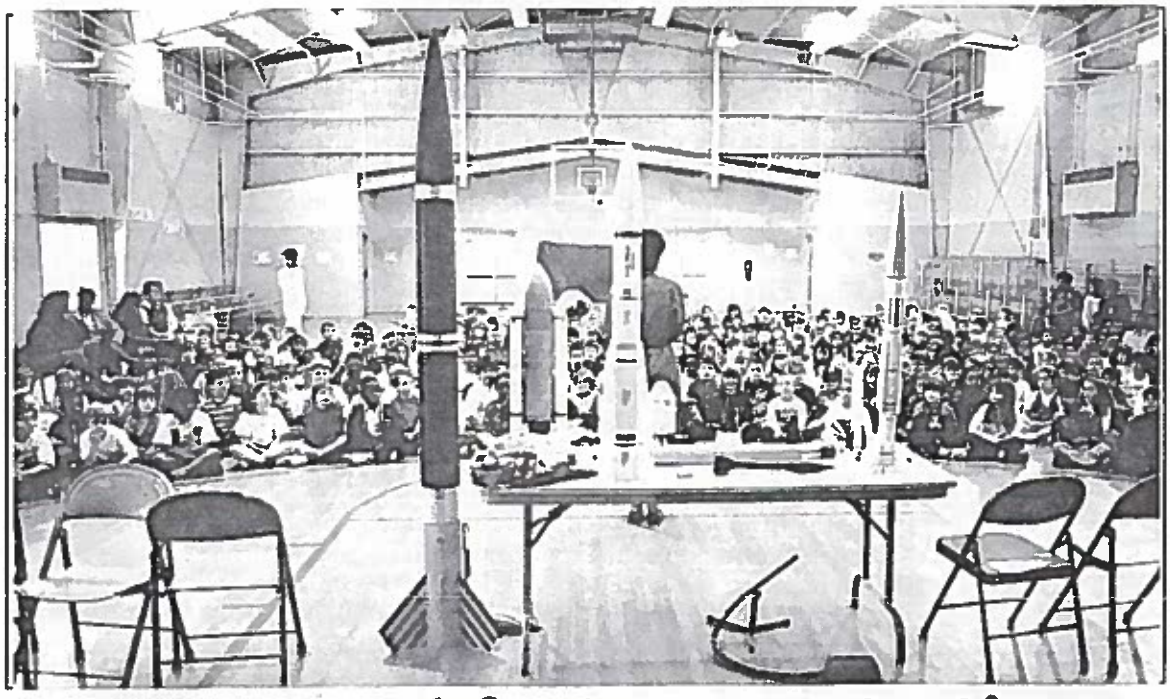
Volume II, Number V - May/June 1994

Flamethrower®

Official Newsletter of the Student Experimental Payload Program



New Record for Demonstrations

The conclusion of the 1993-94 school year set many records for the S.E.P. Program. Among those was the impressive success of the Alabama Space Week back in March. Traveling to 21 schools and conducting 42 demonstrations, the S.E.P. Team talked to over 8,000 students in a 10 day period. Each demonstration included a brief history of the space program using some very nicely detailed models and an introduction to model rocketry. Each demonstration also included at least three launches (two model rockets and one high power), except for one demonstration that sustained bad weather.

Most of the demonstrations were conducted for middle school and elementary grade students such as the first graders at West Madison Elementary (photo above). To get the students involved in the demonstration, one student is selected to play the role of "Wise Man Wu", the ancient Chinese scientist that tried to launch himself on a rocket chair. The student is dressed in Chinese attire and seated in a chair, then the S.E.P. Team explains what happened to this "Wise Man". Other students are seated in folding chairs which are arranged to show the cramped conditions of pre-shuttle space cockpits. Using the ever-popular "Stomp Rocket", students are treated to a demonstration of action-reaction, and the simularity of model rocket motors to space shuttle SRB's are explained.

But the high point is always when the students move outside to see the rockets being launched. A typical demonstraion will include a model being launched on an "A" impulse motor, followed by the same rocket being launched on a "B" or "C" impulse motor. When the location permitted, a larger rocket was launched on an "E", "F" or "G" motor to introduce students to the world of high power rocketry. At the conclusion of the demonstration, the sponsor teacher is presented with literature, stickers and a video tape which has a short overview of the S.E.P. Program.

A Note from the Program Director

"One of the best kept secrets in education". That was the comment made to me by a teacher after the conclusion of our space week demonstration. She went on to explain that if her fellow science teachers knew about our program, we would have more demonstrations than we could handle. The popularity of the S.E.P. Program has caught on in numerous schools across the state of Alabama, and the records of our steady correspondence with other schools across the country continue to grow. At the writing of this newsletter, the S.E.P. Program is involved with 426 schools in 38 states on a regular basis. That converts into tens of thousands of students that the program is making indirect contact with, and that doesn't include the correspondence that results from semi-regular articles in Sport Rocketry magazine.

And the program is starting to take on duties standard to NAR sections and Tripoli prefectures. The program has been able to secure a 150 acre field to hold launches, time is spent with high power enthusiasts as well as those who prefer model rockets, and the S.E.P. Program is proud to have offered the opportunity to several individuals to become certified in high power. With our continuing support to the Huntsville Area Rocketry Association (NAR Section 403) and involvement in such developments as Dan Coon's water rocket and Tim Picken's steam rocket (see specific articles in this issue) the S.E.P. Program is earning its reputation as the number one aerospace education organization in the country.

Now the program is in the process of securing a permanent facility to house materials and serve as a location to sponsor periodic workshops for teachers and students interested in learning more about rocketry, aerospace science, or possible careers in the aerospace industry.

We'll keep you posted.

