

Southeastern Space Supporter

Newsletter of HAL5 – the Huntsville Alabama L5 Society chapter of the National Space Society

Volume 7, Number 1 — January–February 1998

FIRST WORD

Great Time to Be in HAL5!

(by Greg Allison, HAL5 President)

HAL5 has just completed an extremely successful year. On the 11th of May 1997 we touched the edge of space. HAL5's High Altitude Lift-Off (HALO) Program launched a hybrid rocket from a high altitude research balloon. The mission known as HALO SL-1 (for Sky Launch 1) was launched from a grass strip airfield just north of Hampstead, North Carolina, about a mile west of Topsail Beach (see photo at right).

The balloon was over 50,000 feet above the Atlantic Ocean when the rocket was fired. The HALO SL-1 rocket ascended to between 30 and 36 nautical miles. HAL5 that day conducted the world's first high altitude ignition of a hybrid rocket. It is the highest flight of a hybrid rocket to date. That day HAL5 proved to the world that small groups can accomplish great things and made space a little closer to all of us.

HAL5 has now embarked on developing it's next mission, HALO SL-2. Several

HAL5 Program Night

Wednesday, January 28, 1998
7 to 8:30 p.m. (with social afterwards)
Huntsville Public Library Auditorium

“Creation, Cosmology, and Chaos: A Fresh Look from a Scientist's Point of View”

Guest speaker will be HAL5's George McKay, Aerospace Engineer (retired)

All HAL5 and NSS members are encouraged to attend, and to bring interested friends and co-workers. Open to the public. Free admission.

developmental firings of the SL-2 800 pound thrust motor have already been conducted. An initial Concept Design Review was held on December 2 (see Nov-Dec SSS issue) in which issues were fleshed out and actions assigned to close them. All major issues have either been closed or are now near closure. Rocket flight electronics are now under construction. Test stand upgrades have begun for a final test firing.

HAL5 membership soared in 1997 to a record high of 82 members. HAL5 received numerous accolades at the 1997 International Space Development Conference (ISDC) in Orlando Florida!

1998 — Better Things To Come!

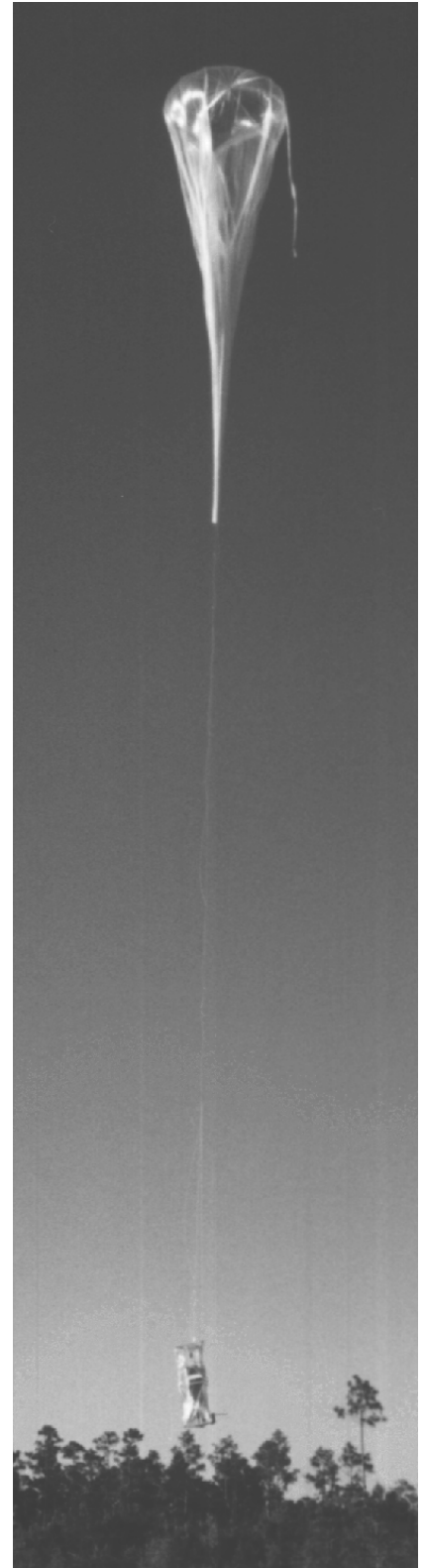
1998 holds exciting promise for HAL5. The SL-2 mission will soon be poised to fly from a barge in the Gulf of Mexico. But first, one more static firing! HALO SL-2, if all goes well, should hit space, ascending to over 50 nautical miles! To date, no amateur group can demonstrate that they have done that. Once again we prepare for a ride into history! Together we shall do it! Next stop — SPACE!

