

Volume II, Number II - November/December 1993

flamethrower®

Official Newsletter of the Student Experimental Payload Program



Kids, Kindness & Kamikaze

One of the elements that led to the formation of our organization was teaching after school classes to "Latch-Key Kids," students in elementary grades who have working parents and would otherwise go home to an empty house. Many schools offer classes to these students and among the options of "Drawing" and "Learning Spanish" is now "Beginning Rocketry," courtesy of the SEP Program. These kids really get excited when they find out that they will actually build and launch their own rockets. But one of the high points has got to be the questions that come up during the classes. Anything from "Can we glue the nose cone in and see what happens?" to "If I try really hard, can I get a small furry animal in my rocket?" are only a few of the samples.

The course covers all the basics of rocketry along with the NAR safety code (so much for the small furry animal!), but the approach has to be completely different. Most of these kids have little to no experience with space science in these grades. In fact, many of them don't even realize that people have landed on the moon. Building the rocket kit is a challenge to all the students, conveying the information on a lower grade level is also a challenge. The reward is seeing the look on their faces as they suddenly make the connection between why a fin must be on straight, and the rocket that just took a left and headed for the next state. Or watching the wild excitement as they run blindly after a rocket descending under a full parachute. Moments like these make you realize that as an instructor, you play an important role in the development of young minds. Many of these students will remember the rocket class they took and will follow through and get involved in science and model rocketry. Others will learn something about stability, the laws of motion, the basics of rocketry and other scientific principles, and never realize it. That is, until it comes up again in a science class.

Entering its third year and continuously upgrading its scope, materials and capabilities, the SEP Program is proud to offer these and other services to students of all ages. What better effort than to teach students that science can be fun and educational.





A Note from the Program Director



With the holiday season rapidly approaching, everyone will be getting ready for an assortment of activities, most of which will not include rocketry. However, rest assured that during the Christmas vacation, the SEP Team will be hard at work getting everything ready for the return to school. Average participation in the program so far this year has been a slight increase over last year, although little time as yet has been spent on rocketry demos. Most of the teachers we have talked with have stated that this year they are not studying space science until after the Christmas break, so the rest of the school year is sure to be busy for our demonstration team.

With new publications under way and the completion on the long awaited "comic book", the SEP Program is continuing to meet the needs of students and teachers everywhere. In fact, the comic book has been so well received that there is discussion of assembling an entire series.

There are also several new projects underway. Next year is the 25th anniversary of the first moon landing and SEP plans to get heavily involved in demonstrations, classes and workshops. Also, a 1/32 scale model of the Apollo Saturn V is under construction. The model, along with its full gantry, will certainly be a show stopper at the demonstrations. Also, the on-board video endeavors by Jeff Frohwein are progressing nicely and soon students will be able to watch their experiments in real time while onboard the various rockets. Additional details on both these projects are covered in this issue of the newsletter.

And to all you students and teachers that have written in or called, thanks for your support and ideas. It is that type of response that will help us improve our materials, and continue to make the SEP Program the largest and most effective non-profit, student oriented payload launching service in the country.

Greg Warren

Flamethrower

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Editor: Greg Warren

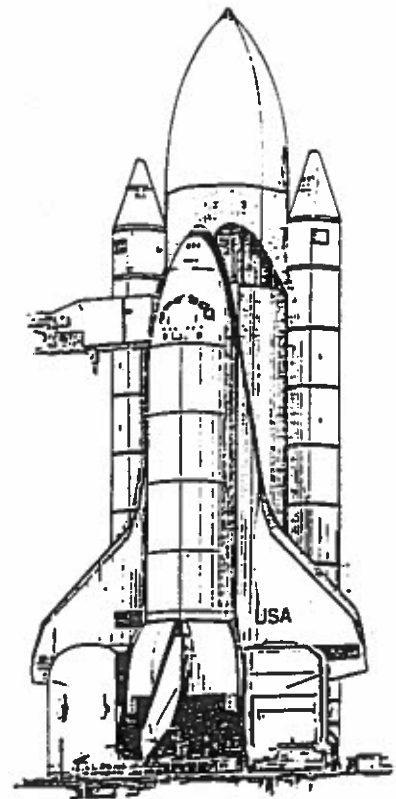
The Flamethrower is the official newsletter of the Student Experimental Payload Program. Issues are published every two months with an update published between issues. Subscription rate is \$10.00 per year. The editor welcomes any material submitted for publication. Contributing editors are noted per article. When submitting photos, please include return postage and address or materials will be kept on file at our office. Send articles or subscription payments to:

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Huntsville, Alabama 35807

The Student Experimental Payload Program is a non-profit organization dedicated to hands-on aerospace education. Team members include:

Greg Warren: Program Director
Joe Robertson: Technical Consultant
Dan Coon: Technical Consultant
Ken Pearce: Payload Integration
Guy McClure: Educational Consultant, High School Level
Pam Fowler: Educational Consultant, Middle School Level
Karen Warren: Educational Consultant, Elementary School Level
Todd Gangl: NASA Space Program Consultant
and numerous others who offer their support

NASA Shuttle Manifest



September 1993

- Vehicle: Columbia
- Mission: Spacelab Life Sciences
- Orbit: 2.39° inclination / 176 st. miles
- Duration: Fourteen days
- Liftoff: Pad 39-B / Landing: Edwards
- Crew: John Blaha, Richard Searfoss, Rhea Seddon, Shannon Lucid, Bill McArthur, David Wolf, Martin Fettman