Greg Warren

Flamethrower

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Editor: Greg Warren

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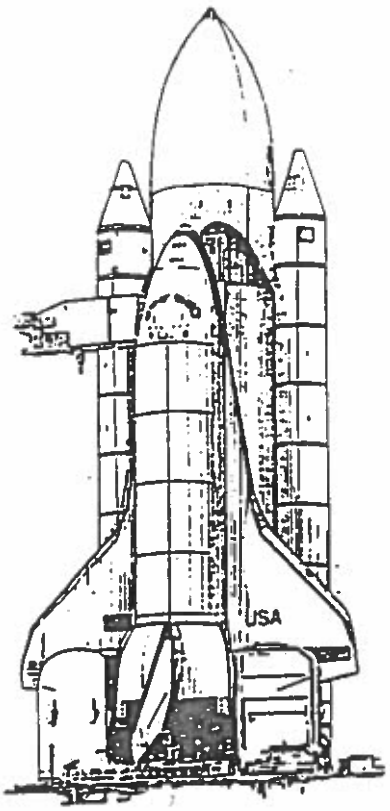
Student Experimental Payload Program
Post Office Box 1934
Huntsville, Alabama 35807

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



July 1994

- Vehicle: Columbia
- Mission: International Microgravity Lab
- Orbit: 28.45° inclination/185 st. miles
- Duration: Thirteen days
- Liftoff: Pad 39-B/ Landing: Kennedy
- Crew: Robert Cabana, James Halsell, Jr., Richard Hieb, Leroy Chiao, Carl Walz, Donald Thomas, Chiaki Mukai

August 1994

- Vehicle: Endeavour
- Mission: Space Radar laboratory - 02
- Orbit: 57.0° inclination/138 st. miles
- Duration: Nine days
- Liftoff: Pad 39-A / Landing: Kennedy
- Crew: Michael Baker, Terrence Wilcutt, Thomas Jones, Steven Smith, Peter Wisoff, Daniel Bursch

September 1994

- Vehicle: Discovery
- Mission: Lidar In-space Technology Exp.
- Orbit: 57° inclination/161 st. miles
- Duration: Ten days
- Liftoff: Pad 39-A / Landing: Kennedy
- Crew: Donald McMonagle, Curtis Brown, Ellen Ochoa, Scott Parazynski, Joseph Tanner, Jean-Francois Clervoy

1994 payload Launches
1 Fire, 4 Missions and a No-Show

To everyone that made it out to the 1994 S.E.P. Program Mission Launches, the day started out like any other rocket event: a little late getting started, the wind a little stronger than what it was supposed to be, people parking in the wrong place, you know - the typical stuff you've come to expect. But the day promised to be full of excitement and surprises, and that turned out to be an understatement. The first disappointment for the day was a paylaod that didn't make it to the launch. For the past few months, several students at UCLA have been developing a micro furnace capable of producing up to 60 microspheres during the flight onboard the SEP II rocket (6 inches in diameter) The progress had been moving along quite well up until the unit had to be condensed down into the payload size, then complications arose. The students are still working on the experiment and hope to have it ready for launch in the near future. SEP has promised them a flight upon delivery of the payload.

Of the eight experiments to be placed on the SEP I flight, the sponsor students were in attendance along with their teachers. After conducting two hours of open range time for students to launch their model and high power rockets, the range was closed to prep the SEP Mission Flight. Since this was a new field, the FAA had requested that any flight exceeding 5,000 feet AGL be called in within 30 minutes of launch. That being accomplished, the crowd of about 150 waited for the countdown. As the numbers rolled backwards to "Zero . . . Ignition", no one could have anticipated the disaster. The forward bulkhead in the J-800 reload gave way and the motor presented a most impressive volcano of smoke and fire while it sat on the pad roasting. The good news was that the payload bay and the experiments were ejected and descended safely to the ground under a parachute while the booster burned.

As if on que, Neal Redmond arrived with his Mad Dawg (Manufactured by Dangerous Dave) which just happened to have an exact size payload bay and the same diameter airframe as the now creamated SEP I. So after a few tradeoffs and transfers, the experiments were loaded and ready to go. This time the flight was picture perfect with a beautiful recovery. For those who stayed to see the additional flight, they were not disappointed. Activities wrapped up around 5:00 p.m.

In addition to model and high power launches, there were activities for family members (such as brother and sisters attending because they had no choice). These activities ranged from playing with styrofoam gliders, to frisbees, to flying kites. Some of the local youth set up a snack and refreshment stand which proved to be popular as the temperature began to climb into the high 80's. Total count for the day, with people coming and going, topped out at around 200 with a steady crowd of around 100 throughout most of the day. Also on hand was Tim Pickens, who brought his steam powered rocket for display (it would be launched a few weeks later, see the related article) and Dan Coon with his water rocket. Dan had two successful launches to an altitude of roughly 200 feet and as usual, was a real crowd pleaser. There is an update on Dan's project elsewhere in this issue of the Flamethrower.

After meeting with local FAA officials on Monday and reviewing a video of the accident with SEP I, the FAA consented to continue the waiver to 10,000 feet AGL. Over the next two days, the SEP Team (with the help of some students from Athens High School), launched and recovered the remaining payload experiments on the SEP I-A and SEP II rockets. The flights culminated in a total of 32 experiments being launched with an average flight altitude of 7,240 feet AGL. Payloads ranged from tadpoles from Highlands Elementary in Huntsville, to accelerometers and air sampling devices from Tennessee and California. The SEP Team is still anticipating the arrival of the UCLA experiment. The micro furnace under construction is one of the most sophisticated experiments that will be launched onboard a non-commercial high power rocket.

Above: Ken Pearce and Greg Warren ready SEP I on the launch tower as participating students look on.

Right: Successful flight of Mission 94-04A with eight experiments onboard a borrowed rocket from Neal Redmond. A perfect flight almost made up for the loss of SEP I.

Time Traveler - Log Entry Data [34 years ago]
Subject: Apollo Program **Source:** All We Did Was Fly To The Moon (Eagle Press ©1983) **Date:** 1960

In his May 25, 1961 address to Congress, President John F. Kennedy said:"Now is the time . . . for this nation to take a clearly leading role in space achievement, which in many ways may hold the key to our future on Earth . . . this is not merely a race. We go into space because whatever mankind must undertake, free men must fully share."

Planning for a lunar manned mission began in April 1957, and in July 1960 NASA named the program Project Apollo. The goals were:

1. To land American explorers on the Moon and return them safely to Earth.
2. To establish the technology required to meet other national interests in space.
3. To achieve for the the United States pre-eminence in space.
4. To carry out a program of scientific exploration on the Moon.
5. To develop man's capability to work in the lunar environment.

