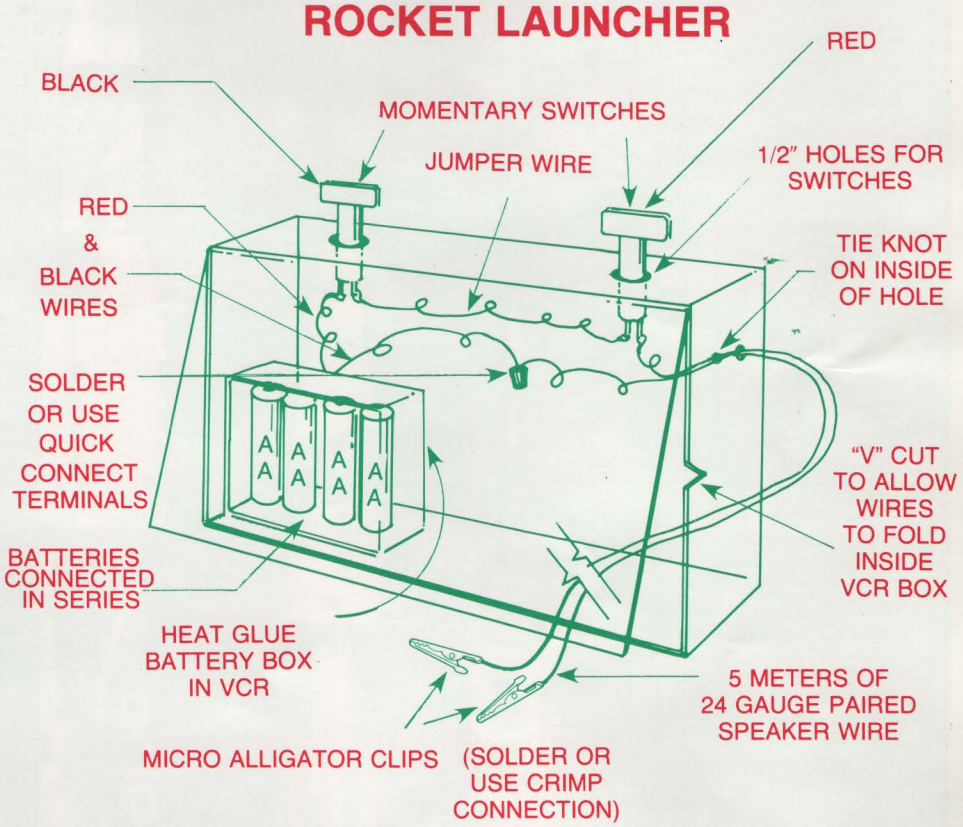
The launch control device is made using the plastic case which encloses a VHS videotape. Parts needed include a package of two momentary contact switches, two copper microclips, five meters of speaker wire, four AA alkaline dry cells, and a battery holder for them. All of these supplies can be purchased at your local Radio Shack or other store. Tools you will probably want to include: side-cutter pliers, a wire stripper, a 1/4" drill bit, a 1/2" drill bit, a roll of 0.32 rosin core 60/40 solder, a soldering iron, and a hot glue gun. The diagram illustrates the completed unit. If you want to make your own launch pad, you will also need a 1/8" x 3 foot length of piano rod, an octagonal cover for an electrical box, and a 1" x 1/4" tension pin.

The drawing illustrates the completed electrical ignition system. Space does not permit us to reprint the complete assembly instructions.

If you would like to receive a copy of the talk with complete instructions on building the electrical ignition system, send a SASE (self-addressed, stamped 9" x 12" envelope) with 45 cents in stamps attached to:

Edward S. Guzdziol
Worth Junior High School
112th & New England
Worth, IL 60482

ROCKET LAUNCHER



ROCKETRY SCIENCE KIT REVIEWED

Larry Shenosky is product reviewer for and acting editor of American Spacemodeling. In the July/August 1990 issue, he did a review of the Estes Rocketry Science™ Kit. Here is part of what he said, reprinted with permission:

"The product's chief asset is the excellent 36 page project manual which explains the math and physics aspects of the hobby in an easy but sophisticated manner. The manual also covers the basics of experimentation and project design...giving aspiring rocket scientists a quick start developing a custom project.

"...Teachers who have seen the manual have commented on its clarity. It does not "talk down" to the modeler."