November 1993

- Vehicle: Discovery
- Mission: Spacehab-2, Wake Shield
- Orbit: 57° inclination / 216 st. miles
- Duration: Nine days
- Liftoff: Pad 39-B / Landing: Kennedy
- Crew: Charles Bolden, Ronald Sega, Jan Davis, Kenneth Reightler Jr., Franklin Chang Diaz, Sergei Krkalev

December 1993

- Vehicle: Endeavour
- Mission: Hubble Optical Correction
- Orbit: 28.5° inclination / 356 st. miles
- Duration: Eleven days
- Liftoff: Pad 39-A / Landing: Kennedy
- Crew: Richard Covey, Story Musgrave, Kenneth Bowersox, Tom Akers, Jeffrey Hoffman, Kathryn Thornton, C. Nicollier

SEP at ASME

In November, the National Historic Society designated the Saturn V Test Facility at Marshall Space Flight Center as a national landmark. To honor the individuals that worked with the test stand during the Apollo era, the American Society of Mechanical Engineers held a banquet at the Space and Rocket Center. The SEP Team was contacted to hold a static test fire of a motor in a scale model of the test stand to honor all the successful firings of the facility. After completing the test stand model in a rather short time frame, the Team traveled to the Space Center and waited for the conclusion of the banquet. The static test fire was to be the closing ceremony of the evening.

With the usual amount of anticipation, the Team went through the procedure, the countdown, and the infamous "FIRE" ... nothing. Well, that happens. And when it does, you recycle and try again. After a short delay again was heard, "FIRE" ... and again, nothing. The third attempt was successful, but by that time had become more of a personal challenge than a closing ceremony. One kind, old gentleman who had worked on the Test Facility in the early days offered the following words of comfort to a rather disgruntled SEP Team: "Don't worry," he said, "the probability of a misfire is directly proportional to the number of spectators present. And when we conducted a test, the whole country was watching!"



Science Day

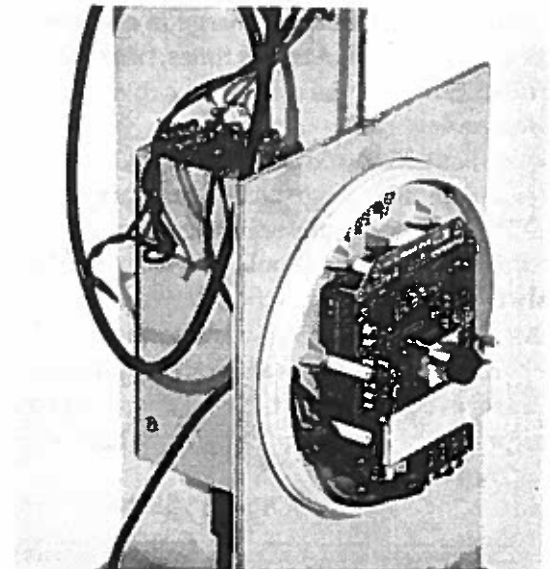
Recently the SEP Team was invited to attend the Super Science Day at the Academy of Science and Foreign Language in Huntsville. The annual event is open to the public to encourage students to learn more about science, technical careers and current events in the high-tech world. Turnout for the half day exposition was impressive with the entire school containing exhibits ranging from live animals to a virtual reality exhibit. And some of the big guns made it out as well. NASA was on hand with a 1/15 scale model of the space shuttle and handouts on current missions. The University of Alabama in Huntsville conducted a hands-on robotic exhibit, complete with a small robotic arm. Several government contractors brought very nice models of their products, including a 1/2 scale mockup of the Patriot missile from Thiokol.

SEP was on hand to introduce students to high power rocketry and payload capabilities, and several members of HARA, the local model rocket club, displayed kits and handed out flyers about model rocketry. During the course of the day, nearly 100 people reviewed the SEP display, picked up printed material about the program, and learned about the continuing success of the SEP Program. It also served as a good source of contact for such organizations as the Boy Scouts and 4-H, both of whom were looking for someone to put on a rocketry workshop in the near future.

"Eye in the Sky" Nears Completion

With an amazing ability to put up with schedule changes, cancelled launches and "oh, by the way's", Jeff Frohwein has continued to work on the video transmitter camera for the SEP Program. The original plan was to have the package ready in time for the Danville launch in October, but complications in the transmitter kept that from happening (just as well, from all available information the Danville launch was plagued with high winds and snow flurries). Jeff has completed the assembly of the transmitter and downconverter, and except for a few minor adjustments the package is ready to fly. A search is underway to determine the best possible antenna for the downconverter, and some adjustments have to be made to the 10 Watt booster unit.

Once completed, the assembly will be able to transmit a high resolution image of either a ground based picture, or of payloads inside the rocket. This will open a new area for students submitting payloads to the SEP Program, as they will be able to observe their experiment in real time or by reviewing the video tape of the flight.