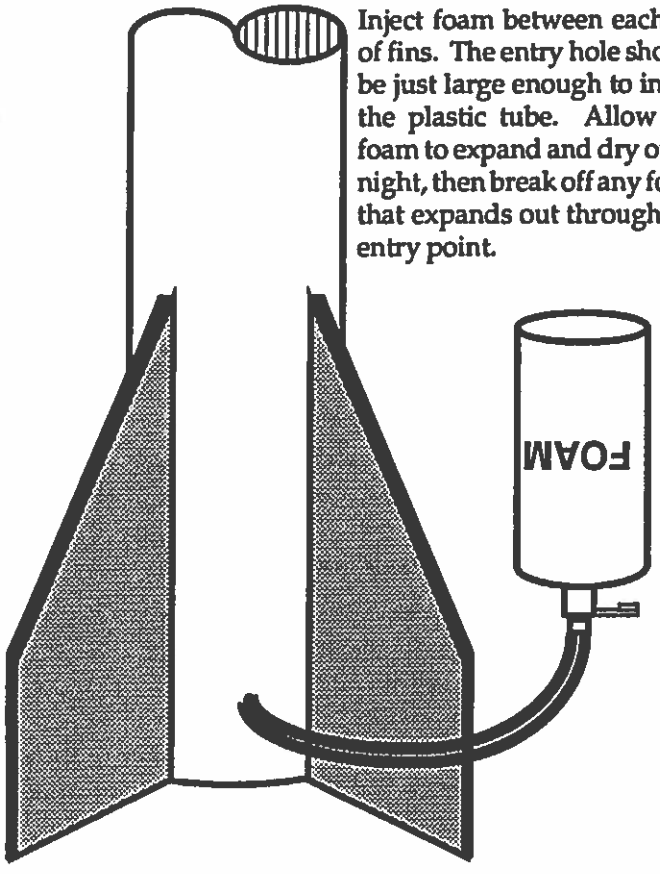
Visual Reference Data
The Apollo Patch

Tech Brief

Extra Strength TTW Fins

If you have crossed the great divide into the realm of high power rocketry, you will learn quickly that the expression "ripped the fins off" is a literal phrase. Often in high impulse flights, the accleration is so great that fins can actually be torn from the airframe. Many high power rocketeers utilize a method called Through-The-Wall (TTW) fin construction in which a slit is cut into the airframe and the root edge of the fin is glued to the motor tube. Fillets are then glued at the joint between airframe and exposed fins. The problem with this is that one cannot apply a great amount of glue to the root edge of the fin when placing it through the slit in the airframe, and internal fillets are impossible unless the fin unit is assembled outside the airframe and inserted as a completed unit.

To help strenghten internal fin attachment, consider using expanding foam in the cavity between the airframe and the motor tube. Expanding foam can be injected into the airframe even on older models with little or no visible marks. This method will also help absorb impact shock when the rocket lands on the ground, and experience has shown the SEP Team members that expanding foam is a tremendous adhesive. This stuff will adhere to anything including wood, fiberglass, paper, composites, metal and skin.



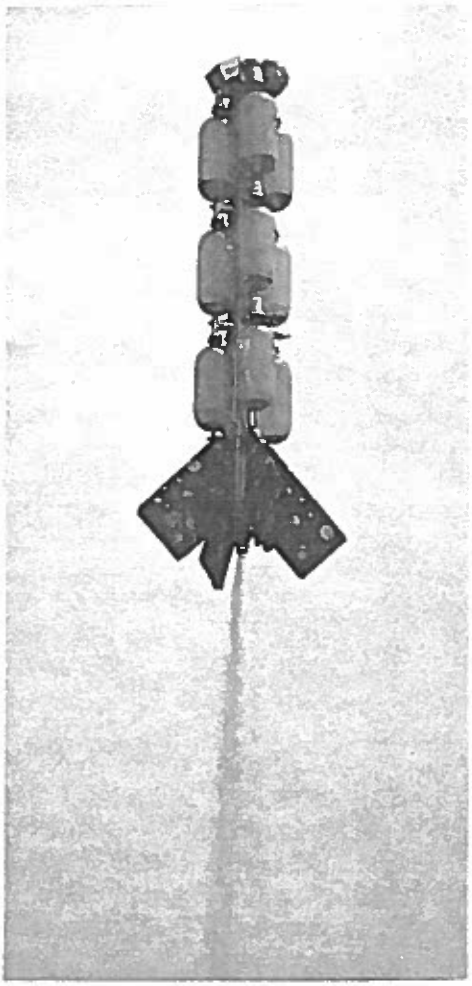
Inject foam between each set of fins. The entry hole should be just large enough to insert the plastic tube. Allow the foam to expand and dry overnight, then break off any foam that expands out through the entry point.

Have Water, Will Fly

It hasn't been easy and it hasn't been an overnight project, but S.E.P. Team Member Dan Coon has come close to perfecting his water rocket. Named "Tsunami" by its creator, the water rocket is unlike any flying machine that most spectators have ever seen. The internal structure is composed of thin wood framing outfitted with a matrix of PVC plumbing and fittings. These intricate patterns terminate in 12 sockets into which 3 litre soda bottles are first filled with a predetermined amount of water, then attached to the fittings. An air valve located near the center of the rather bulky looking vehicle allows for pressurized carbon dioxide to be forced into the structure, pressurizing the tanks to 90 PSI. A ball valve at the bottom of the exhaust tube sends the pressurized water into the nozzle. Action forces reaction and up the rocket goes.

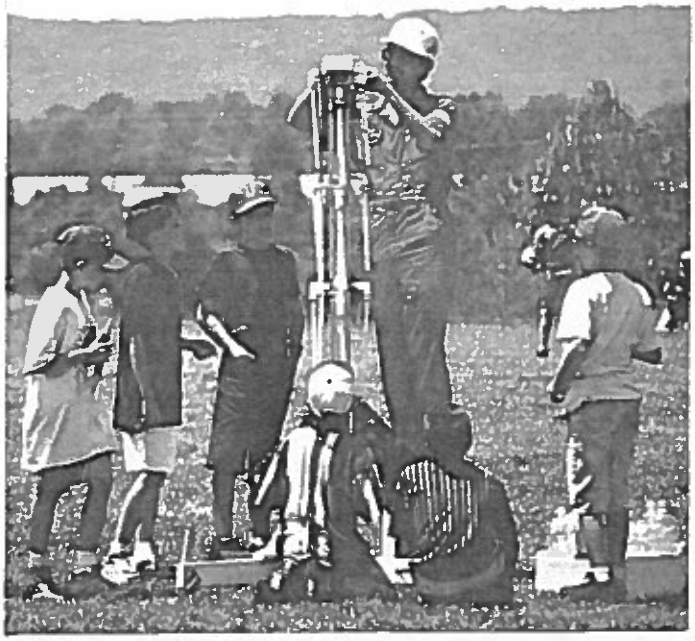
Reading about the Tsunami is one thing, but to really appreciate this unique vehicle there is no substitute for seeing it launched first hand. Despite the fact that water is dumped from the nozzle in less than three seconds, the liftoff is amazingly slow and majestic. Utilizing a 1/2" launch rod, the Tsunami rises straight up with a rather impressive roar with little or no rolling on the way up. A slow and gentle flight to around 200 feet (average) allows the nealy six foot tall rocket to remain in clear sight to all spectators. At or near apogee, depending on the general feelings of the person tending to the radio control unit, a signal from the transmitter releases a 6 foot parachute for a slow and steady descent. Dan has also added a panaramic camera (also radio operated) and has managed to capture several very impressive photographs of crowds, terrain and of course - sky.

