



FALL
1988

MODEL ROCKET NEWS MAGAZINE

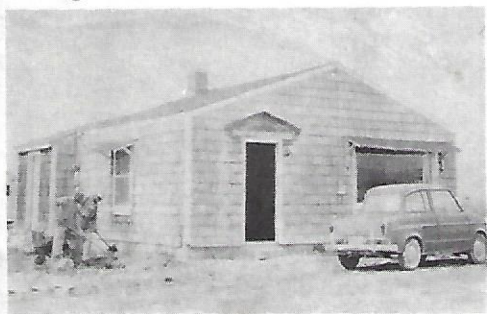
DEDICATED TO AND PUBLISHED FOR ESTES ROCKETEERS, AMERICA'S FUTURE IN SPACE



1988 IS THE THIRTIETH ANNIVERSARY OF ESTES INDUSTRIES!

Thanks for making it possible!

The company was founded in 1958 by Vern Estes and his wife Gleda. The first products were model rocket engines for Model Missiles, Inc., a Denver company. Vern invented and developed Mabel 1, the first really successful machine to make reliable model rocket engines. The company soon introduced a few parts sold by mail order. It grew. Yes, Gleda actually did roll some body tubes on her kitchen table using a section of broom handle. Some of the early catalogs had the pages sewn together on a sewing machine.



Vern and Gleda soon moved to Penrose to have room for growth. This photo shows the first office building in the process of being renovated from a four-room house to become the first headquarters of Estes Industries in Penrose, Colorado. They hired two local men to help. At that time I doubt that even Vern and Gleda dreamed that this location would soon become the Model Rocket Capital of the World, a title which it can still claim today.

Estes Industries continued to grow. We now employ hundreds of people. In 1969 Damon acquired Estes Industries. In following years Damon acquired Vashon Indus-

(Continued on page 3)

AEROTREK™ MODEL ROCKET ALTITUDE PREDICTION TOOLKIT

By Bob Cannon, Manager, Educational Services and Editor, *Model Rocket News Magazine* and *Estes Educator News*

The first question any new model rocketeer asks is "How high can model rockets go?". You can determine how high a rocket did go by tracking its flight. You can make a good prediction of how high a rocket can go by analyzing the rocket and its engine.

The factors involved in predicting the height a model rocket will reach on a specific flight can be measured. Use of equations allows you to predict the performance. Knowing how such things as the size of the rocket, its surface smoothness, etc. affect rocket flight can help you make much better rockets.

AEROTREK-1 which is printed on page 7 is a program which helps bring these concepts together. It is written in Applesoft Basic and will run on any Apple II computer. It is extremely simple to use, requiring no input from the user. Only the <Y>, <N>, arrow keys, and <RETURN> are required to enter all the data needed to perform the altitude prediction computation. In addition, the program allows the computed flight results to be printed out on an Imagewriter II printer.

Mike Dorffler, who wrote the program, has added REM statements throughout to explain how the program works and specifically on each line from 770 to 930 which are the actual mathematic flight calculations. The program will take approximately 2 hours to type in. It is **STRONGLY** recommended that the program be typed in **EXACTLY** as shown. Pay special care when typing in the DATA statements beginning at line 1440 Save the completed program to disk with the command: SAVE AEROTREK.1

In addition to the single stage altitude prediction program, Mike has written a program for two stage flights, three stage flights, single stage cluster flights, single stage incremental weight flights, and a Designer's Scratchpad program. The Designer's Scratchpad program allows single stage altitude prediction up to 160 NS model rocket engines and body tubes up to 128 mm diameter.

And that's not all, ever wonder how high a model rocket would go if it were

(Continued on page 7)

THE REAL WORLD OF SPACE?

By Steven Jochums, President, Illinois Valley Aerospace Club and Vice-President, Peoria L-5 Chapter of National Space Society, Roanoke, VA

As I poured through a batch of old model rocketry papers the other day I came upon an old Estes catalog. It was published in 1971, the year that my Interceptor was brand new (and on the front cover of the catalog), and Project Apollo was in full bloom. A little more than a year before Neil Armstrong became the first man to walk on the lunar surface. Other Apollo flights were now sailing the proven path to the moon. Our country seemed bound for the future, and participating in model rocketry was more than just simple fun. It was a personal participation in the adventure of space flight.

As I opened this old catalog, I saw these words on the first full page "NOW...you can step into the real world of space...". At that moment I remembered how different things felt today than they did back then. "The real world of space", huh? The wonderous world of model rocketry seems so much more appealing than "the real world of space" that we find in our country today.

Back in 1971 we, as eager young Estes Rocketeers, were unaware of the budget battles going on in the closed rooms in Washington which were to shape the future of America in space. It was in 1971 that the Space Shuttle was being systematically whittled down from a two-stage, fully reusable system with a fleet size of ten, to a reusable Orbiter with a disposable External Fuel Tank and two Solid Rocket Boosters with a fleet size of, maybe, five. NASA had received the go-ahead from President Nixon but would never receive the support necessary to build the Shuttle the way it was originally proposed.

In the stretch of years from then to now NASA has had to use more and more of its steadily declining resources to build and operate the Shuttle. Because of penny-pinching back then, the Shuttle costs more to operate now, sapping NASA's ability to do other useful work in space.

This is a very different picture than I or anyone else would have imagined for our future in space back in '71. But in real terms, it was the decisions made by Congress and the President back in '71 that have affected NASA's policies and shaped the course of our space program ever since. This is an important fact to remember as we, today, look toward our future in space.

(Continued on page 5)

MODEL ROCKETRY BRIEFING AT AFJROTC WORKSHOP AT MAXWELL AFB

By Wayne McCain, Senior Advisor, Huntsville Area Rocketry Association, NAR Section 403, Huntsville, AL

As a guest of the Air Force Jr ROTC at their annual workshop at Maxwell AFB on July 30, 1987, Wayne McCain, senior advisor of the Huntsville Area Rocketry Association, led a one hour briefing on model rocketry for over 130 Air Force officers and school principals. The purpose was to orient the ROTC instructors to the educational benefits of model rocketry in the aerospace curriculum. McCain, a Marketing Manager for Morton Thiokol's Aerospace Group, has been interested in rocketry and aerospace for over 20 years since his early exposure to Estes model rocketry. He has been professionally involved in aerospace for 15 years, and is currently working on a Doctorate at the University of Alabama in Huntsville in his "spare time".

The briefing included a little history of the hobby as well as comparison of model rocket engines to commercial propulsion systems. Samples of an inert propellant similar to that used in the Space Shuttle SRB were passed around. Audience participation was great. Several individuals shared their modeling experiences.

McCain, his wife Dana, and young son Matthew adjourned the group to the field

outside the elementary school in which the workshop was being held for about a dozen demonstration launches. The Estes SR-71™ was the obvious favorite of the blue-suited crowd. Despite the 100 degrees of heat and 95% humidity, everything went well and all models were recovered. Major Moreman and his son have taken up model rocketry as a hobby.



Photo by Dana McCain
Wayne McCain (left) and Air Force Major Henry Moreman. McCain is holding an Estes Shuttle Orbiter built by John Anglin specially for the event. Moreman is holding HARA President Vince Huegele's Big Bertha™

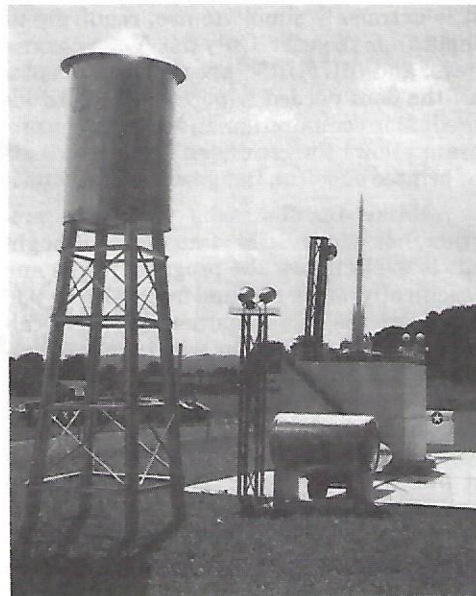
ON ANY GIVEN SCALE

By Sam Gordon, Oil City, PA

T-24 hours and counting as a large van loaded with equipment rolls down the access road to Launch Pad 7. Soon, trucks, cars, and an array of scientific equipment will fill the area. As the sun slowly starts its eastern sojourn, the huge orange service structure starts to roll back revealing the gleaming white rocket perched atop the launch pad.

A day at Kennedy Space Center?...Not exactly. What it is is the most unusual model rocket launch in the world. It all takes place in Cooperstown, Pennsylvania on the average of four times a year. Large crowds of spectators are treated to a display of model rocketry that rivals the real thing.

The layout consists of 3 separate launch areas, 100 feet of connecting highway, 10 buildings, 10 light towers, a bridge, an industrial area, swamps, cranes, tanks, a control center, parking lots, radar towers, an observation area, and more, all constructed in 1/6 scale. Construction on this unusual launch site began in 1977 in HO scale with the first launch taking place in April of 1978. Costing thousands of dollars to build, along with countless hours of work, the complex has gone through several scale changes including HO, O, and 1/20. With every launch, another facet of ground support equipment emerges. The huge 1/6 scale has just about everything that a real space center has.

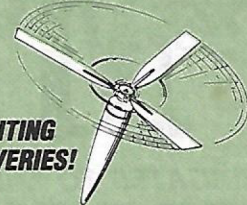


The system is owned and operated by the Sam Gordon family of Oil City, Pennsylvania. Everything had to be custom-built from photographs and measurements taken of real equipment at the Kennedy Space Center. Fuel trucks are over 5 feet long, floodlight towers stand nearly 6 feet high, a blockhouse is over 8 feet in diameter. The huge launch pad constructed to resemble the Delta launch facilities at the Cape has a

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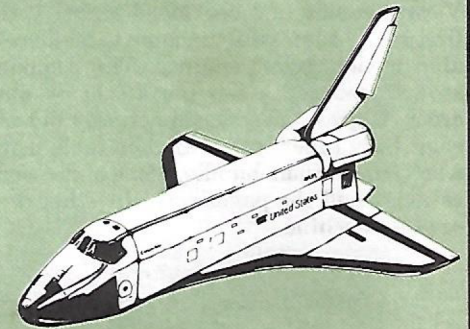
Have as much fun watching a model rocket descend as you had as it was launched.

- ★ Be sure to have at least one HelioCopter™ flown at your big Rocket Launch. The spectacular descent, from 800 feet, is a real crowd-pleaser. (And it gives you a chance to talk later about rotary wing aircraft, if you wish.)
- ★ 25.4 inches of rocket at launch, 12 inch parachute for recovery of the rocket. Plus a helicopter recovery nose cone! Spectacular flights with Estes C6-3 or C6-5 engines.



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LAUNCH YOUR SPACE SHUTTLE™ NOW!



NASA's Space Shuttles are to resume flight schedules in September. Launch your own Space Shuttle™ now. See catalog pages 5, 32, 36, and 56.

ESTES MODEL ROCKET NEWS MAGAZINE

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Charles Webb Photographer
Chuck Sherjanec Graphic Design
Margaret Swope 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.

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MESSAGES FROM LAUNCH CONTROL

New Computer Product

Our own Mike Dorffler has written a very useful new series of computer programs to help you. The new product containing these programs is called AEROTREK™ Model Rocket Altitude Prediction Toolkit, #9033, and retails for \$19.95.

We are giving you a free treat. The first program on the disk is printed for you in the article beginning on page 1. Input this program and run it on your Apple II series computer. Better yet, buy the disk and have all of the programs already on the disk for only \$19.95.

Survey

Thanks to the hundreds of rocketeers who completed and returned the questionnaire from the Fall 1987 MRNM. The results were helpful in our initial New Products meeting for our 1989 new products

The survey revealed that the "Idea Box" was the most popular feature. Free plans was next most popular. (Please send in your entries for this year's Free Plans Contest!) We hope to publish free plans in many future issues. Technical articles nearly tied Free Plans in popularity. The comments about the favorite articles supported this choice. (Keep those good articles coming! We can't publish your article if we don't have it!)

Ads and "Messages From Launch Control" were next most popular, each scoring over 50% readership.

As usual, many of you are new to model rocketry. But nearly half of you have been in the hobby for five years or more. And well over half of you can handle Skill Levels 4 or 5. Great!

Most of you have built over 10 kits. A large number of you are 18 and over. Most of you launch every rocket you build. Well over half of you buy from local hobby shops as well as by mail order from Estes. I am happy to report that about 1/3 of you belong to the NAR.

Over half of you want more Skill Level 4 models, high tech products, and rereleases of classic Estes kits. You will note from the 1988 Estes catalog that we are already working on these things.

Fast Service

Thanks to Noah Beck of Lebanon, OH and others who have sent in letters thanking us for our fast service. We try to provide quick service, and we usually succeed.

The Real World of Space?

This thought-provoking article by Steven Jochums starts on page 1. It was submitted a year ago. The content is still all too true. Our country needs to dream again! We can aspire to achieving only that which we can dream. Lately our national dreams tend to seem small, short-term, and self-limiting. Please heed his message and write your congressman. Model rocketeers are generally the individuals "with stars in their eyes". This country right now needs more people with stars in their eyes and the willingness to work to make their dreams come true.

Science Fairs

Yes, now is not too early to start thinking about next year's Science Fair entry. For the many thousands of you who are old enough not to be in the public school system, why not consider a good R&D project for presentation at NARAM or to write up for publication in American Spacemodeling or Model Rocket News Magazine?

Why not plan a great R&D project now? Even if you don't plan to enter it in a Science Fair or publish it, it may be the best way to answer that question about your rockets which has been bothering you for a long time. Besides, think of the edge you will have on the other Science Fair entrants if you get in some great research and flight data documentation now instead of trying to do everything at the last minute. (And it can be very cold to fly in February and March!)