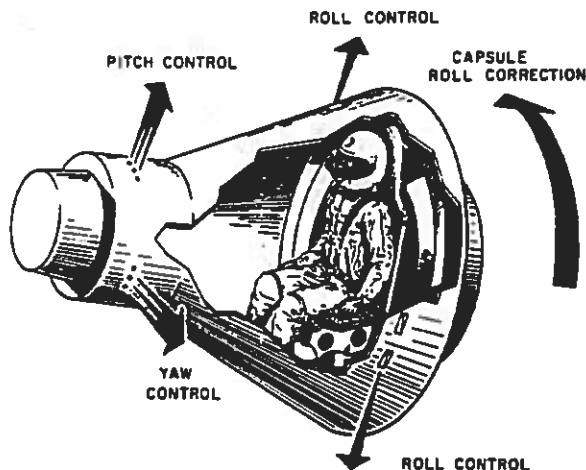


Time Traveler - Log Entry Data [33 years ago]

Subject: Mercury Capsule Source: All We Did Was Fly To The Moon (Eagle Press ©1983) Date: 1960

The size of our first space capsule was dictated by the proven rockets of the day. Outside dimensions were 9' 6" tall and 6' 2" in diameter at its widest point. Yet the interior pressure hull was about the size of a telephone booth. John Glen had said, "You don't climb into the Mercury spacecraft, you put it on." When seated on his contour couch inside the capsule the instrument panel was only 24 inches in front of the astronaut's face. Mercury would fit on the top of both the Redstone and Atlas boosters. It was built by McDonnell Aircraft in St. Louis with the help of 4000 suppliers, including 596 direct subcontractors from 25 states. A major feature of the bell-shaped Mercury capsule was an ablative heat shield made by the CTL division of The Studebaker Corporation. This heat shield absorbed the tremendous heat built-up on reentry into the atmosphere. Mercury contained 750,000 parts and 7 miles of wiring. Before launching its first human occupants, the Mercury also flew monkeys, chimpanzees - and even a pig.

Visual Reference Data the Mercury Capsule

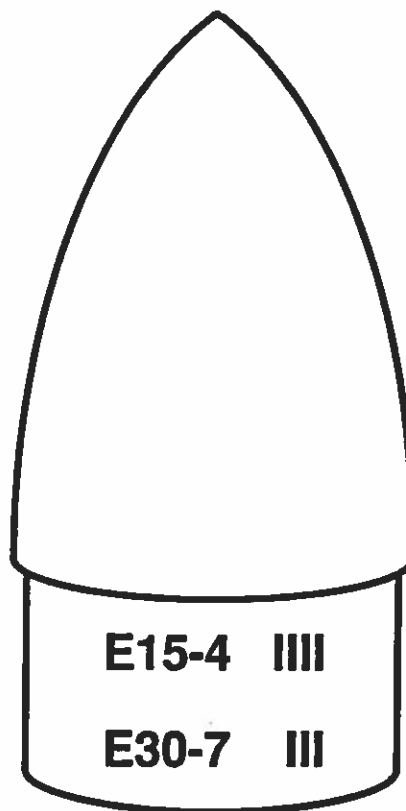


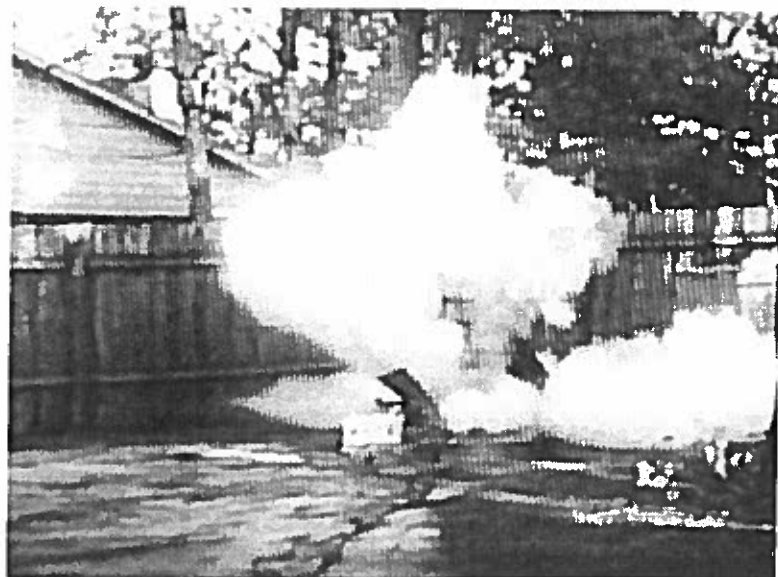
Tech Brief

Motor Selection Reference

Keeping up with which motor goes in what rocket can be an easy task if you have only a couple of models, and a catalog handy to look them up. But what happens when you have a wide selection of models and no catalog? Or a scratch built model that flew really well on "some motor" about a year ago, but which motor was it? In some cases it may not be critical if your ejection charge is activated a couple of seconds early or late. At other times, two seconds one way or the other can mean the difference between a stripped parachute or a devastating impact.

To avoid this problem, some people use data cards and keep them in their range boxes. But data cards can get lost. At SEP, we write the motor information on the tube coupler shoulder or nose cone shoulder. That way, the information is always available, and the data can't be confused with motor specifics pertaining to another rocket. In addition to the particular motor, we also put tally marks beside each motor for every flight. This is a great way of keeping up with your preferred motor per model and how many times the rocket has been up.