What's in store for the Tsunami? At present, Dan is working on a new fin system for the rocket to overcome the frequent breakage that occurs from impact. Also in the works is an attempt to place gyros onboard the vehicle, completely eliminating the need for a launch rod. Dan has also talked about working up plans or possibly a kit for a similar version of his rocket, designed for student construction.



Clockwise:

Dan always draws a crowd of curious onlookers when he starts to prep the water rocket for flight. Although he encourages questions and participation, as the pressure inside the 3 litre bottles rises, he has the onlookers back off to a safe distance.



With a slow and majestic liftoff, the rocket takes to the air for another flight to around 200 feet. A radio controlled parachute brings the vehicle back for another crowd pleasing demonstration.

Packing a radio controlled camera, the rocket has managed to capture several impressive photographs. Here, the water rocket looks back on the spectators at a SEP Demonstration. Since liftoff is very slow and steady, the photographs are extremely clear from the 35mm panaramic camera.

25th Anniversary Tribute to the First Moon Landing Saturday 23 July 1994 - Athens, AL

July 20th, 1969:

"Houston, Tranquility Base here . . . the Eagle has landed."

These historic words were spoken 25 years ago as Apollo 11 gently landed on the moon. Shortly thereafter, as he put the first footprint on the surface of the moon, Neil Armstrong commented:

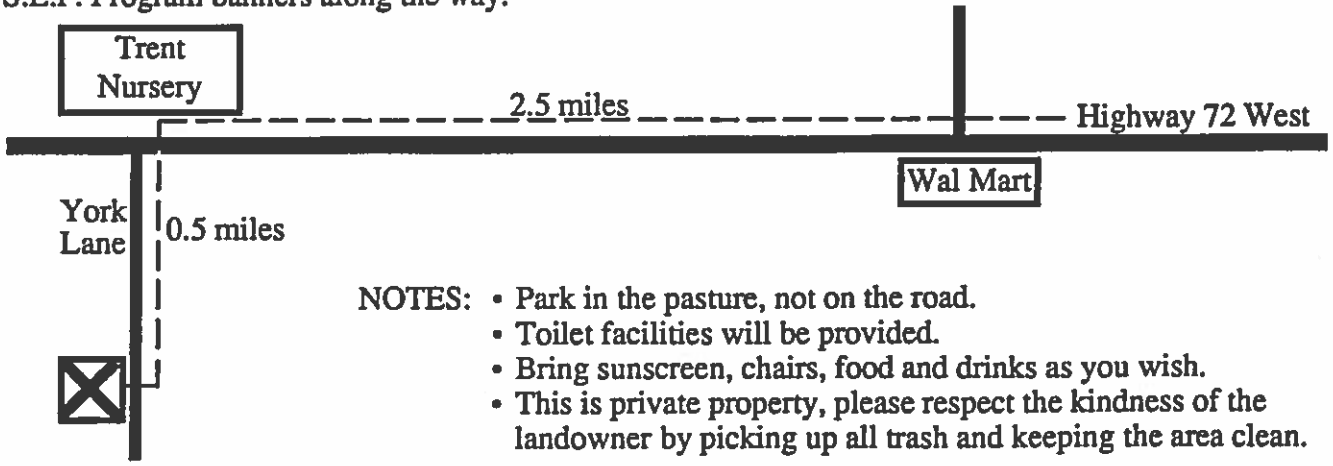
"That's one small step for Man . . . one giant leap for Mankind."

Join the S.E.P. Program, its team members, students and rocketeers as they pay tribute to the individuals that helped make that milestone in history possible. Events include:

- Model rocket and high power rocket launches - 2:00 p.m.
- Video presentation of the first moon landing - 7:30 p.m.
- Spectacular night launch with lunar landing dedication
- Recognition ceremony for astronauts past and present

Admission is free and the public is invited.
Food and refreshments available courtesy of
Athens Optimists Club and S.E.P. Program.

Directions: Travel **WEST** on **Highway 72** to Athens. Once entering Athens, continue on Highway 72 West until you reach **Wal Mart** on the left. Continue on Highway 72 for **2.5 miles** past the traffic light at Wal Mart. Turn **LEFT** onto **York Lane** (Trent Nursery on Hwy 72 will be on your right), and travel **0.5 miles**. The launch will take place in the large pasture to your right. Look for S.E.P. Program banners along the way.



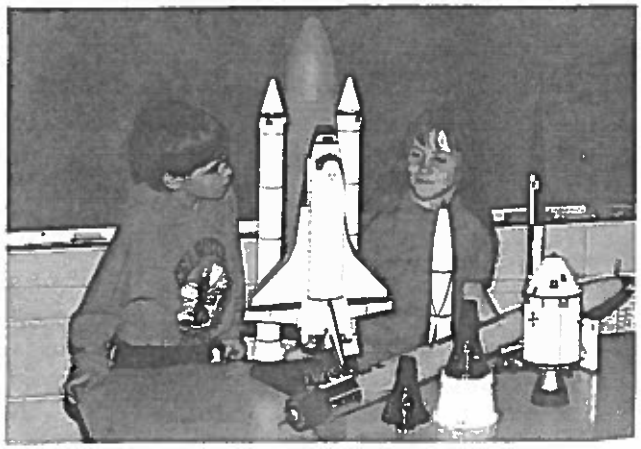
NOTES:
- Park in the pasture, not on the road.
- Toilet facilities will be provided.
- Bring sunscreen, chairs, food and drinks as you wish.
- This is private property, please respect the kindness of the landowner by picking up all trash and keeping the area clean.

The Student Experimental Payload Program is a non-profit organization dedicated to hands-on aerospace education. For more information call (205) 230-0353.

New Demo Models

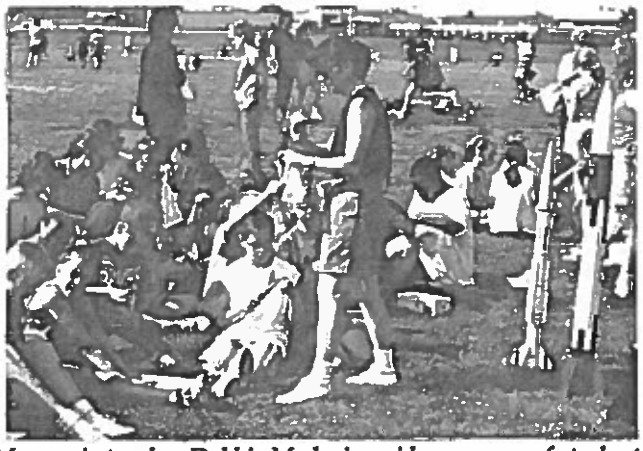
The SEP Team has acquired some new tools in the battle to educate students about the space progam. Several highly detailed scale models have been added to the inventory that the team uses during their demonstration. These models include a scratch built Mercury and Gemini capsule in 1/32 scale, an Apollo capsule in 1/35 scale and a Space Shuttle with external tank and solid rocket boosters in 1/72 scale. Rounding out the collection is an A-4 with launch platform also in the popular 1/72 scale.