Need to review how to do a research project? The "Foreword" in our Projects In Model Rocketry (#2831, \$0.80) has some good guidelines to follow. And the rest of the book has a lot of good ideas for projects involving model rocketry.

I was pleased to see model rocketry included (An Estes Saturn V even made the cover!) in a new book called Science Fare by Wendy Saul and Alan R. Newman, published recently by Harper & Row (paperback, \$14.95). If your library doesn't have one, ask them to order one.

Bob Conner

Have you joined the Estes Space Program? If not, why not do it now. It is a lot of fun, and it gives you a chance to earn and show off Achievement Awards for expertise in many different areas of model rocketry. See page 12 for more information

From page 1 "Thirtieth Anniversary"

tries and had Estes produce and market the cold-power rockets and rocket cars. Centuri Engineering was also acquired. Estes produced and marketed products for both Estes and Centuri companies for several years. Hi-Flier, a kite company in Illinois, was acquired by Damon. Its production and sales were transferred to Penrose to share facilities with Estes. Sales and some manufacturing operations for Hi-Flier are still carried out at Penrose, but Hi-Flier has just acquired a large facility in Pueblo, Colorado (a large town about 25 miles east of Penrose) to which most kite manufacturing operations have been transferred.

You are the reason Estes Industries has continued to grow. Thanks for supporting us through your purchases of our model rocket kits, engines, and supplies. We will continue to bring you the best in model rocketry products.

From page 15 "ESP Corner"

Test the clothing item to insure that high temperatures will not damage the fabric, especially if you are putting the patch on synthetics such as nylon. High temperatures for prolonged periods of time will distort the appearance of the emblem. Set the machine at 360°F or hand iron on synthetic setting. Remove the paper backing. Place emblem on garment for application. Cover the emblem with wax paper or tin foil. Apply pressure for approximately 10 seconds. For extra protection, after the patch has cooled carefully stitch the patch in place with white thread by carefully sewing around the white border of the patch.

Then wear the patch with pride!

WANT AN ESTES 30TH ANNIVERSARY PATCH? SEE AD ON PAGE 16.

ESTES SPACE PROGRAM MEMBERS

The following is a list of some of the first rocketeers to join the Estes Space Program™. Sorry, but we do not have available the entire list of members or the names of the Achievement Awards earned by these ESP members. If your name is not on this list, but should be, read the "ESP Corner" article on page 15 to learn what you can do about it.

MASSACHUSETTS

Matthew Fontaine, Chicopee; William Lutat, Westfield; Anthony Vincent, Spencer; Edward Lipman, Andover; Steve Paul Michaels, Lowell; Dan Gouvela, Westford; Darrell Richard Gagne, Beverly; Rob Dangel, Needham; Sean Gregory, East Taunton; Peter W. Kodis, N. Dartmouth; Brian K. Astin, Taunton.

RHODE ISLAND

Michael Iafrate, N. Scituate; William Deluca Jr., Providence.

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AD ASTRA

By Joseph L. Warnock, Independence, KS

Tribute was given to the Challenger and Apollo I astronauts by the students of Lincoln Memorial School in Caney, KS. Several different ways were used in the January 1988 tribute.

John Redfern, the school's music teacher, taught students in grades 3-6 the song "I Touch The Future (Reach For The Stars)" by Fred W. Stawitz. This song is part of the "Reach for the Stars" Day packet available from the Kansas-National Education Association, 715 West Tenth, Topeka, KS 66612.

Joe Warnock, third grade teacher, organized a Reach for the Stars Trivia Contest. Each student in grades 4-6 received a 76 question test about space and our space program. The students had ten days to use any resource materials (except asking people for answers) to find the information. A fifth grader, Jamie Cornett had the top score of 93%. Two sixth graders, Kim Evenson and Angela Lopez had 89% and 88% scores. The top thirty winners chose their own prizes from a collection of Space Shuttle models, books, and NASA memorabilia.

The third grade classes conducted a Challenger memorial rocket launch on January 28. The students watched video tapes of the selection and training of Christa McAuliffe and saw the weather-delayed attempts to launch flight 51-L. They viewed the launch, explosion, and address by President Reagan on the night of the disaster.

Teacher Joe Warnock, who had been an applicant for the Teacher in Space program, read short biographies of the Apollo I and Challenger astronauts. The classes adjourned to the playground for the rocket launch.



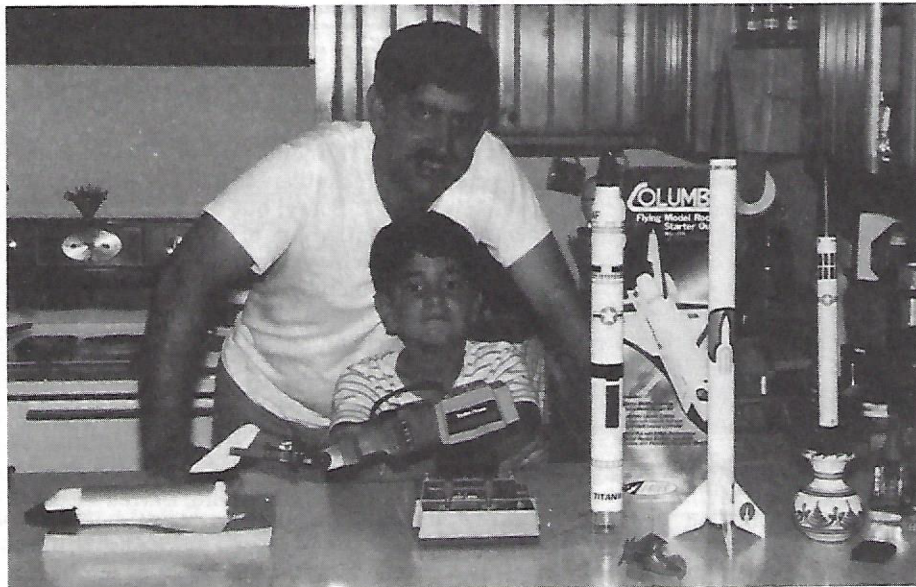
The specially constructed model was powered by an Estes D12-7 engine and carried a streamer to be separated from the rest of the rocket at ejection. The streamer carried the signatures of all the third graders on a pledge to "Reach for the Stars" in all their efforts in honor of the astronauts.

Rather than a countdown from 10, the students recited the names of the three man Apollo I crew and the Challenger 7 crew before the launch.

A computer prediction of the rocket's performance (program courtesy of Estes) forecast an apogee of nearly 2,000 feet. No one could deny that it went at least that high! At apogee the streamer was ejected to return separately and the recovery system for the rocket was deployed. Both parts were visible for a time during their return, but the wind caused a rapid drift to the northeast. We had not planned to recover the rocket as this seemed a more fitting tribute to allow it to drift out of sight.

The memorial was just that, memorable, and we plan another for next year.

HIGH TECH CONSTRUCTION TECHNOLOGY



This photo shows Joey Ovies of Boca Raton, FL and his dad Hernando. Hernando writes "Enclosed is a picture of my son and I happily building an Estes rocket. I used to build them in my youth, and when I had a son I thought he'd like them

too. I've built a few for him (He's 7.), and he loves launching them. I work for IBM in Boca Raton and building rockets is a great way to relax. Your magazine is great! Hope you publish the picture. We are the first to use Robotics!"

THERE IS NO SUCH THING AS A MODEL ROCKET FUSE

Every so often you may find a store offering a "bargain" in "model rocket fuse". Don't fall for it! There is no such thing as "model rocket fuse".

The NAR/HIA Model Rocketry Safety Code requires that "I will use only electrical igniters which will ignite my rocket engine within one second of actuation of the launching switch". (Part of Rule 9.)

This rule requiring use of only electrical igniters has been in the code for a long time. It was put there for a good reason--your safety. With electrical ignition you are in control of the ignition sequence. Until you insert the safety interlock key and press the launch button, the rocket can not take off. With fuses and matches, you no longer have absolute control. The fuse may not ignite. The fuse may go out after it is ignited. Even worse, it may not go out...but you think it has! This "hang fire" may result in someone going up to check on the rocket...just in time to have it zip off the launch pad as you are touching it. A bad scare! Maybe a few burnt fingers--or worse!

Use only safe electrical ignition systems and igniters!

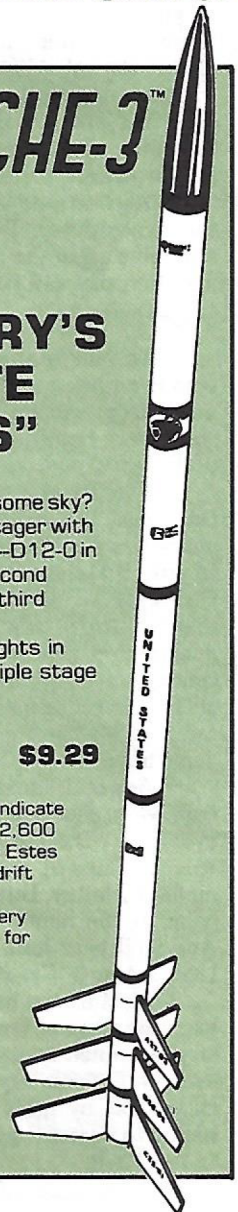
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- * Really want to grab some sky? Launch this three-stager with the maximum power--D12-0 in booster, C6-0 in second stage, and C6-7 in third stage.
- * Capable of great flights in single, double, or triple stage configurations.

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- * Repeated flight tests indicate that rockets reaching 2,600 feet at apogee (as the Estes Comanche-3) tend to drift long distances while in recovery mode. Recovery percentage diminishes for high flights.



GREAT AERIAL PHOTOS!

The Estes AstroCam™ 110 aerial camera takes excellent photos from high in the air. The 1/500th second shutter speed freezes the action. The shutter is activated automatically as the ejection charge deploys the parachute. The camera is the nose cone of the special Delta II™ model rocket. This unit is fairly heavy as model rockets go, weighing 3.75 ounces at launch.

Estes C6-7 engines launch the camera and rocket hundreds of feet into the sky. The long, 7 second delay engine lets the rocket coast past apogee and actually tilt toward the ground and start to fall before the ejection charge functions. At ejection the camera is pointing downward, so the camera snaps a vertical picture of what is on the ground. If the camera is pointing straight down, the photo shows the area directly beneath the rocket. If the camera is tilted to one side, the photo is oblique (slanted, not perpendicular) shot of the area to one side of the rocket.

The AstroCam™ 110 takes photos with standard 110 color film cartridges (ASA 400 or VIR 400). The camera takes one photo per flight. To take another picture from the sky, prep the rocket again with a fresh engine, advance the film, and reset the camera. Launch the rocket, and a few seconds later....Eureka! Another great spy shot from the sky!

The AstroCam™ 110 takes great color photos. Fly it with Estes C6-7 engines. See the two aerial photos in the article in the next column. These photos were taken with the camera of a teacher in Wisconsin.

ASTRO CAM™ 110 #1327 \$33.29



photo: Dick O'Grady, Wausau, Wisconsin

GREAT MR PROJECT IN WISCONSIN

By Dick O'Grady, Science Teacher, Riverview School, Wausau, WI

In May 1987 students in all four of my fourth grade science classes built and launched Alpha™ model rockets. They did a great job, including learning many scientific principles. We decided to take a group photo of the students with their rockets on the playground map of Wisconsin which they painted earlier in their social studies class.



photo: Dick O'Grady, Wausau, Wisconsin

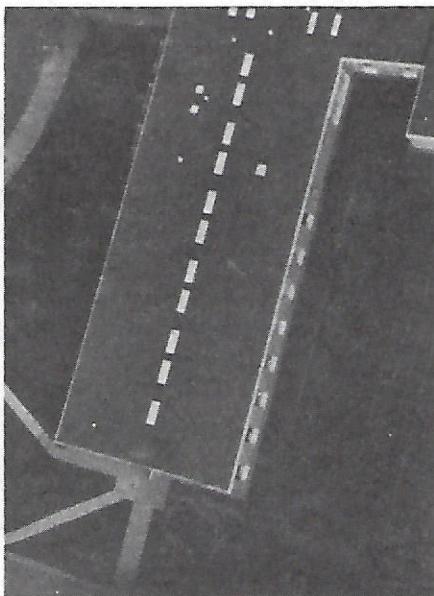


photo: Dick O'Grady, Wausau, Wisconsin

This AstroCam™ photo of Riverview School shows part of the building and the map of Wisconsin is barely visible at the bottom of the photo. The white rectangles on the roof are skylights. A ten year old student is on the roof (to the right of the skylights.)

This other AstroCam™ photo is the best one I have taken. It shows John Muir Middle School in Wausau.

From page 1 The Real World

Right now the future could sure look better. The only Space Shuttles flying at this moment are those of Estes Rocketeers, like you and me. ((This should change this summer.--Editor)) Our National Space Station, a goal presented by President Reagan in 1984, has been redesigned and pushed back so many times that its cost of construction has nearly doubled due to inflation and redirected efforts. The ability of our nation to recover from the Challenger accident of 1986 has been dreadfully slow, shackled by government indecision and hampered by the absence of ELVs (expendable launch vehicles) to pick up the slack left by the Shuttle stand-down...

As you read this the rest of the world is busily working on their futures in space development.

The Soviets have been increasing the size and scope of their manned space stations and increasing the number of space launches per year. The Russians launched more rockets in January 1987 alone than we flew in all of 1987...A group of Soviet scientists and officials have visited the US offering commercial launch space on their Proton booster, which is roughly the size of our old Saturn 1B. One does not need to tell the Soviet administration the importance of space research.

The Japanese are also entering the ELV launch service market and have already successfully placed their own satellites in GEO (geo-synchronous orbit), using Delta-type rocket technology licensed from the US...

The Chinese are drumming up satellite business for their Long March 3 booster, which is able to loft the same size payload to GEO as either the American Delta or the European Airiane, and at very competitive costs...