ANSWERS FOR TRIVIA HUNT

1. Buzz Aldrin
2. Roger Chaffee, Gus Grissom, and Ed White
3. Yuri Gagarin
4. Valentina Tereshkova
5. X-15
6. Sergei Korolev
7. Ariane
8. Homing All the Way Killer
9. Massachusetts
10. Bell X-1
11. General Chuck Yeager
12. RL-10
13. Werner von Braun
14. Mike Mullane
15. Northrup Strip or the White Sands Space Harbor
16. Dr. John P. Stapp
17. The minitrack
18. The Little Joe
19. Jarvis, Resnik, McAuliffe, McNair, Onizuka, Smith, and Scobee
20. Earth
21. First manned lunar landing

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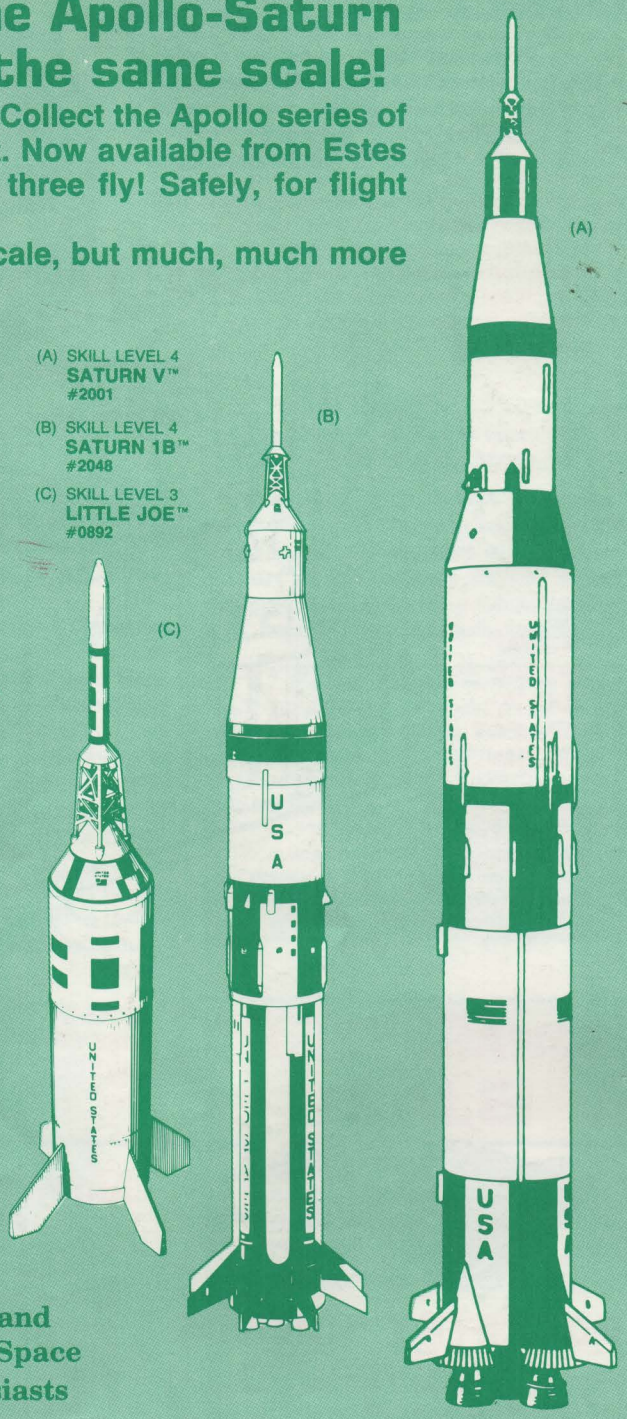

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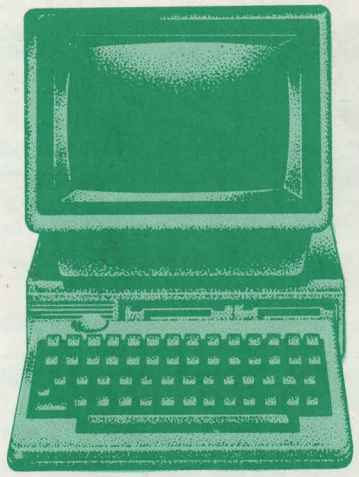

Now you can build superior birds...contest winning rockets! Design your own model rockets...or use a standard kit...and then OPTIMIZE IT!

How, you eagerly ask? Simple, reply I. Use the Estes computer software to design, and redesign, and re-redesign, and optimize your rocket...without having to build it! Once you have rearranged the parts to produce the absolute peak performance, then you can build that dream bird.

PC AEROTREK™ by our own Mike Dorffler provides many fast, easy to use programs to let you really predict the performance of any rocket configuration you dream up. And the results are reliable. It even provides two programs on what your model rocket could do if you launched it from the surface of the moon! (These last two can't be proven by experiment yet [The others can], but who knows, by the time you are old enough to qualify for flight status as an astronaut, we should return to the moon!)

PC ASTROCAD™ by Michael Gasperi provides ten programs to let you predict and analyze the drag, stability, performance, etc. of your model rocket. Lets you analyze effects of changing a fin, lengthening body tube, etc. Very useful programs.

Both programs are now available for both Apple II series and IBM computers.

Use these products to design and redesign your rockets this winter, then take home the top trophies next spring!

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PC AEROTREK™ for IBM computers #9034 . . . . . $19.95
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