Using NASA photographs for reference, the models are painted in realistic patterns and make nice visual aides for the demonstration. Using scale model rockets like the Black Brant helps introduce students to the model rocket aspect of the demonstration.



Thrid grade students look over the scale models after a SEP Demonstration at their school.

Other items that the SEP Team uses during their demonstration is a mockup Chinese War Rocket, several high power kits, and various model rockets. One of the attention getting devices is a full scale mockup of the SEP I Payload Rocket made of clear acrylic. This 4" diameter, 67" tall rocket shows a full complement of experiments in the payload bay, through-the-wall G-10 phenolic fins, parachutes, shock cord, anchoring method and all the other goodies typical to a high power rocket.



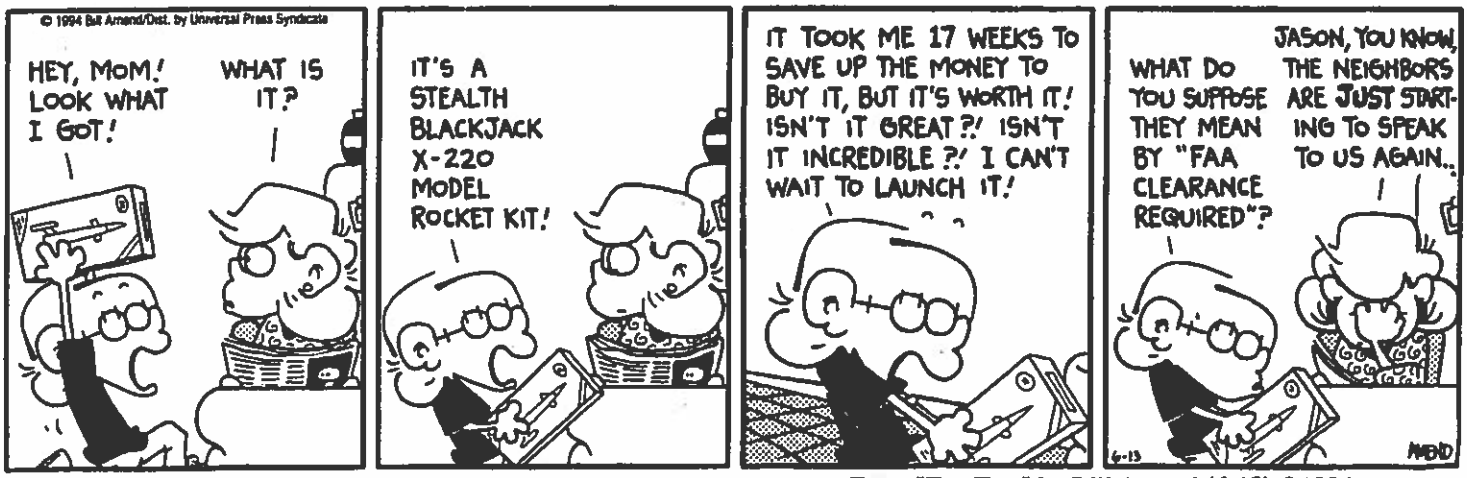
Monrovia teacher Debbie Medaris guides a group of students through the steps of motor preparation.

The SEP Team Lends a Helping Hand

The Student Experimental Payload Program was on hand to assist 5th grade science teachers at Monrovia Elementary during the last week of school. Each 5th grader had built an Alpha III and was ready to launch, but the sponsor teacher had never launched a rocket before and was looking for assistance. After some scheduling rearrangements the SEP Team was able to conduct the activities for the school.

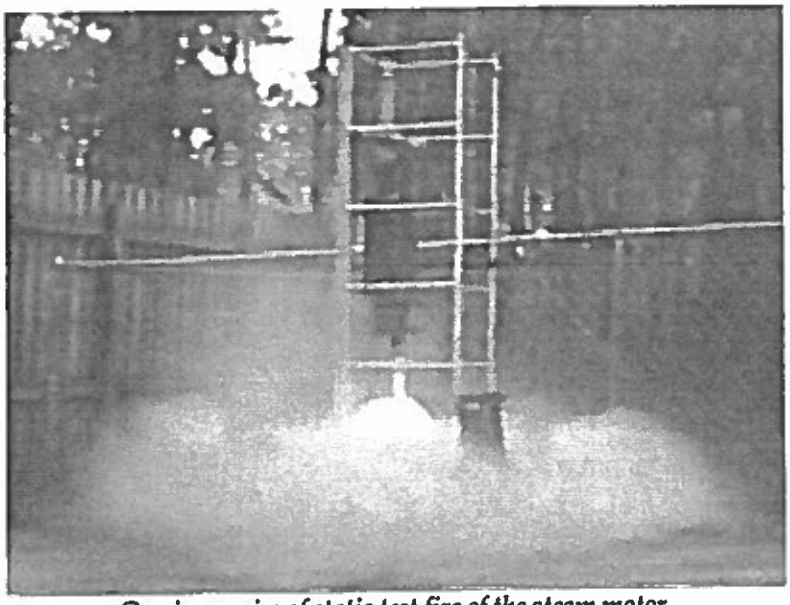
The day's activities included setting up a full range with five pads, PA system, weather station and barrier ropes. The students divided up into five homerooms and were cycled through the motor prep stage, then on to the launch phase, while the third home room served as range recovery. That left two home rooms with nothing to do . . . or so they thought.

The remaining home rooms participated in frisbee tossing contests and styrofoam glider contests. Each of these contests included a 1st, 2nd and 3rd place winner per home room. The activities seemed to time out rather well and a complete rotation of home rooms kept everyone doing something different. Since this was a half day activity and the kids had to get back to school, the entire event was only three hours. During that time period all 176 students launched their rockets, Dan managed to launch his water rocket two times, and the SEP Team launched a few high power rockets to show the kids what they can expect in the future.