But in the near term, the most aggressive space program in direct competition to our own is the European Space Agency, and particularly the French Airianespace which operates Airiane, the world's first totally commercial launch service...Although the ESA and NASA have cooperated for many years, there is a growing sentiment within ESA member countries to be separated from the US in all launch and vehicle-related areas so that Europe's space technology will not be in the hands of the US.

So where does that leave us? It is plain to see that in the 17 years since that Estes catalog was printed, the "real world of space" has become an international arena of communications, competition, and commerce, with the US in an unenviable position. There are, however, a few private companies in the US with their eyes on the skies. Large space notables such as McDonnell/Douglas, Martin-Marietta, and General Dynamics, have placed their ELVs into the ring to vie for commercial satellite launches under a program operated by the Department of Transportation. Also, there are private entrepreneurial companies such as American Rocket Company, Pacific Amer-

(Continued on page 6)

SPACE CAMP

Space Camp is growing! In addition to the popular Space Camp for grades 4-7 and the Space Academy Level I (grades 8-10) and Space Academy Level II (a ten day college accredited program for grades 11, 12, and college freshmen) offered in Huntsville, AL there is now Space Camp Florida for grades 4-7. The new facility offers Space Camp programs near NASA's launch complex.

Adults can still enjoy the exciting 3-day weekend sessions in the fall.

Yes, Space Camp attendees still build and fly the Estes Hercules™ two-stager.

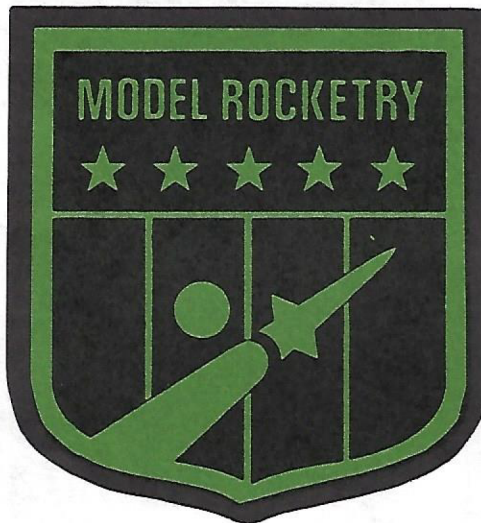
For more information on any of these great programs for this fall or next spring or summer, write to: **Space Camp '88, Box 1680, Huntsville, AL 35807.**

CAP MODEL ROCKETRY PATCH OFFICIAL

In early June 1987 the Civil Air Patrol officially approved a model rocketry patch. This award patch, once it is earned, may be worn on the right breast pocket of the fatigue uniform and on the right sleeve of the jumpsuit.

The movement within the CAP to authorize wearing of this patch originated with 1LT Faye H. Jaus of the Mid-Pacific Institute squadron in Honolulu, Hawaii. She and her squadron have been extremely active, including many model rocketry activities for themselves and other squadrons. Col. John A. Parrish, Jr., Hawaii Wing Commander, CAP, gave strong support to her proposal when he forwarded it to CAP national headquarters last February.

We are extremely pleased that the CAP has taken this step. As you are probably aware, the Civil Air Patrol has long sponsored model rocketry activities as part of its program. In fact, they have published an excellent manual, CAPM 50-20, for model rocketry activities and model rocketry contests (following the NAR Pink Book rules). We were flattered that they chose our Model Rocketry Award Patch #9005! (This award is available for only \$3.00 exclusively to teachers and adult leaders of certified youth groups for awards to their best rocketeers.)



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FLIGHT
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- * **NEW, HIGHER-POWER ENGINE SELECTION!**
- * Now includes SIX EACH of A8-3, B6-4, C6-5, and C6-7 Estes engines!
- * Plus 30 igniters (Six extras!)
- * Plus recovery wadding.

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From page 5 The Real World

ican Launch Services, Space Services Incorporated, and TransSpace Carriers who are attempting to create new and lower cost vehicles to push payloads into space. But there are still speed bumps built into this new "fast track" of space commerce left over from the NASA-DOD (Department of Defense) monopoly on space transport.

The National Commission on Space has completed their year of work and handed their report to Congress, the President, and the nation. Copies are available at many book stores. It illustrates our nation's possible future and goals in space for a fifty-year period and shows the incredible bounty of technology and resources available to our nation as a by-product of these endeavors. The report's title, "Pioneering the Space Frontier", says it all...NCoS Chairman Dr. Thomas Paine said that it is almost certain that some lunar mining operations will be taking place before the end of the century. The only question is, what language will they be speaking?

The bottom line is that it is up to us, all citizens of this nation interested in a hopeful future in space, to make our concerns heard. There is no age limit on the desks of Congress, and all Americans have a right to speak their minds. If you feel strongly about America's future in space, then make your concerns known. Simply pick up a piece of paper, write down what you think (It doesn't have to be long or flowery.), and put it in the mailbox to your Congressman or Senator. All it will cost you is a few minutes and 25 cents. Better yet, use several sheets of paper and several stamps and make your views known to your senators and congressmen. The effects on our elected officials receiving hundreds of letters from concerned model rocket enthusiasts from all ages and walks of life may have tremendous effect on the mind-set of Congress. This is your country. Tell them what you think. This being an election year, most of them will be listening to their constituents.

Estes rocketeers are the best people for this important job. Every time they build and fly their model rockets, they are voicing their zest for spaceflight, in a very personal way. Their creations, small and fragile, or large and powerful, are put to the test after tender loving care in assembly and finishing. This makes us all kindred spirits with all those who fashion metal, glass, and steel into the dreams of spaceflight. As *Model Rocket News Magazine* so aptly points out in its title "...Estes Rocketeers, America's Future in Space".

It is time for us to make sure that our future in space can be assured. In between coats of sanding sealer, jot down a short letter to your local Congress-critter, and make sure that he or she knows how **you** feel about America's future in space, **YOUR** future in space, before it is too late. American access to space is only guaranteed by our presence in space. Let us make sure that the door stays open.

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launched from the surface of the moon? This program, "Lunar Launch", is on this disk, also. This program dramatically demonstrates that future model rocketeers will have the capability to actually start their model rockets on intergalactic flight.

There are seven programs for Apple II computers on the AEROTREK™ Model Rocket Altitude Prediction Toolkit, catalog #9033, available for \$19.95.

```

10 REM -----
20 REM AEROTREK-1 SINGLE STAGE ALTITUDE PREDICTION PROGRAM
30 REM BY MIKE DORFFLER - COPYRIGHT (C) 1988 ESTES IND.
40 REM -----
50 TEXT : HOME : PRINT CHR$(21)
60 VTAB 8: HTAB 15: PRINT "AEROTREK-1": PRINT
70 HTAB 12: PRINT "BY MIKE DORFFLER": PRINT : HTAB 11: PRINT "COPYRIGHT
(C) 1988": HTAB 10: PRINT "ESTES INDUSTRIES INC."
80 VTAB 18: HTAB 4: PRINT "TURN ON IMAGewriter FOR PRINTOUTS"
90 GOSUB 1280: FOR P = 1 TO 3000: NEXT
100 REM =====SET UP PROGRAM SCREEN=====
110 HOME :V = 1: GOSUB 1250
120 VTAB 2: HTAB 8: PRINT "SINGLE STAGE MODEL ROCKET"
130 HTAB 6: PRINT "PERFORMANCE PREDICTION PROGRAM":V = 4: GOSUB 1250
140 V = 20: GOSUB 1250
150 VTAB 22: HTAB 2: PRINT "USE ARROW KEYS AND <RETURN> TO SELECT"
160 HTAB 8: PRINT "PRESS <Q> TO EXIT PROGRAM"
170 REM =====BEGIN DEFINING VARIABLES=====
180 VTAB 6: PRINT "SELECT BODY TUBE ->":V = 8: GOSUB 1250
190 NC = 11:MN = 1: GOSUB 270
200 VTAB 10: PRINT "SELECT DRAG COEF ->":V = 12: GOSUB 1250
210 NC = 6:MN = 2: GOSUB 270
220 VTAB 14: PRINT "SELECT ROCKET WT ->"
230 VTAB 15: PRINT "(WITHOUT ENGINE)":V = 16: GOSUB 1250
240 NC = 400:MN = 3: GOSUB 270
250 VTAB 18: PRINT "SELECT ENGINE ->"
260 NC = 12:MN = 4: GOSUB 270: GOTO 700
270 REM =====MENU SCROLL ROUTINE=====
280 T = 1: IF MN = 3 THEN T = 29
290 GOSUB 400
300 GOSUB 1200
310 IF K = 136 OR K = 139 THEN T = T - 1: GOSUB 400: GOTO 300
320 IF K = 149 OR K = 138 THEN T = T + 1: GOSUB 400: GOTO 300
330 IF K < 141 THEN 300
340 ON MN GOTO 350,360,370,380
350 T$ = BT$(T1):BD = BD(T1) / 25.4: RETURN
360 C$ = CD$(T1):CD = CD(T1): RETURN
370 M = T1:RW = M / 28.35: RETURN
380 E$ = EE$(T1):TI = TI(T1):EW = EW(T1)
390 PW = PW(T1):TD = TD(T1): RETURN
400 REM =====SCROLL ADVANCE SUB=====
410 IF T = NC + 1 THEN T = 1
420 IF T = 0 THEN T = NC
430 T1 = T + 1: IF T1 > NC THEN T1 = 1
440 T2 = T1 + 1: IF T2 > NC THEN T2 = 1
450 ON MN GOTO 460,520,580,640
460 REM =====SELECT BODY TUBE=====
470 VTAB 6: HTAB 20: INVERSE : PRINT "
480 VTAB 6: HTAB 20: PRINT BT$(T1): NORMAL
490 VTAB 5: HTAB 20: CALL - 868: VTAB 7: HTAB 20: CALL - 868
500 VTAB 5: HTAB 20: PRINT BT$(T): VTAB 7: HTAB 20: PRINT BT$(T2)
510 RETURN
520 REM =====SELECT DRAG COEFFICIENT=====
530 VTAB 10: HTAB 20: INVERSE : PRINT "
540 VTAB 10: HTAB 20: PRINT CD$(T1): NORMAL
550 VTAB 9: HTAB 20: CALL - 868: VTAB 11: HTAB 20: CALL - 868
560 VTAB 9: HTAB 20: PRINT CD$(T): VTAB 11: HTAB 20: PRINT CD$(T2)
570 RETURN
580 REM =====SELECT ROCKET WEIGHT=====
590 VTAB 14: HTAB 20: INVERSE : PRINT " GRAMS
600 VTAB 14: HTAB 20: PPINT T1: NORMAL
610 VTAB 13: HTAB 20: CALL - 868: VTAB 15: HTAB 20: CALL - 868
620 VTAB 13: HTAB 20: PRINT T: VTAB 15: HTAB 20: PRINT T2
630 RETURN
640 REM =====SELECT ROCKET ENGINE=====
650 VTAB 18: HTAB 20: INVERSE : PRINT "
660 VTAB 18: HTAB 20: PRINT EE$(T1): NORMAL
670 VTAB 17: HTAB 20: CALL - 868: VTAB 19: HTAB 20: CALL - 868
680 VTAB 17: HTAB 20: PRINT EE$(T): VTAB 19: HTAB 20: PRINT EE$(T2)
690 RETURN
700 REM =====FLIGHT CALCULATIONS=====
710 WA = RW + EW - (PW / 2): REM CALCULATE AVG. WEIGHT THRUSTING
720 FA = 3.14159 * (BD / 2) * (BD / 2): REM CALCULATE FRONTAL AREA
730 DF = FA * CD: REM CALCULATE DRAG FORM FACTOR
740 BT = WA / DF: REM CALCULATE BALLISTIC COEFFICIENT THRUSTING
750 TA = 16 * (TI / TD): REM CALCULATE AVERAGE THRUST IN OUNCES
760 A = (TA / WA) - 1: REM CALCULATE DRAG FREE ACCELERATION
770 VV = 0.36981 * SQR (A) * TD / SQR (BT): REM INTERMEDIATE
780 BA = 235.26 * BT * LOG (FN C(VV)): REM BURNOUT ALTITUDE
790 BV = 87 * SQR (A) * SQR (BT) * FN T(VV): REM B.O. VEL
800 WC = RW + EW - PW: REM AVERAGE WEIGHT COASTING
810 BC = WC / DF: REM CALCULATE BALLISTIC COEFFICIENT COASTING
820 BB = 1 + ((BV * BV) / (7659.3 * BC)): REM INTERMEDIATE
830 CA = 117.63 * BC * LOG (BB): REM CALCULATE COAST DISTANCE
840 TT = BA + CA: REM BURNOUT ALTITUDE PLUS COAST DISTANCE
850 AA = BV / (87 * SQR (BC)): REM INTERMEDIATE
860 CT = 2.7041 * SQR (BC) * ATN (AA): REM COAST TIME

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870 REM =====CONVERT ENGLISH TO METRIC=====
880 BA = INT (BA * .3048):BV = INT (BV * .3048)
890 CA = INT (CA * .3048):TT = BA + CA
900 EW = INT (EW * 28.35):PW = INT (PW * 28.35)
910 CT$ = LEFT$(STR$(CT),3)
920 REM =====DISPLAY FLIGHT RESULTS=====
930 HOME : PRINT "COMPUTED FLIGHT PARAMETERS FOR:"
940 V = 2: GOSUB 1250
950 VTAB 3: PRINT "ROCKET TYPE.....SINGLE STAGE"
960 PRINT "ROCKET WEIGHT.....":M: GRAMS"
970 PRINT "ROCKET DIAMETER...":T$:
980 PRINT "DRAG COEFFICIENT...":C$:" (" :CD:") CD"
990 PRINT "ENGINE USED.....":E$:
1000 PRINT "ENGINE WEIGHT.....":EW:" GRAMS"
1010 PRINT "PROPELLANT WEIGHT...":PW:" GRAMS"
1020 PRINT "THRUST TIME.....0"
1030 IF TD < 1 THEN VTAB 10: HTAB 21: PRINT TD:" SECOND": GOTO 1050
1040 VTAB 10: HTAB 20: PRINT TD:" SECONDS"
1050 V = 11: GOSUB 1250: VTAB 13: PRINT "FLIGHT RESULTS:" PRINT
1060 PRINT "BURNOUT ALTITUDE = ":BA:" METERS"
1070 PRINT "BURNOUT VELOCITY = ":BV:" METERS/SEC"
1080 PRINT "COAST DISTANCE = ":CA:" METERS"
1090 Pk:INT " TOTAL ALTITUDE = ":TT:" METERS"
1100 PRINT "COAST TIME = ":CT$:" SECONDS": VTAB 23
1110 PRINT "DO YOU WISH A PRINTOUT? <Y>ES OR <N>O":
1120 GOSUB 1200: IF K < > 217 AND K < > 206 THEN 1120
1130 IF K = 217 THEN VTAB 23: HTAB 1: CALL - 868: CALL 768
1140 VTAB 23: HTAB 1: CALL - 868
1150 PRINT "TRY ANOTHER FLIGHT? <Y>ES OR <N>O"
1160 GOSUB 1200: IF K < > 217 AND K < > 206 THEN 1160
1170 IF K = 217 THEN 100
1180 HOME : VTAB 21: END
1200 REM =====GET KEYBOARD RESPONSE=====
1210 WAIT 49152,128:K = PEEK (49152): POKE 49168,0
1220 IF K = 209 THEN 1180
1230 RETURN
1240 TEXT : HOME : VTAB 22: END : REM END PROGRAM HERE
1250 REM =====DRAW DASHED LINE=====
1260 FOR P = 1 TO 37 STEP 4: VTAB V: HTAB P
1270 PRINT "-----": NEXT : RETURN
1280 REM =====ENTER ESTES ENGINE DATA=====
1290 DIM EE$(12),TI(12),EW(12),PW(12),TD(12): FOR J = 1 TO 12
1300 READ EE$(J): READ TI(J): READ EW(J): READ PW(J): READ TD(J)
1310 NEXT
1320 REM =====ENTER DRAG COEFFICIENTS=====
1330 DIM CD$(6),CD(6): FOR J = 1 TO 6: READ CD$(J): READ CD(J)
1340 NEXT
1350 REM =====ENTER ESTES BODY TUBES=====
1360 DIM BT$(11),BD(11): FOR J = 1 TO 11: READ BT$(J): READ BD(J)
1370 NEXT : FOR X = 768 TO 831: READ D: POKE X,D: NEXT
1380 REM =====DEFINE HYPERBOLIC FUNCTIONS=====
1390 DEF FN S(X) = ( EXP (X) - EXP ( - X) ) / 2: REM SINE
1400 DEF FN C(X) = ( EXP (X) + EXP ( - X) ) / 2: REM COSINE
1410 DEF FN T(X) = FN S(X) / FN C(X): REM TANGENT
1420 RETURN
1430 REM =====ESTES ENGINE DATA=====
1440 DATA 1/2A3 01.25 NS,.28,.197,.062,.36
1450 DATA 1/2A6 01.25 NS,.28,.176,.055,.2
1460 DATA A3 02.50 NS,.56,.268,.123,.86
1470 DATA A8 02.50 NS,.56,.571,.11,.32
1480 DATA A10 02.50 NS,.56,.278,.133,.26
1490 DATA B4 05.00 NS,1.12,.74,.294,1.2
1500 DATA B6 05.00 NS,1.12,.723,.22,.83
1510 DATA B8 05.00 NS,1.12,.681,.22,.6
1520 DATA C5 10.00 NS,2.25,.899,.448,2.1
1530 DATA C6 10.00 NS,2.25,.91,.44,1.7
1540 DATA D11 15.00 NS,3.37,1.51,.653,1.4
1550 DATA D12 20.00 NS,4.48,1.52,.879,1.7
1560 REM =====DRAG COEFFICIENT DATA=====
1570 DATA UNFINISHED,1
1580 DATA POOR,.9
1590 DATA FAIR,.8
1600 DATA GOOD,.7
1610 DATA EXCELLENT,.6
1620 DATA MIRROR,.5
1630 REM =====ESTES BODY TUBE DATA=====
1640 DATA BT-5 13.8 MM,13.8
1650 DATA BT-10 18.3 MM,18.3
1660 DATA BT-20 18.7 MM,18.7
1670 DATA BT-30 19.4 MM,19.4
1680 DATA BT-50 24.8 MM,24.8
1690 DATA BT-55 33.6 MM,33.6
1700 DATA BT-60 41.6 MM,41.6
1710 DATA ST-20 51.8 MM,51.8
1720 DATA BT-70 56.3 MM,56.3
1730 DATA BT-80 66.0 MM,66
1740 DATA BT-100 100. MM,100
1750 REM =====40 COLUMN SCREEN DUMP DATA=====
1760 DATA 160,0,169,193,132,54,133,55,32,234
1770 DATA 3,162,0,138,32,193,251,165,40,133
1780 DATA 60,24,105,39,133,62,165,41,133,61
1790 DATA 133,63,177,60,32,237,253,32,186,252
1800 DATA 144,246,32,142,253,232,224,24,144,219
1810 DATA 32,142,253,160,240,169,253,132,54,133
1820 DATA 55,76,234,3