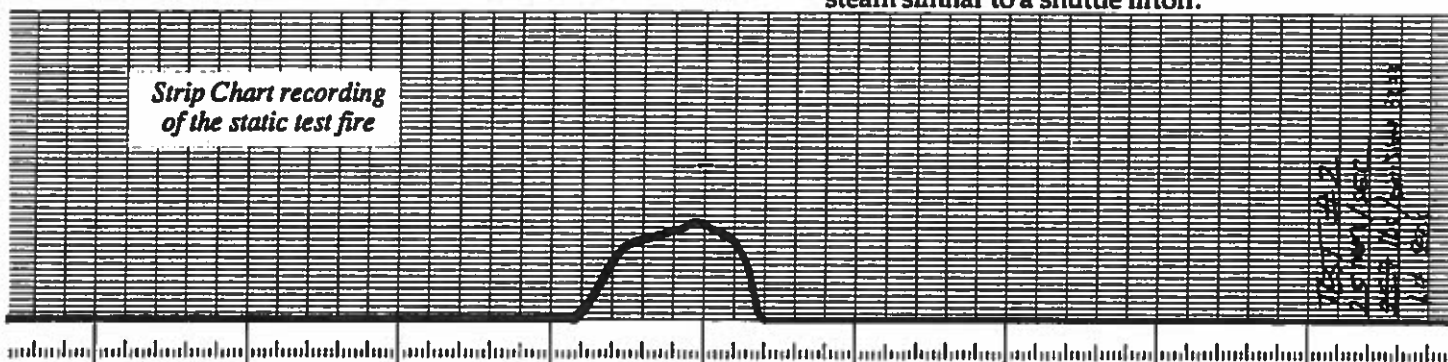


Static Test Fire of the steam motor at full thrust

Getting All Steamed Up

After months of preparation and research, Tim Pickens has moved a little closer to realizing a launch of his steam rocket. On November 28, Tim conducted his first static "fire" of the motor near his workshop. The results were very pleasing.

With a small collection of loyal followers on hand to assist, the LP gas tank required nearly two hours to heat the motor to the 406° necessary for the static fire. For this test the motor contained 22 pounds (10 liters) of water and was designed to release at 260 psi. Using his garage as a blockhouse, the crew stood ready with video camera running, the strip chart recorder humming away and a cautious voice giving off the countdown. At T-0 the retainer pin was dislodged from the nozzle and the super saturated steam gave out a roar. Within 1.4 seconds, the rocket produced a cloud of billowing white steam similar to a shuttle liftoff.

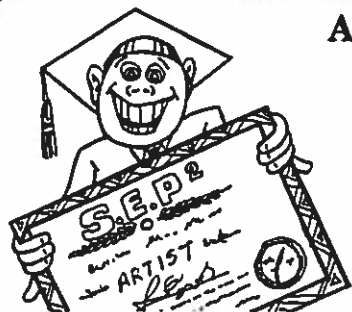


Strip Chart recording of the static test fire

In an instant, all that remained was the echo and an empty rocket motor nestled on its test stand. The test had been a complete success and was captured both on video and on the strip chart. The final results showed that during the 1.4 second expulsion duration, a peak thrust of 546 pounds was produced with an average thrust of 326 pounds.

Tim was satisfied with the test results, and pointed out that the actual launch status will be heated to an even higher temperature with the same amount of water. With his data and research based on the previous work of Bob Truax, Tim also pointed out that in the Truax project (which was conducted years ago), they had to fire the motor at 200 psi because the lines and valves started leaking. But modern materials and components allow for a more precise and secure system, enabling Tim to push the limits that stopped Truax.

The launch vehicle is under construction and although no definite launch date has been set as of yet, the experiment promises to be an exciting (and very loud) one, to say the least.



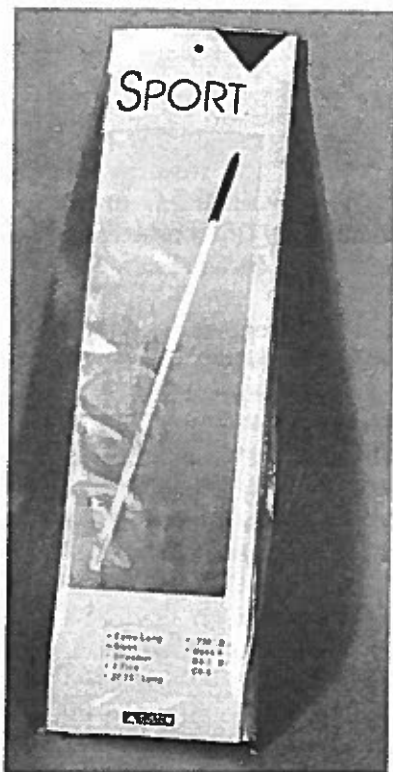
Announcing the 2nd Annual SEP Program Space Art Contest

Divisions for every grade level
Prizes awarded to division winners
Certificates awarded to everyone



Details coming in the Jan/Feb issue of the *Flamethrower*

Construction of the "SPORT"



Manufacturer: Custom
Diameter: 00.736"
Length: 37.75"
Fins: (4) Balsa
Recovery: Streamer
Motors: A8-3, B4-2,
 B4-4, C6-5

If you have never built a rocket kit before in your life, this is an excellent choice. The SPORT by Custom Rockets is a simple kit, yet offers impressive overall length to the novice. The assembly is quick and straight forward, and the instructions

are clear and concise on nearly every point. As an experienced rocketeer I had no trouble putting the kit together in a little over 30 minutes, but for the purpose of this article I have to approach the construction as a first time model builder. In that respect, let's review the kit from start to finish.

Upon opening the bag and examining the parts, one should always compare the items in the kit with the list of items named on the instruction sheet. The line drawings of the parts lend assistance to this task, except where it mentions "item I" as the Fin Template, but doesn't show an "item I" among the line drawings. Next is the Stage Coupler, "item J" which is depicted in the line drawings as a square with a curved line running through it, not as an actual tube coupler. Once you get past those little quirks (which are minor indeed!), the instructions are straight forward and easy to follow.

Call me spoiled, but I have grown accustomed to die-cut balsa fins, or pre-cut plywood fins for the high power kits. With the SPORT, you build the rocket the old fashioned way . . . one fin at a time. And that means cutting out a template from the sheet provided, tracing it onto the balsa stock (following the layout guide in the instructions), and cutting them out with an x-acto knife. While this activity doesn't present a major challenge to most people, it will require supervision by an adult if the kit is being constructed by a young rocketeer.