From "Fox Trot" by Bill Amend (6-13) ©1994

Flight of the Steam Rocket

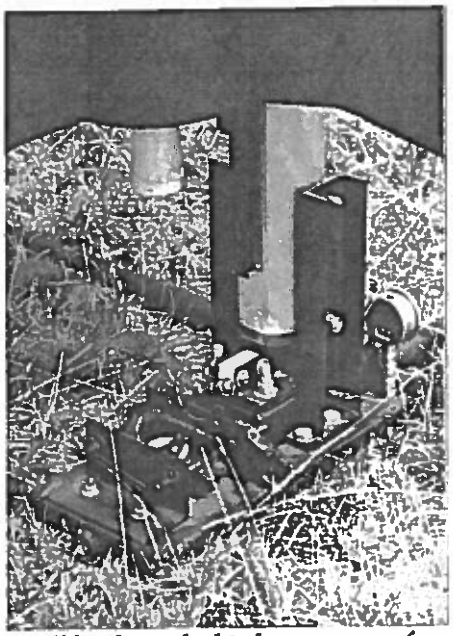


One in a series of static test fire of the steam motor.

For nearly a year, Tim Pickens has been working on a project that, in some respects, is a trip back in time. He has spent hundreds of hours researching, developing, testing, improving, and constructing a steam powered rocket. With the current situation pertaining to high power rocket motors, availability, and the D.O.T., Tim may have come up with the answer.

And recently his efforts paid off in a most impressive way. His efforts didn't come overnight, however. In fact, Tim found it necessary to completely redesign and construct a new test stand for static testing of the motor. In the old configuration, when the motor was activated it rose upward nearly six inches against a load cell. When the motor deadheaded against the securing mechanism of the framework, severe sloshing of the water occurred which set up an oscillation. The result was an erratic reading on the strip chart recorder and actual thrust could not be calculated. To remedy the situation, Tim designed a test stand in which the motor was held stationary. Rated at 1500 pounds and equipped with a new load cell capable of handling up to 2000 pounds of thrust, the improved test stand allowed the motor to be mounted in any XYZ configuration. Now the results of subsequent tests would be much more accurate, and work could progress.

And progress it did. Over the next few weeks several tests were conducted (five in one weekend). The results: at 250 PSI and 18.15 pounds of water, the motor produced 275 pounds of thrust with an ISP of 24.2 for 440 pounds per second. With an expulsion time of 1.6 seconds, the motor produced an equivalent of 1957 newton seconds. Now it was time to integrate the proven motor into an airframe. And that brought on a whole new set of problems. For example, how do you heat the water? Activate an ejection charge? Place an ejection charge? What about the shifting center of gravity when the water was dumped?

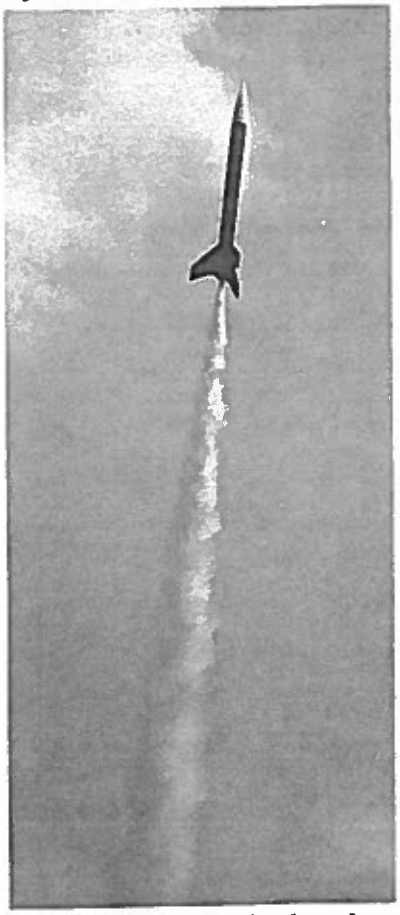


All hardware had to be pressure safe up to several hundred pounds.

The decision was made concerning an 8" diameter airframe and nosecone (Public Missiles), three fiberglass reinforced plywood fins, and a total length of 12 feet. The finished rocket was impressive by itself, not to mention the internal heating element (electrolysis) and custom built rail launch system.

The S.E.P. Program designed and built the radio controlled ejection and recovery system. Because we were dealing with a lot of unknown elements, it was decided to use a manually controlled radio system instead of a timer. In the event something went wrong, the recovery system would have to be deployed quickly even at the risk of destroying the rocket (the agreement was made between the SEP Team and Tim, "If you get it up, we'll get it back.")

With the final details worked out, the launch crew and several interested individuals arrived at the "SEP Proving Grounds" early on Saturday. A dead battery in the radio unit caused a delay, but the problem was resolved and the moment of truth had arrived. The ejection charge and recovery system was packed while the rocket underwent its initial pressure buildup. With everyone waiting and hoping, the countdown proceeded, the 100 foot steel cable was pulled and the pin released. What followed was one of the most impressive flights I think I have ever witnessed. The rocket shot straight up off the rail without even a split second of hesitation. Twelve feet tall and nearly 50 pounds and in a split second it had disappeared with a roar and a pure white cloud of steam. The ejection charge fired when activated and the rocket descended under a 10 foot canopy. The flight was over rather quickly, and the peak altitude was only 639 feet. But, as Tim pointed out, "This was just to see if it worked. Wait till next time - I'm working on a new nozzle, and . . . "



She's OFF! A perfect launch and beautiful maiden flight.

Science Lab

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

Making a Space Helmet

Activity Description:

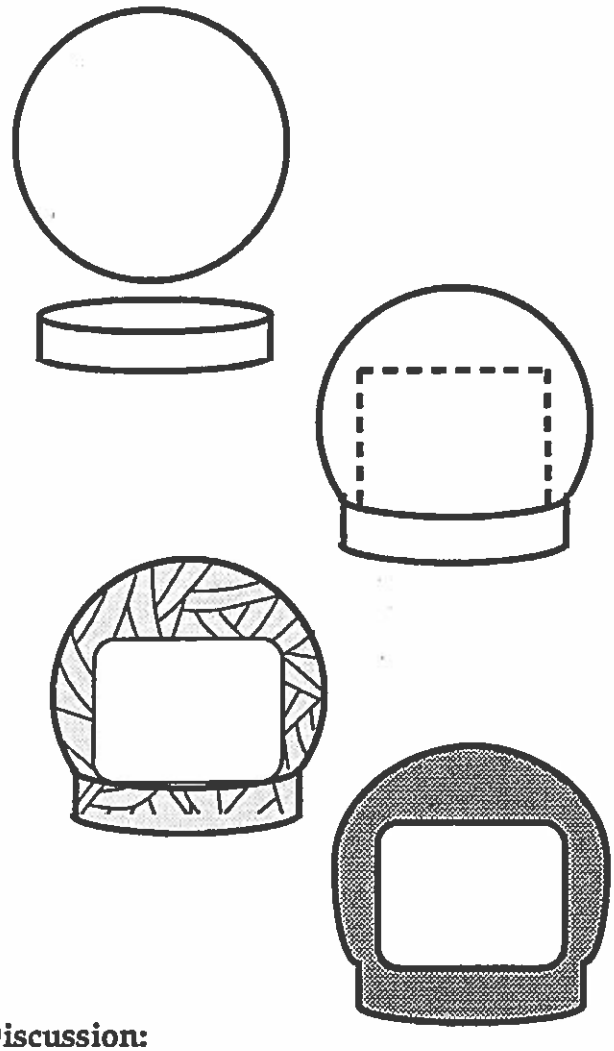
This activity is designed as a class activity in which all participating students will have a paper mache mock space helmet to keep.