```

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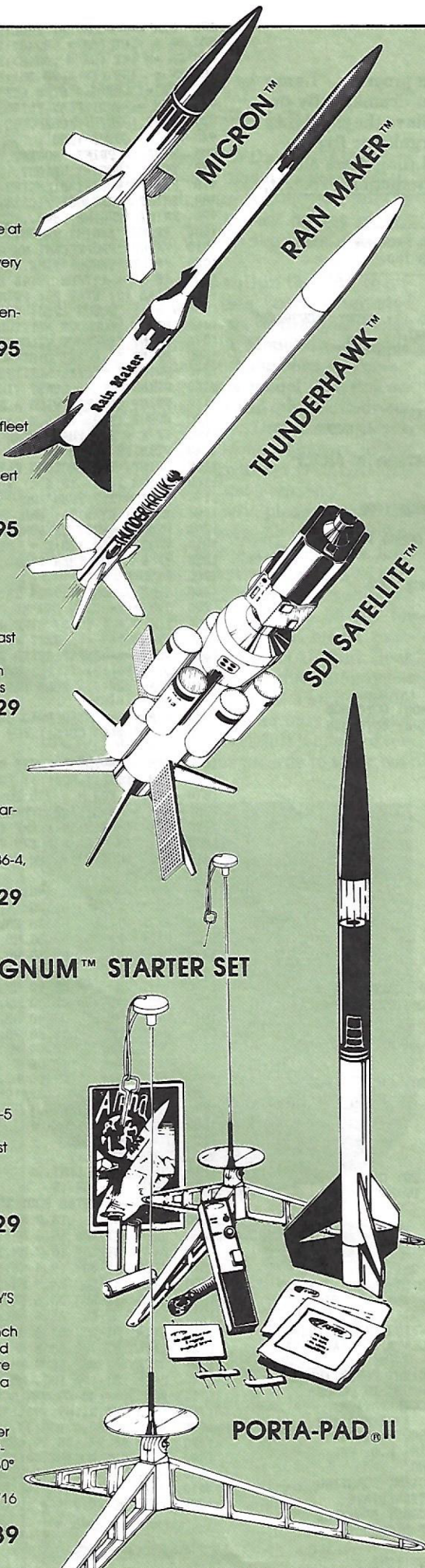
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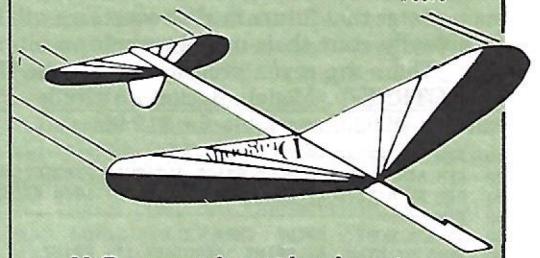
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1602 B4-4 engines	3.45
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1511		A10-3T (4 each)	61	3.60	
1593		1/2A6-2 (3 each)	61	3.30	
1598		A8-3 (3 each)	61	3.45	
1599		A8-5 (3 each)	61	3.45	
1601		B4-2 (3 each)	61	3.45	
1602		B4-4 (3 each)	61	3.45	
1604		B4-6 (3 each)	61	3.45	
1605		B6-2 (3 each)	61	3.45	
1606		B6-4 (3 each)	61	3.45	
1607		B6-6 (3 each)	61	3.45	
1608		B6-0 (3 each)	61	3.45	
1613		C6-3 (3 each)	61	3.95	
1614		C6-5 (3 each)	61	3.95	
1615		C6-7 (3 each)	61	3.95	
1616		C6-0 (3 each)	61	3.70	
1617		C5-3 (3 each)	61	3.70	
1620		B8-5 (3 each)	61	3.45	
1665		D12-0 (3 each)	61	6.30	
1666		D12-3 (3 each)	61	6.30	
1667		D12-5 (3 each)	61	6.30	
1668		D12-7 (3 each)	61	6.30	
1672		Blast-Off™ Flight Pak	60	23.89	
1741		X-15™ Power Kit	7	7.19	
LAUNCHING EQUIP. & ACC.					
2205		Safety Cap./Key	63	1.10	
2212		Astron™ Launcher	62	12.89	
2215		Porta-Pad® II Launch Pad		12.89	
2220		Electron Beam™ Launcher	62	15.79	
2231		Fin Alignment Guide™	66	13.99	
2232		AltTrak™	66	11.79	
2233		Repair Kit	67	4.69	
2241		Blast Deflector Plate	63	2.49	
2243		1/8" Two-Piece Rod	63	3.59	
2244		3/16" Two-Piece Maxi™ Rod	63	4.69	
2247		Micro Clips	63	21.39	
2301		Model Rocket Igniters	60	61.89	

Prod #	Qty.	DESCRIPTION	Cat. Page	Price Each	TOTAL
RECOVERY SUPPLIES					
2262		Parachute 10"	70	1.99	
2264		Parachute 12"	70	1.99	
2267		Parachute 18"	70	2.49	
2271		Parachute 24"	70	2.49	
2274		Recovery Wadding	60	1.89	

PARTS ETC.					
2245		Battery Clips	63	2/2.05	
2276		1/8" Shock Cord	70	1.05	
2277		1/4" Shock Cord	70	1.15	
85744		36" Shock Cord	70	1.20	
2294		Tape Discs	70	24/1.80	
2341		1" Streamer Material	70	3.10	
2343		2" Streamer Material	70	3.35	
2292		Snap Swivels	70	12/2.30	
2280		Large Screw Eyes	70	6/1.70	
2279		Small Screw Eyes	70	6/1.60	
2281		Extra Small Screw Eye	70	6/1.35	
38412		Tape Strips	70	72/2.05	
2340		Shroud Lines	70	1.80	
2840		Model Rocketry-Space Age Teaching Aid	64	1.15	
2841		Model Rocketry Study Guide	64	1.45	
2842		Altitude Prediction Charts	64	2.00	
2843		Aerodynamic Drag of M.R.	64	2.00	
2844		Elem. Math. of M.R. Flight	64	.85	
2845		The Classic Collection	64	3.50	
2811		M.R. Launch Systems	64	.85	
2817		Guide For Aerospace Clubs	64	1.10	
2815		Model Rocket Contest Guide	64	1.10	
2821		Laws of Motion & M.R.	64	.70	
2820		Alpha Book	64	1.10	
2810		Ind. Arts Teacher's Manual	64	1.45	
2819		M.R. Tech Manual	64	.75	
2822		Camp Leader's M.R. Manual	64	1.45	
2859		The Rocket Book	64	16.30	
2860		Handbook of Model Rocketry	64	11.95	

Prod #	Qty.	DESCRIPTION	Cat. Page	Price Each	TOTAL
32102		BFS-20	69	3/1.90	
32106		BFS-20L	69	3/2.15	
32108		BFS-30	69	3/1.95	
32110		BFS-30L	69	3/2.20	
32116		BFS-40	69	3/2.00	
32118		BFS-40L	69	3/2.20	
30302		BT-5	69	1.80	
30316		BT-20	69	2.05	
30352		BT-50	69	2.05	
30382		BT-55	69	2.35	
30396		BT-60	69	2.55	
30424		BT-70	69	3.15	
30433		BT-80KD	69	2.90	
3131		EB-20A	69	1.65	
70216		BNC-5V	68	1.80	
70212		BNC-5E	68	1.80	
70214		BNC-5S	68	1.80	
70218		BNC-5W	68	2.05	
70230		BNC-20B	68	1.95	
70240		BNC-20R	68	2.05	
70226		BNC-20AM	68	2.00	
70241		BNC-20Y	68	1.90	
70256		BNC-50J	68	2.05	
70262		BNC-50K	68	2.25	
71028		PNC-50KA	68	1.95	
71001		PNC-50SP	68	2.70	
70266		BNC-50Y	68	2.70	
71009		PNC-50Y	68	2.50	
71070		PNC-55AC	68	3.15	
71038		PNC-55D	68	3.15	
71020		PNC-60MS	68	2.75	
71043		PNC-60AH	68	3.95	
70300		BNC-70AJ	68	4.40	
71035		PNC-80K	68	4.10	
3150		EH-2050	68	2.00	
3151		EH-2055	68	2.00	
3152		EH-2060	68	2.00	
3153		EM-520	68	1.95	
3154		EM-2050	68	2.05	
3156		EM-5055/60	68	2.65	

Prod #	Qty.	DESCRIPTION	Cat. Page	Price Each	TOTAL
70002		TA-520	69	1.95	
70004		TA-550	69	2.05	
70006		TA-2050	69	1.80	
70010		TA-2055	69	2.20	
70012		TA-2060	69	3.15	
70014		TA-5055	69	3.15	
70016		TA-5060	69	3.75	
70028		TA-5560	69	3.85	
70034		TA-6070	69	3.55	
30252		JT-5C	69	1.20	
30254		JT-20C	69	1.20	
30260		JT-50C	69	1.20	
30262		JT-55C	69	1.20	
30266		JT-60C	69	1.20	
30270		JT-70A	69	1.80	
70152		NB-20	69	1.40	
70158		NB-50	69	1.65	
3102		AR-5055	70	4/1.95	
3100		AR-2050	70	10/2.30	
2321		1/4" Launch Lug	70	12/2.00	
2322		2 3/8" Launch Lug	70	10/2.20	
2328		Maxi™ Rod Launch Lug	70	4/1.80	
3190		1/8" x 18" Dowel	70	8/1.65	
3191		1/12" x 12" Dowel	70	8/1.65	
3140		Regular Engine Holder	70	3/2.30	
3142		Mini Engine Holder	70	3/2.00	
3110		RA-2050	70	20/1.80	
3111		RA-2055	70	10/1.90	
3113		RA-2060	70	10/1.95	
85013		Multi-Purpose Set	70	2.05	
COMPUTER SOFTWARE					
9025		Model Rocketry	65	24.95	
9026		Flight	65	44.95	
9027		Physics	65	24.95	
9028		AstroCad	65	19.95	
9033		AeroTrek	NEW	19.95	

SUB TOTAL

Send a Friend a Catalog!