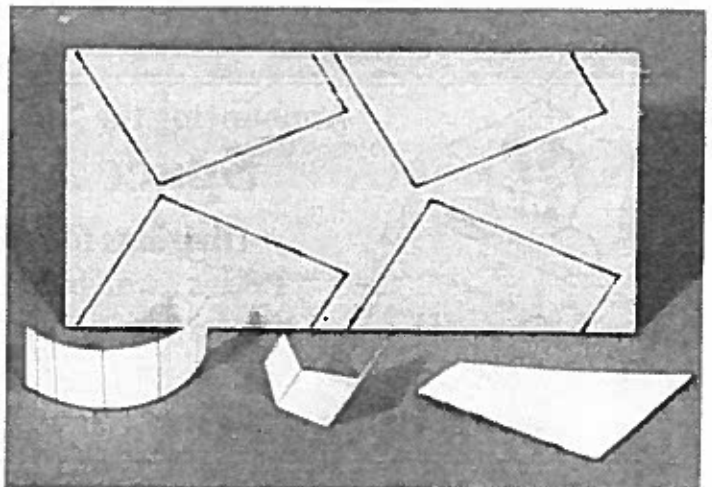
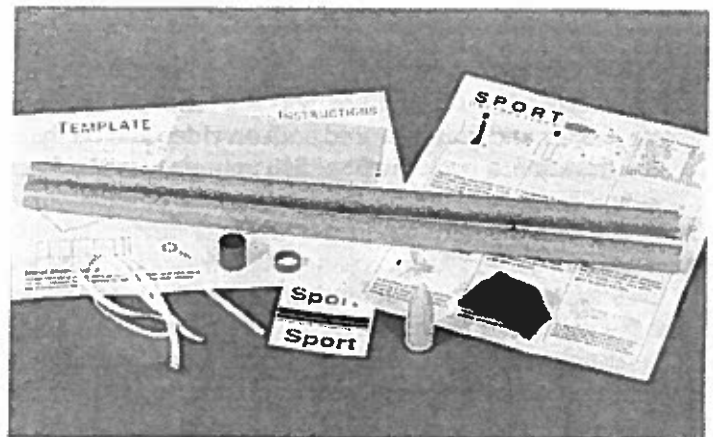
Sanding sealer applied to the fins and balsa nose cone simplify the sanding process, and the application of typical glue fillets along the fin joints finish the major part of the construction. I found that the longest part of the assembly was waiting for the glue to set up. The two long sections of body tube are joined by a tube coupler which is glued into both sections. The rocket is designed to separate at the nose cone. The shock cord mount is the standard tri-fold paper method, although the kit does contain an elastic shock cord instead of a rubber band. Attach the bright orange streamer and you're ready for paint.

One thing that should be pointed out is that the kit does not contain an engine hook. You will find that an engine block is

included and is the first assembly step in the instructions, but the manufacturer recommends wrapping tape around the motor for a friction fit before launch. I see both pros and cons to this. I personally like the security of an engine hook instead of tape, mainly because I have twisted and crushed paper tubes while trying to pull out motors that are coated with melted tape. On the other hand, if you have an engine hook sticking out, in most cases your rocket will not stand on its fins. Everyone has a preference . . . it really isn't a major deal.

In future articles of this type, I will include a photo of the launch and a review of the flight of the kit being reviewed. However, holiday schedules and bad weather did not allow me to give the SPORT its "trial by fire". That also explains the finished, yet unpainted kit. I never paint my kits until I have launched them once. It's kind of a tradition that developed from spending hours on a paint job, only to watch the rocket drift off into oblivion or suffer some other terminal fate.

If it seems like this article is rather short, that's because there isn't much to the assembly of the SPORT. This could prove to be very beneficial to novice rocketeers. Final opinion: The SPORT is a good kit for beginners, offering clean lines, impressive length and concise instructions. All the parts went together easily and the kit would serve well in teaching new rocketeers about baseline assembly procedures.



New SEP Video

With the fast paced lifestyle that so many teachers and students have, most do not have time to sit down and read through the necessary literature to properly conduct rocket classes or get involved in programs like SEP. To overcome this problem, the SEP Program is developing a video that will include a brief history of rocketry, the hobbies of model and high power rocketry, and how to use rocketry in science and career investigation. To assist in this production and to ensure that the finished product is first class, Falcon Cable TV producer Dean Jones is assisting in the technical editing and mixing of the video. Dean has worked in television production for several years and has offered his experience, talent and access to high grade broadcast equipment to ensure a professional end product.

Working closely with the SEP Team, Dean has managed to secure permission to use footage from NASA, private contractors in the aerospace industry, and even footage from individuals at LDRS and Danville high power launches. The finished video is expected to be about 15 minutes long and promises to be a landmark in rocketry promotion.