Materials:

Inflated P.E. Ball or other soft inflated ball
approximately 12" in diameter
Several Sections of Newspaper
Flour
Water
Poster Board
Clear Motorcycle "bubble" Faceplate (optional)

Procedure:

1. Tear the newspaper into strips approximately 2" wide and 12" long.
2. Cut a two strips of poster board 3" wide and 22" long. Join them together and overlap them to form a band 10" in diameter.
3. Set the inflated ball on the band.
4. Mix the flour and water together to make a paper mache mixture.
5. Using typical paper mache techniques, cover the ball and band with the soaked newspaper strips, leaving an opening for the face.
   NOTE: If you are going to use the motorcycle bubble faceplate, refer to the faceplate as a template.
6. Sand the dried helmet to a smooth finish.
7. Puncture and remove the inflated ball, and paint the helmet to your own specifications.



Discussion:

Astronauts must wear a helmet as part of their space suit whenever they go out of their space ship because there is no oxygen in space. Inside their ship, such as the shuttle, astronauts can remove their helmets and space suits and wear normal clothes. That is because the space ship is a "closed atmosphere environment", which means it has air pressure and an oxygen supply just like being on Earth.

Let us hear from you:
Write a report about what you think it would be like to travel in space. 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 their new kit, the U.S.S. Pegasus. The kit is the first and only mid-power parasite glider on the market. Two styrofoam shuttles are carried aloft by a "D" or "E" powered booster. The shuttles free-fly back to earth while the finless booster core returns by parachute. Overall length of the booster is 36" with a 1.6" diameter. Each of the shuttles are 12" x 10". The kit is easy to build and features quality Orion components. Catalog $2.00. Contact: Orion Rocket Works; P.O. Box 232504; Leucadia, CA 92923

The launch Pad

announces that their "Hawk MIM-23A" kit, in 1/5.45 scale, soon to be upgraded to use two "D" engines. Release of the new version should occur at NARAM-36. There will be no increase in price ($24.99) and the rocket clubs can still obtain a 40% group discount. A copy of the 1994 catalog can be purchased by sending $2.00 to: The Launch Pad; 8470-E Misty Blue Court; Springfield, VA 22153

Public Missiles Ltd.

is again offering its large 11.41" airframes and components. buy 3 and receive 10% off on the total airframe price (limited to purchase of the 11.41" size airframes only). Watch for some High-Tech revolutionary mid-size kits to be released this summer. Two phone lines are now available to assist customers (810) 468-3521 for catalogs and general information and (810) 468-1748 to place orders or get technical assistance. Please, no calls after 9:00 p.m. EST. Public Missiles Ltd.; 38300 Long; Mt. Clemens, MI 48045

East Coast Rockets

has been revived and will be working hard to get the word out. Joe Polidori, Jr. and Vinu Patel have become partners in the business and are currently working on a catalog. We expect to see some exciting products from these folks. East Coast Rockets; 230 N. Maple Ave.; B-1 Suite 284; Marlton, NJ 08053

North Coast Rocketry

announces the PowerClub. Envisioned as a means of allowing NCR rocketeers to interact, the PowerClub features: the Tempest, a 2.6" diameter kit, a "Certified Rocket Scientist" certificate, membership card, and a subscription to the NorthStar newsletter. Additionally, PowerClub members will be eligible for monthly prize drawings, exclusive product offerings, reissues of discontinued kits and special sales. North Coast Rocketry; 4848 S. Highland Drive; Suite 424; Salt Lake City, UT 84417

Apogee Components

made several product announcements at the NAR National Sport Launch in February. New kits include Over-EZ Egglofter for use with 24mm "D" and "E" motors, Maxima 1/2A, A and B Boost Gliders. The glider kits feature pre-cut contest grade balsa and spruce fuselage with bright yellow pod tubing. Apogee Components; 19828 N. 43rd Drive; Glendale, AZ 85398

THOY

has two new models that continue in the tradition of high quality, high-tech kits; the Macron and the Thuria. Both kits were introduced at the Chicago Show and are now available. THOY; P.O. Box 467; Yipsilanti, MI 48197

Estes Industries

new Rocket Builder's Marking Guide will be appreciated by the rookie modeler as well as the experienced enthusiast. The kit includes a series of tools, constructed of sturdy plastic, that allow the modeler to mark body tubes easily and accurately. Estes Industries; 1295 H Street; Penrose, CO 81240

Quest Aerospace

X-30 Aerospace Plane (skill level 4) kit lets expert modelers build and fly a model of the hypersonic plane now being developed by NASA and Air Force engineers. Based on a prototype design, the X-30 features a preprinted Aeroshroud surrounding a sturdy internal framework, plus vacuum formed upper canopy, die-cut and laminated wings and carefully crafted duct work. Dual Tuff-chute parachutes and a scale data sheet with mission information are also included. Quest Aerospace; 1-800-682-8948, extension 84

Magnum, Inc.

has become the exclusive source for the popular North Coast Rocketry Redwing Asp kit. Featuring a 2.125" motor mount, twin 36" parachutes and pre-cut fins, this kit has an overall length of 84". Magnum, Inc. offers a wide variety of other items in their large inventory. Magnum, Inc.; P.O. box 124; Mechanicsburg, OH 43044

Thrust Aerospace

announces itself as a new entry in the model rocket industry. The company carries a selection of advanced components and premimum quality accessories. They stock G10/FR4 fin material in a wide range of thicknesses, ignition supplies, launch accessories, plastic display models based on Wernher Von Braun's concept rockets, custom machining of metal and plastic parts, and more. Catalog $1.50. Thrust Aerospace; 405 Tarrytown Road; Suite 203; White Plains, NY 10607