Please rush an ESTES Model Rocketry Catalog to:
 Friend's Name _____
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Please rush an ESTES Model Rocketry Catalog to:
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Charge Card providing your order is \$10.00 or more. Simply fill in the information below.

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Master Charge Card No. [] [] [] [] - [] [] [] [] - [] [] [] [] - [] [] [] []

Expiration Date _____

Card Holder's Signature _____
 (\$10.00 Minimum Order For Credit Card Orders.) (As it appears on card.)

ESTES INDUSTRIES, PENROSE, COLO. 81240

HANDLING CHARGES	
Order Amount	Handling Charge
\$0 to \$15.00	\$1.50
\$15.01 to \$30.00	\$2.00
\$30.01 and UP.	\$2.50

Merchandise Total

State Sales Tax 3%
(Colo. Residents Only)

→ Add Handling Charge

Add Balance Due Estes Ind.
From Previous Order

Subtract Previous Order Credit
(Credit Slip(s) Enclosed)

TOTAL PAYMENT ENCLOSED

For Estes Use Only

1	[] [] [] [] [] [] [] [] [] []	[] [] [] [] [] [] [] [] [] []
2	[] [] [] [] [] [] [] [] [] []	3 [] [] [] [] [] [] [] [] [] []

PRICE LIST / ORDER FORM



Please note new prices on this order form. Prices in catalog are no longer correct.

A DAMON COMPANY

Rush this order to:
ESTES INDUSTRIES
1295 H STREET
PENROSE, CO. 81240

Effective 9-1-88

ESP

Please print name and address below or attach label. Correct address on label if necessary.

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Address _____

City _____

State _____ Zip Code _____

Phone () _____ Birth Date ____/____/____
mo. day yr.

PRICES SUBJECT TO CHANGE WITHOUT NOTICE. "Estes is an equal opportunity employer."

Prod #	Qty.	DESCRIPTION	Cat. Page	Price Each	TOTAL
MODEL ROCKET KITS					
0801		Mosquito™	12	1.99	
0865		Mini Mean Machine™	22	7.19	
0866		Mini Tri™ Pak	30	7.19	
0870		Pulsar™	12	2.99	
0871		Vector™	14	2.99	
0872		Sparrow™	14	2.99	
0873		Hawkeye™	32	2.99	
0874		Mini-Scale Combo™ Pak	34	6.49	
0875		Dragonfly™	50	6.49	
0876		Micron™	NEW	3.95	
0880		Skinny-Mini™	16	4.19	
0881		Mini Mars Lander™	34	4.29	
0882		Ninja™	18	4.19	
0885		Sprite™	20	3.19	
0886		Gnome™	14	3.19	
0887		Leprechaun™	14	3.19	
0889		NASA X-15™	46	6.49	
1207		Phantom™	66	5.79	
1208		Sky Hook™	20	5.79	
1225		Alpha™	22	5.79	
1256		Alpha III™	26	6.99	
1284		Space Shuttle™	56	21.29	
1292		Wizard™	16	3.59	
1295		Mean Machine™	42	16.29	
1327		AstroCam™ 110	29	33.29	
1333		Scorpion™	42	10.19	
1377		Hercules™	48	9.29	
1380		Phoenix™	44	16.29	
1381		Yankee™	12	3.59	
1382		Comanche-3™	50	9.29	
1385		Space Shuttle Columbia™	36	11.79	
1391		Mini Shuttle™	32	5.79	
1906		Sizzler™	22	7.19	
1917		Zinger™	12	2.99	
1919		Honest John™	40	7.59	
1921		Mercury Redstone™	56	15.29	
1929		Stealth™	44	8.19	
1933		X-16™	46	7.19	
1936		Sunbird™	22	4.19	
1937		Astro™	18	3.59	
1938		Laser™	16	3.59	
1941		Fox Fire™	30	4.69	
1942		SR-71 Blackbird™	44	12.89	
1948		Big Bertha™	26	8.19	
1949		Viking™	26	2.99	
1950		Echo™	20	3.79	
1951		Mighty Moe™	26	4.29	
1953		Fireaero™	32	5.79	

Prod #	Qty.	DESCRIPTION	Cat. Page	Price Each	TOTAL
1954		Starbird™	38	5.79	
1955		Ranger™	42	8.19	
1956		Blazer™	24	3.59	
1957		Nike-Apache™	46	7.19	
1958		Black Brant II™	54	9.79	
1959		Scout II™	26	3.19	
1960		Nova Payloader™	38	7.19	
1961		Crusader Swing-Wing™	58	9.29	
1970		Der V-3™	40	10.89	
1971		Nimbus™	50	5.99	
1972		BullPup 12D™	32	6.49	
1973		Interceptor II™	48	8.69	
1974		Explorer™	48	6.49	
1976		Jupiter C™	54	13.69	
1977		GeoSat LV™	54	14.69	
1978		Gemini Titan™	40	9.79	
1979		Clipper™	36	5.99	
1980		LongShot™	18	6.49	
1981		D.A.R.T.™	24	6.49	
1982		Transtar Carrier™	20	6.49	
1983		Arrow™	34	7.19	
1984		Phaser™	14	3.79	
1986		Reliant™	18	3.19	
1987		Sentinel™	36	9.29	
1988		Argosy™	48	5.99	
1989		Liberty™	16	4.89	
1991		Blue Star™	12	3.19	
1992		Dasher™	24	5.39	
1993		Lancer™	24	5.39	
1994		RamJet™	52	5.39	
1995		HelloCopter™	72	9.29	
1996		Eggspress™	38	9.29	
1997		Pathfinder™	52	10.39	
1998		Mega Sizz™	42	10.89	
1999		Corsair™	52	6.49	
2000		Voyager™	40	7.19	
2001		Saturn V™	58	52.29	
2002		Thunderhawk™	NEW	6.29	
2003		SDI Satellite™	NEW	9.29	
2009		Rain Maker™	NEW	6.95	
ESTES SPACE PROGRAM					
1443		Estes Space Program™ Membership	28	8.69	
STARTER SETS					
0716		X-15™ RTF Set	7	31.98	
1406		Alpha III™ Starter Set	3	25.99	
1407		Deluxe™ Starter Set	10	32.69	
1412		Ninja™ Starter Set	10	18.49	
1417		Screaming Eagle™ Starter Set	7	20.69	

Prod #	Qty.	DESCRIPTION	Cat. Page	Price Each	TOTAL
1422		Magnum™ Outfit	NEW	39.29	
1432		Sizzler™ Starter Set	9	29.99	
1440		Discovery™ Starter Set	11	34.89	
1441		Space Shuttle™ Set	5	32.69	
PARTS ASSORTMENT					
1463		Designer's™ Special	67	29.39	
MODEL ROCKET ENGINES					
1503		1/2A3-2T (4 each)	61	3.45	
1504		1/2A3-4T (4 each)	61	3.45	
1507		A3-4T (4 each)	61	3.60	
1510		A10-0T (4 each)	61	3.60	
1511		A10-3T (4 each)	61	3.60	
1593		1/2A6-2 (3 each)	61	3.30	
1598		A8-3 (3 each)	61	3.45	
1599		A8-5 (3 each)	61	3.45	
1601		B4-2 (3 each)	61	3.45	
1602		B4-4 (3 each)	61	3.45	
1604		B4-6 (3 each)	61	3.45	
1605		B6-2 (3 each)	61	3.45	
1606		B6-4 (3 each)	61	3.45	
1607		B6-6 (3 each)	61	3.45	
1608		B6-0 (3 each)	61	3.45	
1613		C6-3 (3 each)	61	3.95	
1614		C6-5 (3 each)	61	3.95	
1615		C6-7 (3 each)	61	3.95	
1616		C6-0 (3 each)	61	3.70	
1617		C5-3 (3 each)	61	3.70	
1620		B8-5 (3 each)	61	3.45	
1665		D12-0 (3 each)	61	6.30	
1666		D12-3 (3 each)	61	6.30	
1667		D12-5 (3 each)	61	6.30	
1668		D12-7 (3 each)	61	6.30	
1672		Blast-Off™ Flight Pak	60	23.89	
1741		X-15™ Power Kit	7	7.19	
LAUNCHING EQUIP. & ACC.					
2205		Safety Cap./Key	63	1.10	
2212		Astron™ Launcher	62	12.89	
2215		Porta-Pad® II Launch Pad		12.89	
2220		Electron Beam™ Launcher	62	15.79	
2231		Fin Alignment Guide™	66	13.99	
2232		AltITrak™	66	11.79	
2233		Repair Kit	67	4.69	
2241		Blast Deflector Plate	63	2.49	
2243		1/8" Two-Piece Rod	63	3.59	
2244		3/16" Two-Piece Maxi™ Rod	63	4.69	
2247		Micro Clips	63	2/1.39	
2301		Model Rocket Igniters	60	6/1.89	

Prod #	Qty.	DESCRIPTION	Cat. Page	Price Each	TOTAL
RECOVERY SUPPLIES					
2262		Parachute 10"	70	1.99	
2264		Parachute 12"	70	1.99	
2267		Parachute 18"	70	2.49	
2271		Parachute 24"	70	2.49	
2274		Recovery Wadding	60	1.89	

PARTS ETC.					
2245		Battery Clips	63	2/2.05	
2276		1/8" Shock Cord	70	1.05	
2277		1/4" Shock Cord	70	1.15	
85744		36" Shock Cord	70	1.20	
2294		Tape Discs	70	24/1.80	
2341		1" Streamer Material	70	3.10	
2343		2" Streamer Material	70	3.35	
2292		Snap Swivels	70	12/2.30	
2280		Large Screw Eyes	70	6/1.70	
2279		Small Screw Eyes	70	6/1.60	
2281		Extra Small Screw Eye	70	6/1.35	
38412		Tape Strips	70	72/2.05	
2340		Shroud Lines	70	1.80	
2840		Model Rocketry-Space Age Teaching Aid	64	1.15	
2841		Model Rocketry Study Guide	64	1.45	
2842		Altitude Prediction Charts	64	2.00	
2843		Aerodynamic Drag of M.R.	64	2.00	
2844		Elem. Math. of M.R. Flight	64	.85	
2845		The Classic Collection	64	3.50	
2811		M.R. Launch Systems	64	.85	
2817		Guide For Aerospace Clubs	64	1.10	
2815		Model Rocket Contest Guide	64	1.10	
2821		Laws of Motion & M.R.	64	.70	
2820		Alpha Book	64	1.10	
2810		Ind. Arts Teacher's Manual	64	1.45	
2819		M.R. Tech Manual	64	.75	
2822		Camp Leader's M.R. Manual	64	1.45	
2859		The Rocket Book	64	16.30	
2860		Handbook of Model Rocketry	64	11.95	

Prod #	Qty.	DESCRIPTION	Cat. Page	Price Each	TOTAL
32102		BFS-20	69	3/1.90	
32106		BFS-20L	69	3/2.15	
32108		BFS-30	69	3/1.95	
32110		BFS-30L	69	3/2.20	
32116		BFS-40	69	3/2.00	
32118		BFS-40L	69	3/2.20	
30302		BT-5	69	1.80	
30316		BT-20	69	2.05	
30352		BT-50	69	2.05	
30382		BT-55	69	2.35	
30396		BT-60	69	2.55	
30424		BT-70	69	3.15	
30433		BT-80KD	69	2.90	
3131		EB-20A	69	1.65	
70216		BNC-5V	68	1.80	
70212		BNC-5E	68	1.80	
70214		BNC-5S	68	1.80	
70218		BNC-5W	68	2.05	
70230		BNC-20B	68	1.95	
70240		BNC-20R	68	2.05	
70226		BNC-20AM	68	2.00	
70241		BNC-20Y	68	1.90	
70256		BNC-50J	68	2.05	
70262		BNC-50K	68	2.25	
71028		PNC-50KA	68	1.95	
71001		PNC-50SP	68	2.70	
70266		BNC-50Y	68	2.70	
71009		PNC-50Y	68	2.50	
71070		PNC-55AC	68	3.15	
71038		PNC-55D	68	3.15	
71020		PNC-60MS	68	2.75	
71043		PNC-60AH	68	3.95	
70300		BNC-70AJ	68	4.40	
71035		PNC-80K	68	4.10	
3150		EH-2050	68	2.00	
3151		EH-2055	68	2.00	
3152		EH-2060	68	2.00	
3153		EM-520	68	1.95	
3154		EM-2050	68	2.05	
3156		EM-5055/60	68	2.65	

Prod #	Qty.	DESCRIPTION	Cat. Page	Price Each	TOTAL
70002		TA-520	69	1.95	
70004		TA-550	69	2.05	
70006		TA-2050	69	1.80	
70010		TA-2055	69	2.20	
70012		TA-2060	69	3.15	
70014		TA-5055	69	3.15	
70016		TA-5060	69	3.75	
70028		TA-5560	69	3.85	
70034		TA-6070	69	3.55	
30252		JT-5C	69	1.20	
30254		JT-20C	69	1.20	
30260		JT-50C	69	1.20	
30262		JT-55C	69	1.20	
30266		JT-60C	69	1.20	
30270		JT-70A	69	1.80	
70152		NB-20	69	1.40	
70158		NB-50	69	1.65	
3102		AR-5055	70	4/1.95	
3100		AR-2050	70	10/2.30	
2321		1 1/4" Launch Lug	70	12/2.00	
2322		2 3/8" Launch Lug	70	10/2.20	
2328		Maxi™ Rod Launch Lug	70	4/1.80	
3190		1/8" x 18" Dowel	70	8/1.65	
3191		1/12" x 12" Dowel	70	8/1.65	
3140		Regular Engine Holder	70	3/2.30	
3142		Mini Engine Holder	70	3/2.00	
3110		RA-2050	70	20/1.80	
3111		RA-2055	70	10/1.90	
3113		RA-2060	70	10/1.95	
85013		Multi-Purpose Set	70	2.05	
COMPUTER SOFTWARE					
9025		Model Rocketry	65	24.95	
9026		Flight	65	44.95	
9027		Physics	65	24.95	
9028		AstroCad	65	19.95	
9033		AeroTrek	NEW	19.95	

SUBTOTAL

Send a Friend a Catalog!