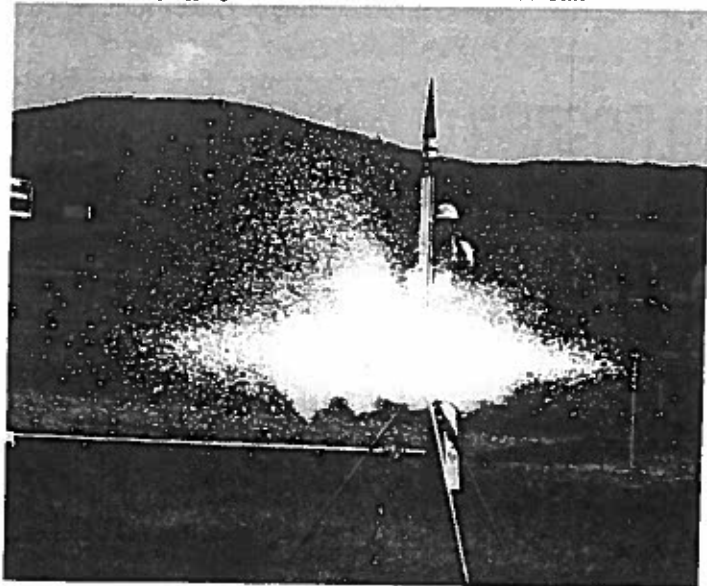


A Classic Event

Each year, the Huntsville Area Rocketry Association (HARA) holds its largest event, the Rocket City Classic. And this year, the 12th, saw some new innovations by both novice and experienced modelers. One major difference was the addition of the SEP Mobile Rocket Launch System. The trailer, in its semi-completed state, offered a single location for launch control, data processing, radio net and PA officer. Although the trailer was functional, its trial run let the SEP Team know that some major revisions are in order.

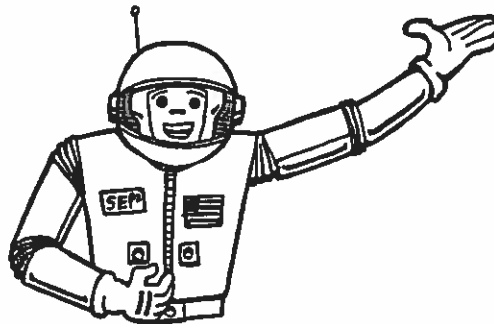
Other added attractions at the Classic included a remote controlled launch gantry which fired a small model rocket, several multi stage launches of medium sized rockets, a 30 gallon "pumpkin parachute" recovery by George Gassoway and numerous silver streak motors with their recognizable flare and shower of sparks.

Liftoff of a Cherokee D on a Silver Streak



New Resource Kit

Since first offering the Teacher Resource Kit through the SEP Program, the kit has undergone several changes and upgrades. The latest revisions include a new payload design kit and additional NASA documentation for searching the technical career arena. The kit is designed to enable teachers to read through the materials and then conduct classroom activities in rocketry, or assist their students in participating in the SEP Program payload launching service.



To introduce the new kit, the SEP Program comic book has made its debut in this issue of the Flamethrower, and is being sent out to everyone on the mailing list. The artist for the cartoon book, Steve "Wildman" Thornton, has been a tremendous help in establishing a mascot for the program. This astronaut-like cartoon character will make occasional appearances in SEP publications and flyers.

For those who have seen the comic book, the reviews are so favorable that the SEP Team is considering production of a series of similar booklets. The series, which at this time is being referred to as "Knowledge is Power", will go beyond the bounds of rocketry and will encompass exploration into other fields of science and technology. Among the possible subjects are a tour of the solar system, astronaut training, a mission onboard the space shuttle, and living and working in space, to name just a few.



Saturn V Project

July 20, 1994 will mark the 25th anniversary of the first moon landing. To commemorate this event, the SEP Program has begun construction of a 1/32 scale Saturn V rocket to be launched in a soon-to-be-planned ceremony. The completed model will include the full launch gantry and crawler, special pre-liftoff smoke and as much detail as the team can include in the time available. The upper section of the nearly seven foot tall model is detailed and ready for integration into the main airframe. The project promises to be a long term assignment, but the end product should be well worth the effort. Unlike the actual rocket, the model will separate only at the upper shroud after a rather low altitude flight. After all, this is for the spectators, we aren't trying to get to the moon.



Historic Models

Anyone interested in rocketry will likely find the following scale plastic models of interest. These display models (which some of you will probably modify for flight) offer highly detailed injection molding and raised panel lines, in addition to a history of the specific subject. The Space Pioneer series consists of four kits:

Explorer I - America's first artificial satellite. This kit comes with a display base offering a hand crank so that the completed model can rotate for viewing.

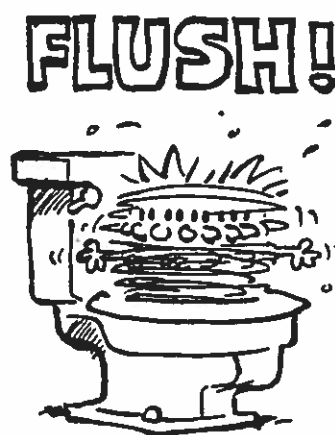
Jupiter C - The rocket that carried the Explorer I on its flight into Earth orbit. The kit includes a detailed launch platform, but no tower or gantry (something to build from scratch!).

3 Stage Ferry Rocket - Created by Dr. Werhner Von Braun in the mid 1950's, the concept rocket was designed to transport cargo and crew members to a space station, then on to a lunar base.

Lunar Lander - Also designed by Von Braun in the late 50's, this concept later evolved into the Lunar Module used in the Apollo program.

The kits retail for \$9.95 each and are available in hobby stores. If your local dealer does not have them in stock, they can be ordered directly from Glenco Hobbies. You may want to leave this article lying around the house as a hint. These kits would make a great gift for anyone interested in rocketry . . . such as yourself.

Before his flight certification, Spaceman Spiff also had to undergo extensive tests, such as Centrifuge Training.