Glenco Models

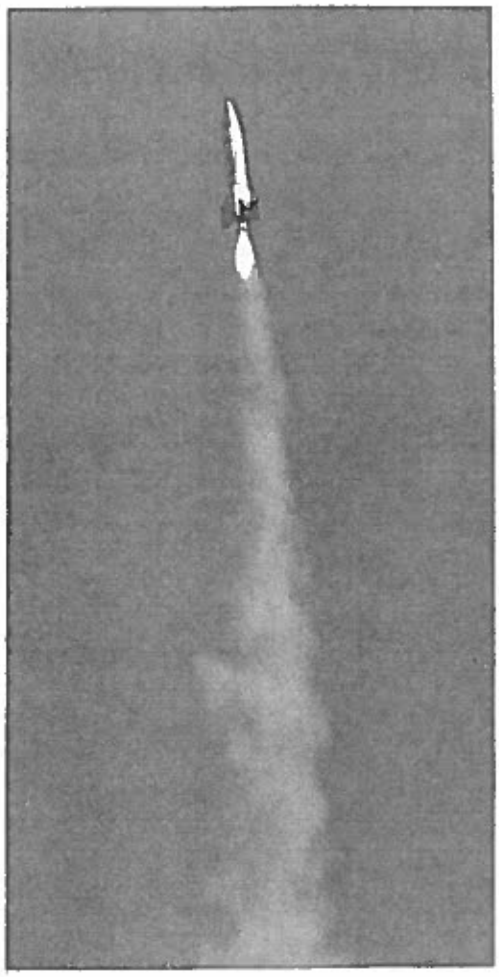
has done it again. The company that continues to bring you unique plastic models has introduced their 1/72 scale Retriever Rocket. This science fiction based kit was originally designed by Wernher Von Braun to retrieve crew members returning from Mars expeditions. The detail on this one is outstanding. Glencoe Models; Box 846; Northboro, MA 01532

Carl Goldberg Models

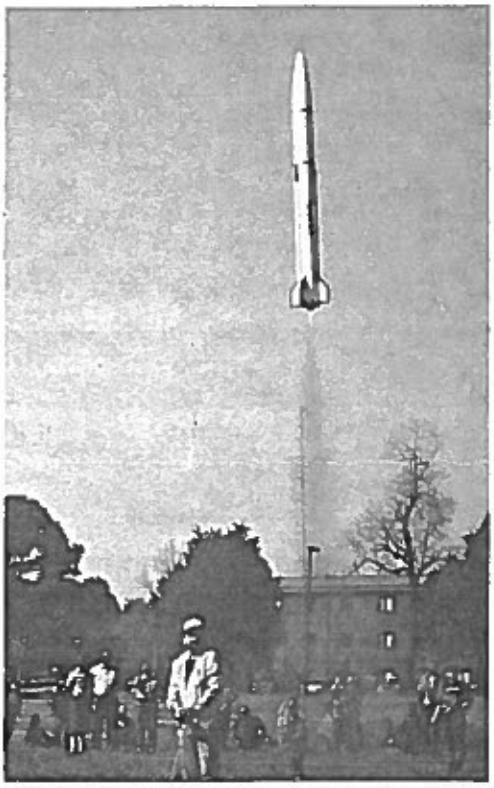
Produces Model Magic Superlight filler. It is stronger, lightweight, non-shrinking and works with all model component materials such as woods, foams plastics and fiberglass. Carl Goldberg Models; 4734 W. Chicage Ave.; Chicage, IL 60651

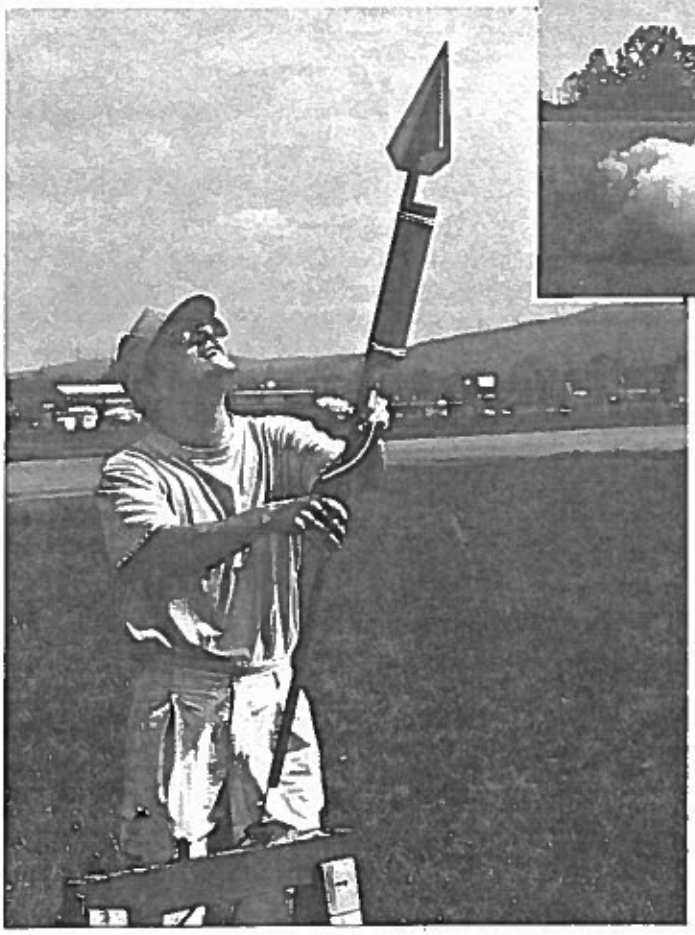
Photo Gallery

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 that is nearest you. Join thousands of other people just like yourself in the world's leading hands-on aerospace hobby.



Clockwise from Upper Left Corner
1. *Picture perfect flight of a sclae A-4.*
2. *Sgt. Thompson displays his Patriot kit.*
3. *Liftoff of a NCR 1/4 scale Patriot.*
4. *Neal Redmond explains the fine points of rocketry to a scout master.*
5. *The S.E.P. Team uses various models during their demonstrations, but they aren't intended to be flown . . . yet.*
6. *Liftoff of the SEP Mission 94-04B.*





Student Experimental Payload Program
Post Office Box 1934
Huntsville, Alabama 35807

Please deliver to:

SGT Thompson, J.E.
I MEF/G-2, 1st SRIG
Box 555321
Camp Pendleton, CA 92055-5321

"A non-profit organization dedicated to hands-on aerospace education"