Please rush an ESTES Model Rocketry Catalog to:
 Friend's Name _____
 STREET _____
 CITY _____
 STATE _____ ZIP _____

Please rush an ESTES Model Rocketry Catalog to:
 Friend's Name _____
 STREET _____
 CITY _____
 STATE _____ ZIP _____

CHARGE YOUR ORDER!



You may now charge your Estes order on your VISA or Master

Charge Card providing your order is \$10.00 or more. Simply fill in the information below.

VISA Card No. [] [] [] [] - [] [] [] [] - [] [] [] [] - [] [] [] []
 Master Charge Card No. [] [] [] [] - [] [] [] [] - [] [] [] [] - [] [] [] []
 Expiration Date _____
 Card Holder's Signature _____

(\$10.00 Minimum Order For Credit Card Orders.) (As it appears on card.)

HANDLING CHARGES	
Order Amount	Handling Charge
\$0 to \$15.00	\$1.50
\$15.01 to \$30.00	\$2.00
\$30.01 and UP.	\$2.50

Merchandise Total

State Sales Tax 3% (Colo. Residents Only)

→ Add Handling Charge

Add Balance Due Estes Ind. From Previous Order

Subtract Previous Order Credit (Credit Slip(s) Enclosed)

TOTAL PAYMENT ENCLOSED

For Estes Use Only

1	[] [] [] [] [] [] [] [] [] []	[] [] [] [] [] [] [] [] [] []
2	[] [] [] [] [] [] [] [] [] []	3 [] [] [] [] [] [] [] [] [] []

ESTES INDUSTRIES, PENROSE, COLO. 81240

FREE ROCKET CHOOSE ONE OF THESE GREAT ROCKET KITS FREE!



DESIGNER'S SPECIAL™ #7629
\$29.39. Value

Send in your order for merchandise totaling \$100 or more and receive a FREE Designer's Special™.



VIKING™ #7625
\$2.99 Value

Send in your order for merchandise totaling \$15 or more and receive a FREE Viking™ kit.



SR-71 BLACKBIRD™ Kit

\$12.89 Value #7628
Send in your order for merchandise totaling \$50 or more and receive SR-71 Blackbird™ Kit



COMANCHE-3™

Send in your order for merchandise totaling \$30 or more and receive a FREE Comanche-3™ kit.



MINI SHUTTLE™ #7627
\$5.79 Value

Send in your order for merchandise totaling \$20 or more and receive a FREE Mini Shuttle™

Important: If you do not list your free kit, you will not receive it.

LIMIT-ONE FREE ROCKET KIT PER ORDER

These special free offers are available only for orders received by May 31, 1989. Orders must be accompanied by full payment (check, money order, Master Card, or Visa charge). Order qualification for a free kit is based on amount of merchandise ordered. If you qualify for one of these free rocket kits, just list the name and special kit number from this page as the last item on your order. List "Free" in the column for total price. These special offers may not be used with other special offers, bonus coupons, or discount.

HARA LAUNCHES FOR NASA

By Vince Huegele, HARA, Huntsville, AL

You've probably had it rain on a day you planned to fly rockets, but what do you do when it rains the day your club is giving a demonstration for NASA? The Huntsville Area Rocketry Association (HARA), NAR Section 403, had just that problem for a launch at the Marshall Space Flight Center on September 12, 1987.

The MSFC annual picnic is a day of recreation and entertainment for the center's employees, but the steady rain soaked the morning sports and games. HARA's launch planned for that afternoon looked hopeless. Many events were canceled. All other activities were moved inside a big assembly building. The club display was also set up inside.

The booth had to be modified on the spot, but ended up being very impressive. Large models framed the table with scale models arranged in the center. Estes and NAR (National Association of Rocketry) lit-

erature were stacked up front along with the "Don't touch the rockets." sign. A VCR and a TV with videos of club launches provided a dynamic attraction. The most frequently asked questions by picnickers were "How high do they go?", "Do you have anything free here?", and "Where's the ladies room?"

About lunchtime the rain stopped, and the clouds broke up. The crowd began moving outside, and the dozen HARA members present began to wonder if a launch would now be possible. We were concerned that the field would be too muddy, but an on-site inspection showed that the field had drained well. We decided to "Go for launch!"

The booth was dismantled since we needed many of the display models as flight models. Launchers were set up in the outfield of the sports area ballpark. Spectators sat on bleachers or leaned on the fence surrounding the field.

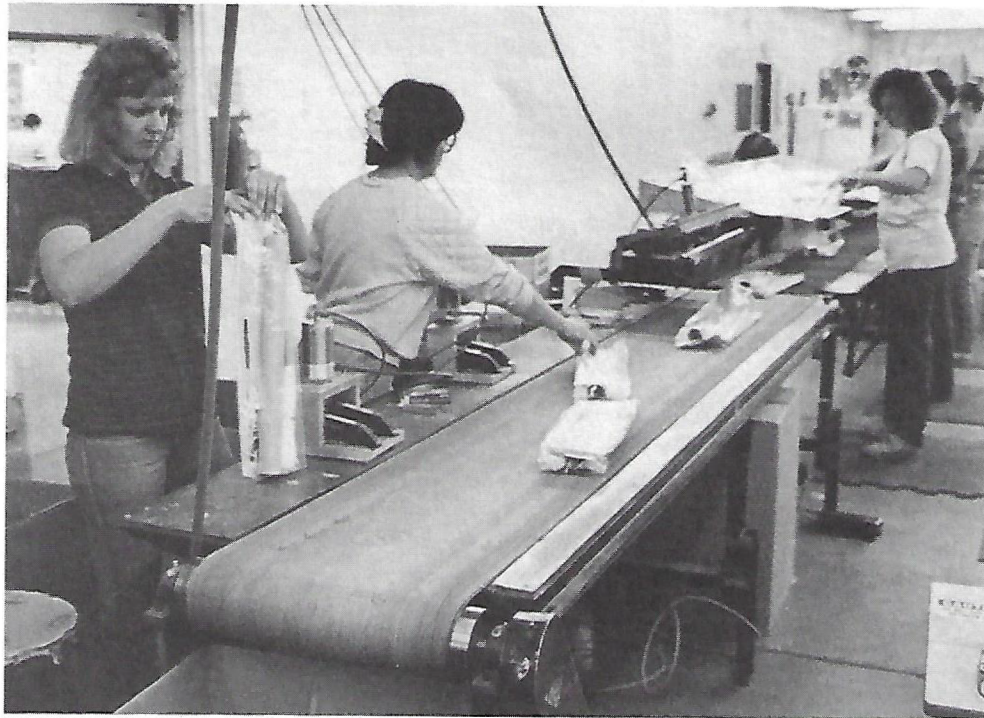
The rockets flown were mostly stan-

dard Estes kits. The launch sequence included V-2™, Hercules™, Nike Apache™, Phoenix™, Big Bertha™, Crusader Swing-Wing™, Maxi Alpha™, and two Saturn V™'s, one with "F" power. Several piggyback gliders were also flown.

As the launch demo progressed Model Rocketry was seen at its best. After the rain's passage the skies were clear, and there was absolutely no wind. Many "D" powered rockets were coming down inside the outfield fence. Gliders were the exception since the dead air kept the birds circling in formation above the crowd's heads. Each launch and landing drew rave applause from spectators and immense satisfaction to modelers.

Despite the soggy start, the day turned out to be successful. Picnic officials claim 5,000 employees made it out to the grounds. Not all of them viewed the demo, but HARA members enjoyed themselves! And so did a lot of our spectators!

ESTES ASSEMBLY DEPARTMENT



Here is one small area of the Estes Assembly Department where our model rocket kits are produced. Shown here are Joyce Pretzer, Carol Babcock, and Kim Myers at the end of the kit packing line involved in producing one of our kits. They are folding over the header and stapling closed the plastic bags on the kits as they come down the conveyor belt moving toward them in the picture. Other persons are adding parts to trays which each will hold the contents of one kit. Just beyond them is the individual who carefully pours the contents of a tray into a special gusseted bag and

places the bag on the conveyor belt.

Many pairs of hands are involved in producing each kit made on one of our production lines, both in the planning and in the actual kit packing. As you are aware, there are many small parts in most of our kits. Our Quality Assurance team checks a certain percent of each production run by taking actual kits off the line and checking to make sure that every part is present.

All these efforts are quite labor-intensive, but necessary, to make sure that you get the right parts in every kit.

US TEAM CHOSEN FOR US-USSR MODEL ROCKET MEET

The US Team for the US-USSR Model Rocket Contest has been chosen from among the best model rocketeers in the country. The contest will be held in late September at NASA Wallops Island, VA. Captain of the US team is Commander Trip Barber, USN, a member of NOVAAR (Northern Virginia Association of Rocketry).

The other members of the US Team and the National Association of Rocketry section to which they belong are: Phil Barnes of Gaithersburg, MD; Bob Biedron of Hampton, VA; George Gassaway of Homewood, AL and member of HARA (Huntsville Area Rocket Association); Fred McMullen of Carthage, MO; Ken Mizoi of Ithaca, NY and member of NOVAAR; George Riebesehl of Schaumburg, IL and member of NIRA (Northern Illinois Rocketry Association); Art Rose and Harry Rose of New York City and member of Pulsar;

Jeff Vincent of New Scotland, NY and ASTRE (Albany-Schneectady-Troy Rocket Enthusiasts); Chuck Weiss of Broadalbin, NY and member of ASTRE; Fred Williams of Franklin, OH; and Dan Winings of Virginia and NOVAAR.

The Parachute Duration Team is composed of Mizoi, Weiss, Vincent, McMullen, Winings, and Barnes. The Streamer Duration Team is McMullen, Art Rose, Harry Rose, Weiss, Barnes, and Williams. The Boost Glider Team consists of Gassaway, Art Rose, Winings, Harry Rose, Vincent, and Mizoi. The Rocket Glider Team is Gassaway, Riebesehl, and Barnes. The Scale Altitude Team is Vincent, Biedron, and Art Rose. The Scale Team is Biedron and Williams.

For further information, contact Ed Pearson, Contest Director, 6808 97th Place, Seabrook, MD 20706.

Get to this meet if you can. Cheer on the US Team! See some great model rockets and model rocket competition.

MAINE

Eric Tardiff, Brewer; James Robert G. Curtis, Bucksport; Joe Beal, Addison; Bonnie Phipps, Machias.

VERMONT

Jeff Severidt, Waterbury; Jim Densmore, Rutland.

CONNECTICUT

Eddie Giarnese, Winsted; Kenneth Balog, Fairfield; Christopher Collier, Orange; Kristofer Spinka, Southbury; Chris Canavan, Wallingford; Jeff Yale, Wallingford; Andy Zychek, Stratford; Mark Aloise, Torrington; Mike Tucker, Danbury; Salvatore Delprete, New Canaan; Alexander Nikas, Old Greenwich; Rogers School, Stamford.

NEW JERSEY

James Petrarca, West Cadwell; Bob Jennings, Springfield; John Rutkowski, Elmwood Park; Mark Rainey, Hackettstown; Richard Federici, Hammonton; Terry Bollinger, Mount Laurel; James Kalis, Medford; Kevin Godbee, New Brunswick.

NEW YORK

Steve Goldsmith, Yonkers; Ed Hagerty, Congers; Andrew Bartko, Middletown; Richard Smiowski, Brooklyn; Donald Calderone, Maspeth; Jon Oldham, Long Beach; Jim Bambauer, Greenlawn; Traci Konigsberg, Nesconset; Vincent Giovannone, Latham; Keith Fischer, Beacon; Chris Thompson, Clay; Matthew Liepke, Minoa; Darryl Stanley, Clarence; Jim Lankes, Amherst; Kris Petty, Churchville; Adam Hill, Livonia; Ross Winston, Warsaw; Ferenc Gy Roka, Rochester; David Gregor, Rochester; Steve Policastro, Allegany; Sean Carls, Cuba.