From "Calvin and Hobbes" by Bill Watterson, p.105 ©1987

Science Lab

Provided to the Student Experimental Payload Program
courtesy of NASA/Aerospace Education Services

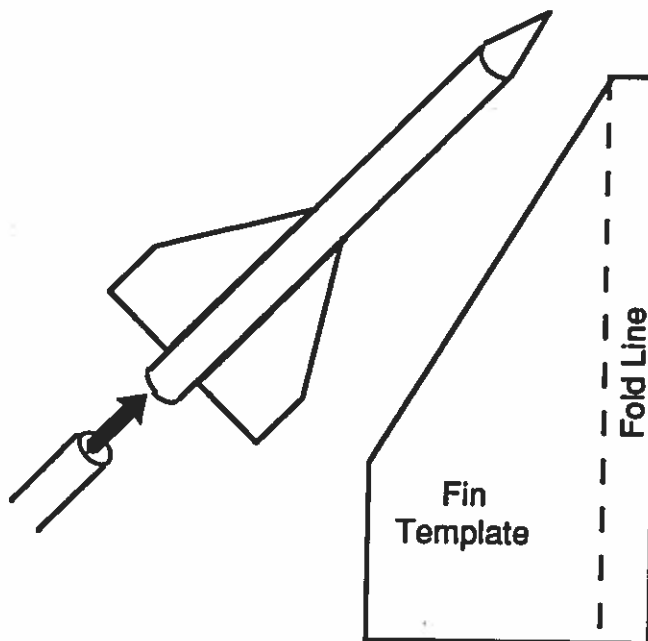
Paper Rockets

Activity Description:

Students can experiment with rocket stability using these quick and easy rockets propelled by a burst of air through a drinking straw.

Materials:

Standard bond paper
Card stock paper (scraps)
Cellophane tape
Scissors
Sharpened fat pencil or dowel
Milkshake straw (slightly thinner than pencil)



Procedure:

1. Cut a piece of 8-1/2" x 11" bond paper in half
2. Wrap the paper tightly around the pencil. Tape the cylinder and remove it from the pencil.
3. Cut slits about 1/2" long in one end of the cylinder and slip it back on the pencil with the slitted end toward the point.
4. Fold the slitted panels over the point of the pencil to form a nose cone. Tape securely and remove from the pencil.
5. Cut out and tape two sets of fins from the card stock using the template provided. Attach to the rocket at the open end.

Flying the Rocket

Slip the rocket over the straw and point in a safe direction, slightly elevated. Blow a strong puff of air into the straw and the rocket will be propelled away in the direction it is pointing.

Discussion:

These simple paper rockets demonstrate the principles of rocket flight and stability. By puffing into the straw, the rocket is propelled in the opposite direction as the air rushes out of the paper cylinder. The importance of fins for steering can be demonstrated by building an additional rocket and not attaching fins, or bending the fins to make the rocket curve in flight.

The flight path of the rocket is a curve back to earth as gravity takes its toll on the motion of the rocket. This is an example of Newton's First law of motion. The harder you blow into the straw the faster and farther the rocket will travel, demonstrating the second law of motion. And the forward motion of the rocket as a result of the air rushing out of the cylinder demonstrates the third law of motion. Can you name the three laws of motion as defined by Isaac Newton?

Let us hear from you:

Write a report about what you think it would be like to travel onboard a real rocket. Reports or stories should be no more than two pages double spaced. Be sure to include your name, school and grade for possible publication.

News from Manufacturers

As listed in Sport Rocketry magazine,
official publication of the National Association of Rocketry.

Orion Rocket Works

announces the release of its newest limited production kit in time for Christmas. Orion's Crayon rocket is a real kick to build and fly. Liftoffs are impressive using a 24mm D or E series engine. Assembly is very easy, making it a great family project. The assembled kit is 12" long and 2-5/8" in diameter. Body tube and nose cone come prefinished in assorted colors. Plywood centering rings and nylon parachute are standard. The Crayon Rocket sells for \$14.95 plus shipping and handling. This kit is a great gift idea for any rocketeer in the house. For more details contact:

Orion Rocket Works; P.O. Box 232504; Leucadia, CA 92923

Countdown Hobbies

announces some new additions which include the active guidance and dynamic flight mechanics rocketry software for windows from Aerosoft Ltd. Also the new Veri-test, Quad-Pod and reloadable 38mm and 54mm motor hardware join the Impulse Aerospace family of products. A collection of out-of-production kits were acquired recently. The goodies include Estes Interceptor, Vostok, Scissor-Wing Transport, ARCAS, ASP, Scout II, Demon, Centuri Satellite Killer combo with Red Eye Satellite. Please call for availability before ordering. For complete information, contact:

Countdown Hobbies; 3 P.T. Barnum Sq; Bethel, CT 06801-1838

M2F2

is now offering their "C" and "D" size Space Camel boost glider at a new competitive price: \$8.95 or three for \$24.00 (price includes shipping). For additional information, contact:

M2F2, P.O. Box 915; La Jolla, CA 92038-0915

Aerotech

announced a price increase that was effective September 1. Class C expendables increased from one to three dollars. Class C reloads were also up one to two dollars. Kit prices experienced an increase in the three to ten dollar range depending on the kit. For information:

Aerotech; 1955 S. Palm St; Suite 15; Las Vegas, NV 89104

North Coast Rocketry

is now looking at January delivery for their Impulse motors and Endeavor Space Shuttle kit. New full color packaging for the entire line of NCR products also seems to be popular with consumers. For additional information, contact:

North Coast Rocketry
4848 S. Highland Drive; Suite 424; Salt Lake City, UT 84417

Quest Aerospace

recently stated that a new C9 motor is in the works. Several kits from the Educator line will be packaged and sold through the hobby shops (Nike-Smoke, Zenith II, Payloader, Quasar). A very nice model of the X-30 NASP prototype was recently displayed at NARAM-35. It will be similar in construction and materials to their Space Clipper. For more information, contact:

Quest Aerospace; P.O. Box 42390; Phoenix, AZ 85080-2390

Pratt Hobbies

has introduced a line of Nomex materials - Heatshield wadding which is reusable and available in two sizes is one of the latest additions to the line. The smaller size is triangular in shape and is tied to the shock cord of your model, and placed in the rocket before the parachute (just like regular wadding). For larger rockets, a 16 inch diameter heatshield has been created. It works well in airframes with diameters from two to six inches. For more information:

Pratt Hobbies; 2598 John Milton Drive; Herndon, VA 22071

Estes Industries

E15-4, E15-8 and E15-P motors have shipped and are available. The new Stratoblast glider is now available and is being stocked in hobby stores at a retail price of \$69.99. Expect some interesting news from these folks in the near future, according to rumors at the Chicago RCHTA show. For more information, contact:

Estes Industries; 1295 H Street; Penrose, CO 81240

Apogee Components

will be introducing two new Medalist motors to NAR Standards and Testing soon. The Medalist C5 motor measures 18 x 51 mm, and the new D4 motor measure 18 x 70 mm. Both motors will offer 3, 5 and 7 second delays. Pricing will be comparable to other Medalist motors (\$7.95). For more information, contact:

Apogee Components; 19828 N. 43rd Drive, Glendale, AZ 85308

Tiffany Hobbies

has a variety of sleek rocket designs including their Thuria, a 32" two stage model that provides the power that rocketeers want. With two 24mm motor mounts, this kit will make outstanding flights. Main features include: two stage 24mm motor mounts, two 18mm motor adaptors, full decals, large payload section and 16" parachute. For more information, contact:

THOY; P.O. Box 467; Ypsilanti, MI 48197

Newman Optics

introduces Zurich Yellow Lens, with their special metallic coating and wraparound design that allows 180° of distortion-free vision. They might be just what you need for tracking rockets on a cloudy or hazy day. These sunglasses offer exceptional contrast and depth perception. Suggested retail is \$45.00 plus \$3.00 shipping and handling. For more information, contact:

Newman Optics; 5083 Ridgedale Drive; Ogden, UT 84403

Hobbico Products

Hobbylite spreads easily, dries fast, and sands to a smooth finish that is perfect for painting or covering. It permanently fills cracks and pinholes in all wood and foam in one application, while remaining as light as air. Hobbylite dries to the same hardness as balsa for smooth, even sanding without clogging sandpaper. The no-shrink mixture is ideal for making contours and small fillets. Contact your local hobby store for additional information.



Work, work, work... will this rocket stuff ever stop?



Participants ready their models for flight at the 12th annual Rocket City Classic. The event brings out both novice and experienced modelers.



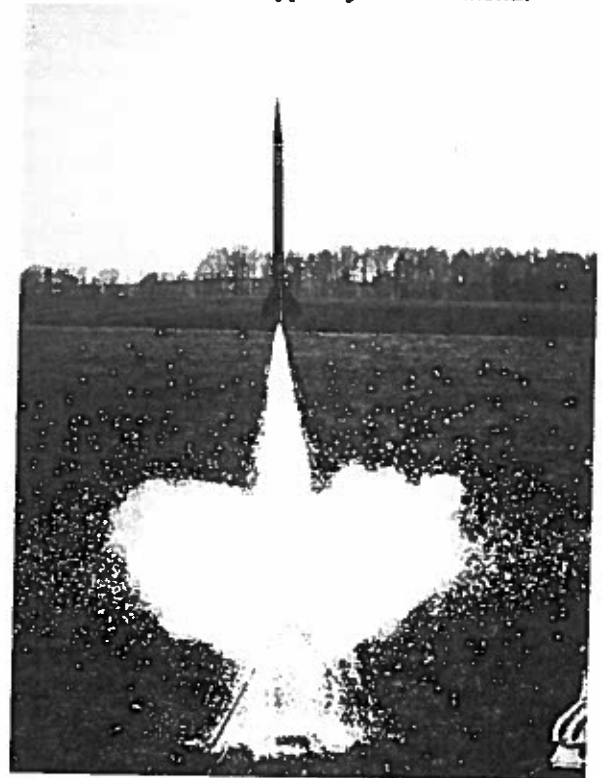
Photo Gallery

Rocketry is fun, exciting and educational. If you are not a member of a rocketry club, talk to your teacher about starting one in your school, or contact the SEP Program to get the name and address of the NAR section nearest you. Join thousands of other people just like yourself in the world's leading hands-on aerospace hobby.



SEP Team member Dan Coon explains the fine points of rocketry to an interested student.

Liftoff of a Black Brant II with a Silver Streak. Another showstopper by Neal Redmond.





SPORT ROCKETRY

OFFICIAL JOURNAL OF THE NATIONAL ASSOCIATION OF ROCKETRY

The National Association of Rocketry (NAR) is the official non-profit national organization for model rocketry. The NAR establishes safety rules, certifies records, provides technical data and news, sponsors contests and promotes model rocketry.

Membership in the NAR entitles you to a one year subscription to **SPORT ROCKETRY** magazine, a membership decal, and a Technical Services (NARTS) catalog. Also available is personal and club liability insurance. And, you can have the fun of meeting other NAR members through local, regional, and national level events.

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