*This list will be continued in the Winter 1988 issue of MRNM



YOUR OWN JEKYLL OR HYDE SET!

- * Make a high-performance beauty! Or a beast!
- * Over 75 separate pieces to let your imagination run wild!
- * YOU decide...Will it be a rocket you will keep...or a creation which should never have seen a launch pad?
- * The "dream" parts collection!

DESIGNER'S SPECIAL
#1463 \$29.39

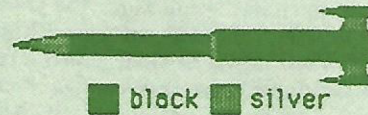
Get A Designer's Special Free! See page 9.

FREE PLAN

THE SILVER STREAK

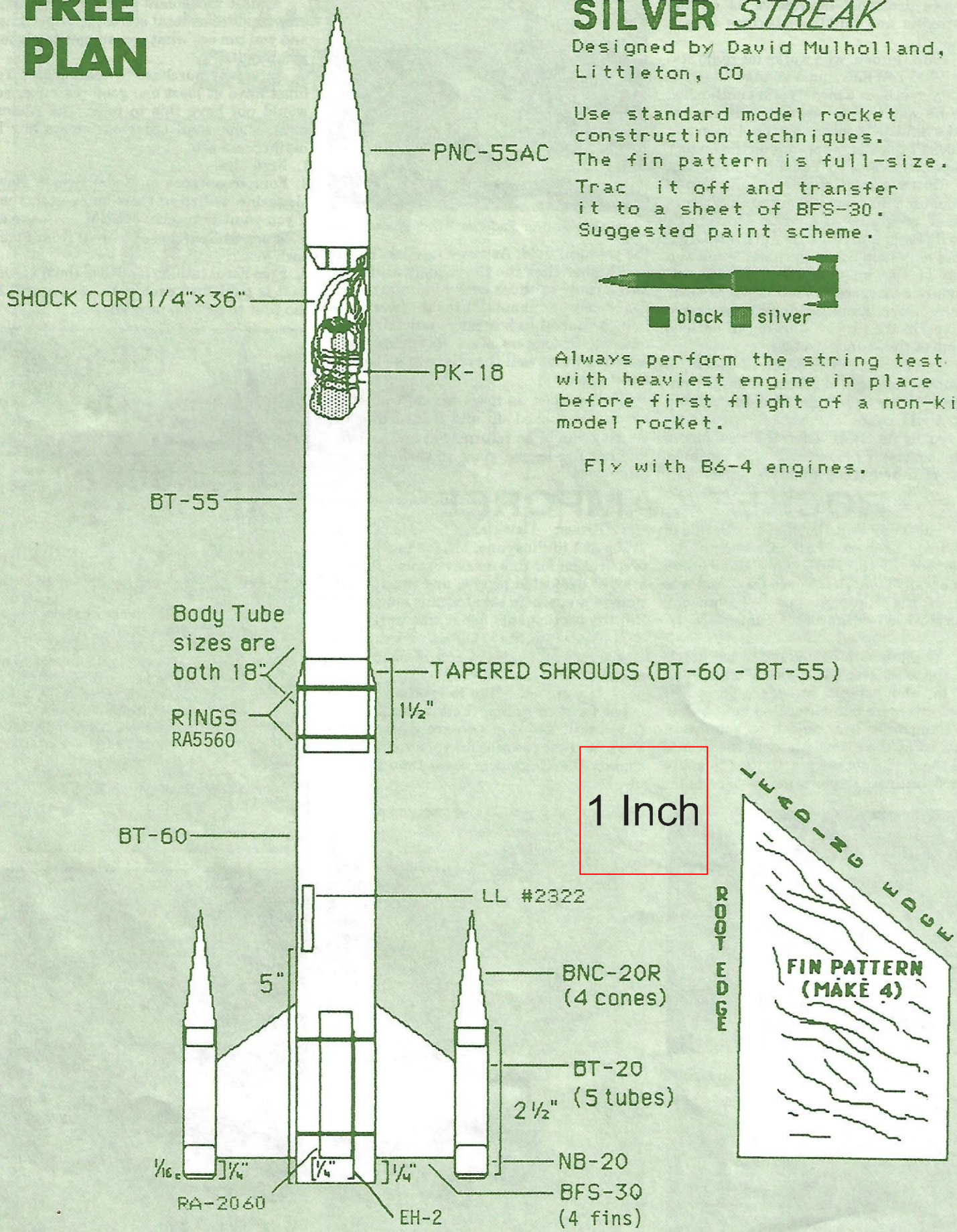
Designed by David Mulholland, Littleton, CO

Use standard model rocket construction techniques. The fin pattern is full-size. Trace it off and transfer it to a sheet of BFS-30. Suggested paint scheme.



Always perform the string test with heaviest engine in place before first flight of a non-kit model rocket.

Fly with B6-4 engines.

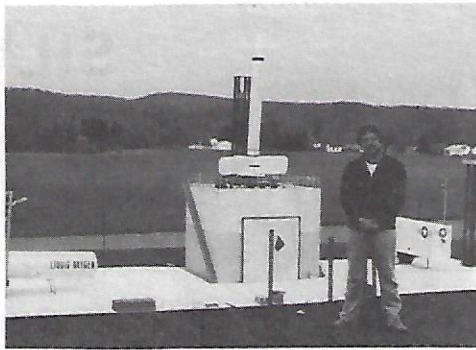


ON ANY GIVEN SCALE

surface area of 10 square feet. Night launches are most impressive as all the streetlights and buildings become illuminated.

Sam Gordon, who works for radio stations WOYL/WRJS and Venango Video in Oil City, has been a model rocket enthusiast since he was twelve years old. He has covered 4 Shuttle launches for the station and produced 2 television specials on the history of Cape Canaveral on Venango Video. Sam also started a local chapter of the Young Astronauts plus teaching gifted children in summer programs at Clarion University. His wife Ester and two girls April and Glynis not only help with the construction and set-up of the huge layout but also sell souvenirs and space-related items at their portable store. Even Gordon's parents are involved in the project working in various aspects of the launch process.

The climax of the event, of course, is the successful flight of behemoth birds from the pad jutting out 50 feet from the visitors area. As the count becomes hot, sirens wail and red lights flash. Then the moment of truth...a burst of smoke and the whooshing sound of thrust from mighty engines split



Sam Gordon near Pad 7 at Windy Rocket Base

the tranquil field. As cameras click, higher and higher flies the fiery giant until it is only visible to those with binoculars. Suddenly someone shouts, "I see the 'chute!" as launch control radios range officials of the descent. Spectators start to trickle away knowing quite well they have to be back to see it again.

Then just as it all began, the entire system is packed up and loaded into the waiting van to be refurbished and to await another fire-legged giant to thrill one and all.

ROCKET CAMPOREE

The Tung Belt District, Boy Scouts of America, held a Fall Camporee on November 13-15, 1987. This Camporee's theme was "Tung Belt Space Day" and was held at the National Space Technology Laboratories in Hancock County, Mississippi.

The promotional efforts were excellent and effective. Over 400 Cubs, Scouts, leaders, and parents attended. Over 350 rocket kits were purchased and built before the Camporee. 348 model rockets were launched at the event! Many of the Scouts used the model rocketry activities to apply toward the Space Exploration merit badge.

Ernest Dawkins, Scoutmaster of Troop 351 in Picayune, MS led much of the preparation for this massive event. It takes a lot of dedicated people, and much, much time to prepare an event of this magnitude. But the participants felt it was worth it!

Boy's Life, May 1988 carried an article and photos on pages 14 and 15 about their model rocketry activity.

If you would like to sponsor such an event for your group, think twice about it. If you still feel that you are game for the work (and the rewards for your youngsters), contact Bob Cannon of Estes Industries for ideas.

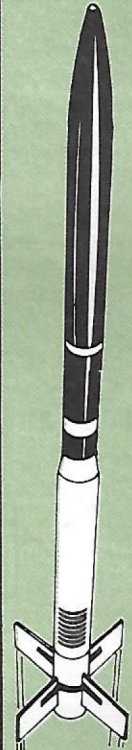


ADVANTAGES OF BUYING BY MAIL ORDER

Most rocketeers purchase their rocketry supplies at local stores. It is fast, easy, and you can see what you are getting before you buy it.

So why purchase by mail order? You must have at least one good reason or you would not have this to read. The reasons most of our mail order customers buy by mail orders are:

1. Free kits.
2. Four free issues of Model Rocket News Magazine mailed to their home each year. If you want to receive MRNM make at least one \$10 purchase by mail from Estes each year.
3. Free Estes catalog mailed to them as soon as it is published each year so they will be the first to see the new kits.

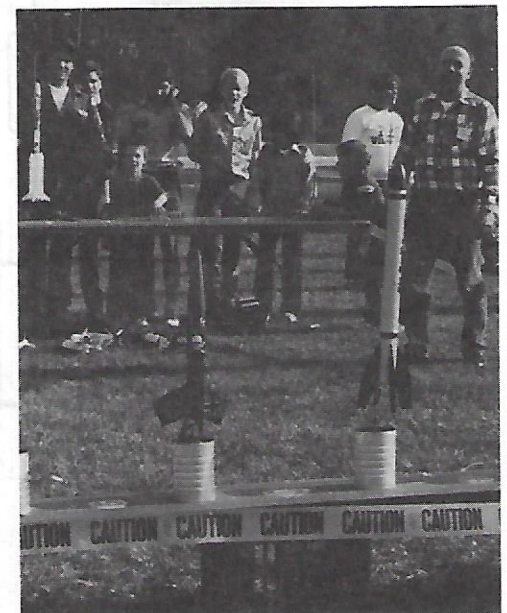


PathFinder™
#1997

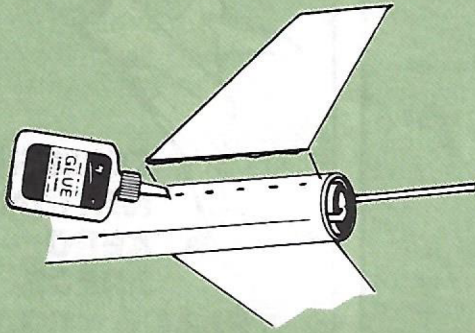
LAUNCH YOUR OWN SOUNDING ROCKET

- * The look of a real sounding rocket
- * D-Power for that "real" take-off!
- * 42.25 inches of scale-appearance
- * Skill Level 3
- * Requires two 12" parachutes (included) for recovery!
- * 1.637" in diameter
- * Power for those upper atmosphere seeking flights by Estes D12-5 engines. Use Maxi™ Rod for launch.

PATHFINDER™
#1997 **\$10.39**

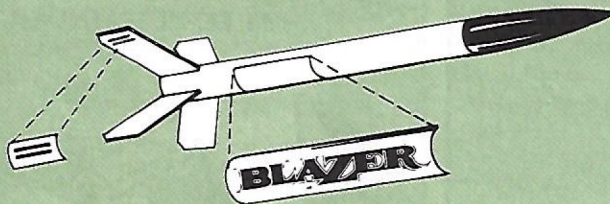


IDEA BOX



For greater fin strength, punch pinholes through the body tube along the fin lines. Punch the holes big enough to permit glue to go through. Four to five holes should be enough for a 2 inch fin. Smear glue around this area and force some of the glue into the holes. Then follow normal fin-mounting procedure to attach the fins to the rocket. This extra glue through the holes into the inside of the body tube makes a much more secure attachment. Do NOT use this method on rockets that use the body tube as the engine mount as the glue will interfere with engine insertion.

Contributed by Christopher Laprise, Fall River, MA



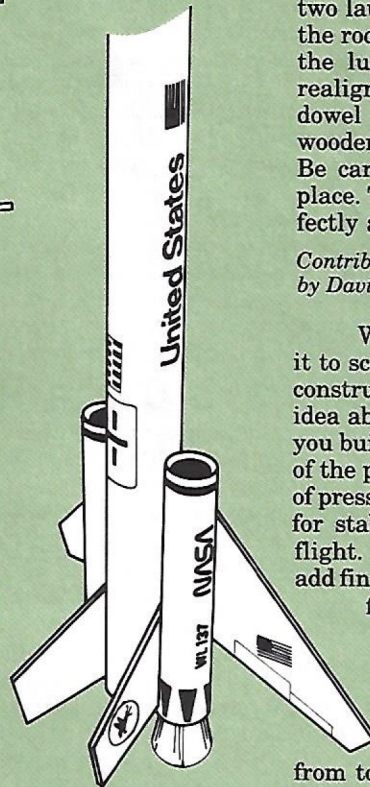
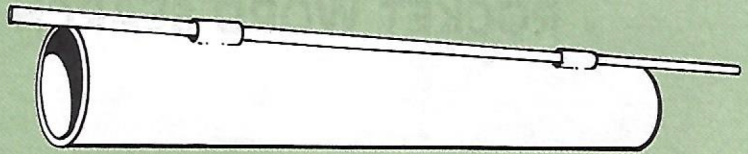
For easier and smoother decal application, let the decal stay wet until it can slide on the paper backing. Then just slide them off the backing onto the rocket. Gently position them, then blot up the excess water with a clean tissue.

To assure smooth ejection of your parachute, first put the proper number of squares of recovery wadding into the body tube. Then put the shock cord into the body tube. Next put in a square of wadding to separate the shock cord from the parachute (prevents tangling up), then insert the properly packed parachute.

Contributed by Tim Williams, Moab, UT

Save the panel cards from all your rocket kits. Tape them up behind or near your rockets. This makes a colorful display.

Contributed by Karl Gruse, Chandler AZ



When using two launch lugs, align the two launch lugs carefully along the body of the rocket. Place an 1/8 inch dowel through the lugs before the glue dries. Carefully realign the lugs if necessary, then leave the dowel in place as the glue dries. Use a wooden toothpick to properly apply the glue. Be careful to avoid gluing the dowel into place. Then remove the dowels. Result—perfectly aligned launch lugs.

Contributed by David Crocker, Clarkston, WA and by David Baum, Bethlehem, PA

When designing your own bird, draw it to scale on graph paper before you begin construction. This way you can get a clear idea about how your rocket will look before you build it. You can also make an estimate of the probable center of gravity and center of pressure. Always test your rocket designs for stability after construction and before flight. If they don't pass the stability test, add fin area or nose weight and retest. **Don't fly unstable rockets!**

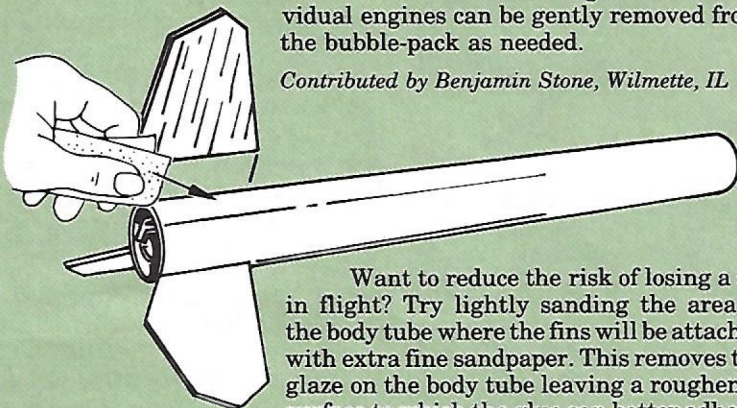
Want to add a custom touch to some of the rockets in your fleet? Glue the caps from toothpaste tubes to the bases of body tubes attached to the sides of your rockets to look like nozzles on parallel SRBs.

Contributed by Ed Brown, Indianapolis, IN

Contributed by Richard Johnson, Tallahassee, FL

Want a way to dispense engines individually from the standard bubble-pack of engines? Cut away the paper above the bubble. Then cut a clean slit near the paper along the left edge of the bubble and across the base of the bubble above the engines for about the width of one engine. Now individual engines can be gently removed from the bubble-pack as needed.

Contributed by Benjamin Stone, Wilmette, IL



Want to reduce the risk of losing a fin in flight? Try lightly sanding the area of the body tube where the fins will be attached with extra fine sandpaper. This removes the glaze on the body tube leaving a roughened surface to which the glue can better adhere. Don't forget to apply glue fillets after the glue used to attach the fins is dry.

Contributed by Mark Blicharz, Springfield, VA

ROCKET WORD SEARCH

Z S C O R P I O N N A T I T E C O X E
 E I E N O T S D E R Y R U C R U M N M
 S U N B I R D R I B K C A L B S I A O
 T R A G U O C E S M X I N E O H P I S
 E L G A E G N I R A O S O D C E L C Q
 R Y O C K R N E K W A H R A T S T I U
 S B A M A R A U D E R A M A R C S G I
 A I R N E S T E S E K N A Y G I B A T
 L G H C K C I R E V A M S O U R P M O
 P B A Y T E T E O E N A C W N E U P C
 H E R C U L E S M F T R O O I L L S O
 A R P L H P S A W I S C U R K Z S A M
 I T O O W H T L A E T S T T E Z A W E
 I H O N E S T J O H N O R S A I R R T
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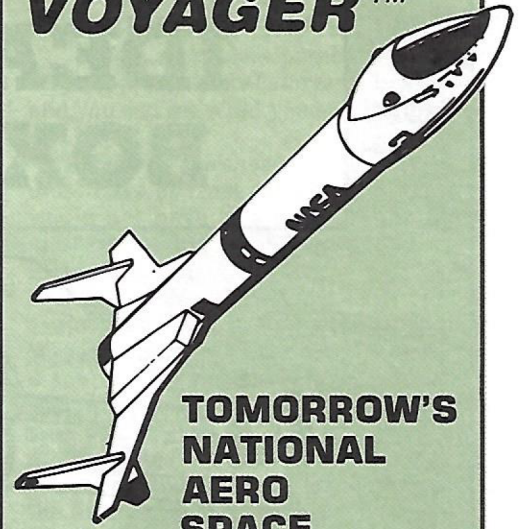
These are the words that you must find in the puzzle.

- | | | | |
|-------------|---------------|----------------|----------------|
| Alpha III™ | Harpoon™ | Nike™ | Space Shuttle™ |
| Astro™ | Hercules™ | Phoenix™ | Starhawk™ |
| Big Bertha™ | Honest John™ | Pulsar™ | Stealth™ |
| Big Yank™ | Laser™ | Saturn V™ | Sunbird™ |
| Blackbird™ | Magician™ | Scorpion™ | Titan™ |
| Comet™ | Marauder™ | Scout™ | Titan™ |
| Cougar™ | Maverick™ | SCRAM™ | Wasp™ |
| Cyclone™ | Mean Machine™ | SCRAM™ | Wasp™ |
| Estes | Mercury | Sizzler™ | Wizard™ |
| Exocet™ | Redstone™ | Soaring Eagle™ | Yankee™ |
| | Mosquito™ | | Zinger™ |

Some words in the list are repeated. You must find these words twice. When you have finished the puzzle, the uncircled letters will spell out a message.

They are mostly names of rockets made by ESTES.

VOYAGER™



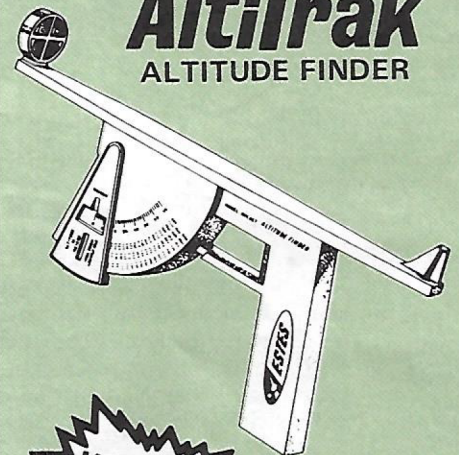
**TOMORROW'S
 NATIONAL
 AERO
 SPACE
 PLANE TODAY!**

- Looks like what the National Aero Space Plane may be
- Hi-tech appearance
- Over 700 feet flights
- Recovery by 18" chute
- Only Skill Level 2
- Fly this experimental aircraft-looking bird with A8-3, B4-4 (First Flight), B6-4, B-5, C6-3, C6-5 Estes power plants

VOYAGER™ II #2000 . . . \$7.19

AltiTrak™

ALTITUDE FINDER



- * Now you can *know* just how high your rockets go
- * AltiTrak™ lets you determine accurately how high your rockets go, using either English or metric units
- * No launch box should be without one!
- * Essential for research projects
- * Use two for greater reliability in tracking--contests, etc.

ALTI TRAK™ #2232 . . . \$11.79

TEST ON NEW SAFETY CODE

The new NAR/HIA Model Rocketry Safety Code went into effect on January 1, 1987. By now you have it memorized, right?

Test your recall of the new rules by taking the test below. No fair rereading the Safety Code before taking the test!

1. I will launch my model rockets only when the wind is less than _____ miles per hour.

2. I will launch my model rockets with the launch rod pointed within _____ degrees of vertical.

3. The launch system I use to launch my model rockets will be _____ operated.

4. Only _____ recovery wadding will be used in my rockets.

5. I will begin my launch sequence with an audible _____-second countdown.

6. If my model rocket becomes entangled in a power line or other dangerous place, I will _____

7. Only _____ igniters will be used to ignite my rocket engine.

8. I will check the stability of each of my model rockets before their _____ flights except when launching models of already proven stability.

9. I will use only pre-loaded, factory-made, _____ certified model rocket engines in the manner recommended by the manufacturer.

10. My model rocket will weigh no more than _____ grams (or _____ ounces) at lift-off.

Check your answers with the NAR/HIA Model Rocketry Safety Code found on page 6 of the 1988 Estes Flying Model Rocket Catalog.

What is the passing grade? One hundred! Model rocketry has established and maintained an excellent safety record in over 300,000,000 model rocket launches. Let us each continue to do our best to keep this excellent safety record.

SAFETY

Be safe.

Do it right...

the first time...

everytime!

ESP™ CORNER

I have good news...and bad news. First the good news.

Congratulations to Jared Twiggs of Spokane, WA for being the first person to qualify for an ESP™ Achievement Award. He qualified for the Single Stage Flight Achievement Award. His award coupon and proof of accomplishment were received on October 6, 1987. Jared qualified for the Scale Model Flight at the same time. Congratulations, Jared!

William Lutat of Montgomery, MA was the second to qualify for an award. It was the Single Stage Flight Award. Good work, William!

The first "grand slammer" was Harry Stephens of Exeter, MO. On November 25 we received his flight coupons and got proof of accomplishment for all five Achievement Awards available at that time. Way to go, Harry!

Now the bad news. My face is red! I goofed. In the Spring MRNM I promised you that we would list the names of individuals who had earned ESP™ Achievement Awards so far. I thought that the system to retain the names of these outstanding model rocketeers as they earned each new Award was in place and functioning. I was wrong! We failed to keep these names.

On pages 3 and 10 is a list of Estes Space Program members who have recently placed an order. We were able to retrieve this information from the computer records. Unfortunately, we were not able to determine who has earned which Achievement Awards.

My apologies for not listing which Achievement Awards you have earned. If your name is not on the list, or if your name is on the list but you would like to have the awards you have earned listed among the achievers in the next MRNM, please send to "ESP"Corner" a note stating:

1. The award or awards you earned and sent in for.

2. When each award was sent in for

To be listed, send in only information on awards for which you earlier qualified and for which you sent in the award coupon. We will try to retain the names of award earners from now on.

I hope that you noticed that there are now eight achievement awards which you can earn.

To you thousands of rocketeers who have joined the Estes Space Program™ but who haven't yet earned your Achievement Awards--Go for it! Learn more about model rocketry, and earn Achievement Awards as your model rocketry skills increase. Be the best!

Attaching the cloth award patches

The ESP™ patches may be attached with a warm iron and/or by sewing. Here are some suggestions on attractive and permanent attachment of the patches.

(Continued on page 3)



THE FUN CLUB!

- The best way to become an Expert—by building and flying!
 - If you haven't yet joined, join today!
- 1 You will receive a big model rocket—the 17.5 inch long Yankee Clipper™
 - 2 You will receive a full-color special issue of Model Rocket News Magazine
 - 3 You will become an official member of the Estes Space Program™. You will receive the membership patch, membership card, cloth membership patch, decals, and more.
 - 4 Most important of all, you can earn Achievement Awards! You will have the fun of building and flying...and learning new skills and knowledge to earn the awards. Eight awards now available:

Single Stage Flight
Multi Stage Flight
Scale Flight

Glider Flight
Payload Flight
Science Fair

School Demonstration
Estes Aerospace Club



ESTES SPACE PROGRAM
#1443 \$8.69

**NOT JUST A GREAT ROCKET,
BUT A WHOLE PROGRAM!**

★ **COLLECTOR'S PATCH FOR
ESTES THIRTIETH
ANNIVERSARY**



- ★ Beautiful!
- ★ Big 3½ inch cloth patch
- ★ Four colors on white! Red, Black, Blue, and Gold.
- ★ Limited edition! Sure to be a prized possession. Buy several for trading.

**ESTES THIRTIETH
ANNIVERSARY PATCH**

#9035. **\$3.00**

Buy now as this patch will not be available once the limited current supply is gone!

CORSAIR™



**GHOST SHIP OF
THE PIRATE
FLEET**

**CORSAIR™
#1999**

A real steal at
\$6.49

- * Exotic ship uses the most sophisticated of the designs utilized by the galactic pirate fleet
- * Mystery ship slips in, commits acts of despicable piracy, then vanishes again into the interstellar void
- * Launch this miniature replica of this cosmic corsair toward the vast starry spaces using A8-3 (First Flight), A8-5, B4-4, B6-4, B8-5, C6-5

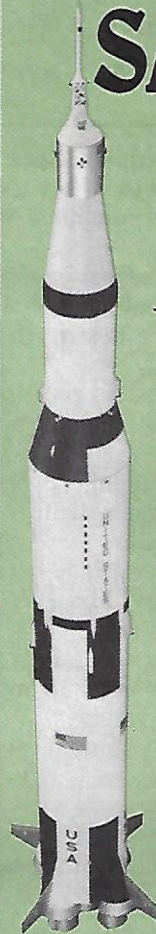
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Thirty Years of Service.
Thanks for Making
It Possible.

**SATURN™
V**



THE KING!

THE PRIDE OF ANY FLEET!

- * Everyone's favorite scale model. Built and flown thousands of times. A great crowd-pleaser when launched in demos. A crowd-drawer when displayed.
- * BIG!
- * 1/100 scale model. Skill Level 4, but worth it!
- * No room that is inhabited by model rocketeers should be without one!
- * Powered by Estes D12-3. Yes, you need a Maxi™ Rod to launch it

SATURN V

#2001 . . . **\$52.29**



SNEAKY!

**CRUSADER
SWING-WING™ GLIDER**

- ★ Prototype NASA high-performance rocket craft can fly to over 800 feet.
- ★ Yet rocket has real mass!
- ★ 18" rocket deploys wings (rotary deployment) at apogee. And ejects its internal power pod. And then glides back—sometimes for 45 second flight duration!
- ★ Launch your own Crusader Swing-Wing™ maxi-glider with dependable Estes B4-2 (First Flight), B6-2, or C6-3 engines.

**CRUSADER
SWING-WING™**

#1961 **\$9.29**

MEAN!

- * D-Power puts this monster up over 800 feet!
- * The hit of your demo!
- * Spectacular flights with Estes D12-5 engines! Requires Maxi™ Rod for launch.

**MEAN
MACHINE™
#1295**

. . . **\$16.29**