Time To Renew Your Membership!

HAL5 memberships expire at the end of the year. It is time for all of us to renew. There is a new exciting year ahead of us! I ask each of you to renew. We need your support to carry our visionary programs into this new year. Let's try to top 100 members this year! Ad Astra!

Please Donate to Project HALO

Many HAL5 members give freely of their spare time to make Project HALO happen. We still need more! If you cannot volunteer yourself, please make a cash donation. Ad Astra per HALO! ☆



Huntsville Alabama L5 Society

President — Greg Allison
Day: 895-2415, Eve: 859-5538
Vice-President — Larry Scarborough
Day: 881-1944, Eve: 881-4363
Treasurer — Ronnie Lajoie
Day: 461-3064, Eve: 721-1083
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Membership — Philomena Grodzka
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Communications — Bill Brown
Day: 876-5151, Eve: 536-9334
Special Projects — Alfred Wright
Day: 876-8037, Eve: 420-6273
Programming — Wade Dorland
Day: 534-2566, Eve: 534-2566

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January / February 1998

The *Southeastern Space Supporter* is a bimonthly publication of the Huntsville Alabama L5 Society (HAL5), a not-for-profit 501(c)(3) organization devoted to the goal of seeing everyday people living in thriving communities beyond the Earth.

Any opinions expressed in this newsletter are those of the authors or of the Editor, and, unless expressly so stated, are not necessarily those of HAL5 or the NSS.

Visit the HAL5 Web Page on Internet via:

<http://advicom.net/~hal5/>

HAL5 encourages its members to speak out on space-related issues, and welcome submissions of both fact and opinion articles of interest to HAL5 members.

Submit letters or articles to: Ronnie Lajoie
162 Kirby Lane, Madison, AL 35757
Day phone/message: 205-461-3064
Night/Weekend phone: 205-721-1083
FAX number: 205-461-5184
Electronic mail address: hal5@advicom.net

Deadline for submittal is the last day of the following months: February, April, June, August, October, and December.

Preferred format for plain text is ASCII (text with graphics is *MS Word* or *WordPerfect*) either sent by E-mail or on a PC diskette. Also acceptable are letters and articles sent by mail or faxed; however, the more retyping required, the less likely the acceptance. HAL5 is not responsible for receipt of mailed submissions; none will be returned unless sent with a SASE. Hand-delivered diskettes will be hand-returned. No compensation is paid for submissions.

HAL5 Promotes Education

(by Greg Allison, HALO Education Chair)

“Moonlink” for 2 Local Schools

Thanks to HAL5 winning third place in the NSS chapter's contest to recruit new members for the NSS, HAL5 won a license for *Moonlink* to present to a local school. *Moonlink* is an Internet software package that will permit school kids to link to the Lunar Prospector moon probe. School kids will be able to explore the moon directly in their classrooms! Pretty neat Aye?

When we surveyed local schools for worthy candidates we found two that were qualified to receive the software. We deemed this program to be so worthy that we bought an extra license so both schools can participate. Many thanks to HAL5 Secretary Peter Ewing for spearheading the coordination with the Huntsville Center for Technology (which serves all five Huntsville high schools), and to HAL5 Vice President Larry Scarborough for working with Mountain-Gap Middle School.

HALO SL-2 Payload RFP to Offer Room for Student Experiments

Within the next two weeks HAL5 plans to release a Request for Proposal (RFP) for a student payload space flight opportunity on the HALO SL-2 rockoon mission. The technical details will be included in the release. In general, the sum total of student payloads will need to weigh no more than two pounds and fit inside the SL-2 rocket electronics canister. Space has been allocated for these experiments (see graphic to right).

This is the first time in my knowledge that a spaceflight opportunity has been made available to schools with a turn-around time of less than a single year. The typical case as been that a student begins an experiment in high school and is still waiting for the flight after completing graduate school. Some payloads make it quicker but I have yet to hear of less than a year. A short opportunity announcement to flight time cycle is critical to successfully involve

students at the high school level or below. The purpose is to teach space science, and get the youth interested in pursuing technical careers.

Alabama School of Math and Science Student Payload May Fly on SL-2

The Alabama School of Math and Science is interested in flying thin film substrates on the HALO SL-2 rocket (see graphic on page 3) for their students to examine cosmic ray tracks in the materials. They also want to fly these films on the balloon. They will send two representatives to Huntsville to talk with the HALO team soon. The Alabama School of Math and Science is a school for gifted high school students which serves the entire state.

HALO Student Achievement Program Seeks Volunteers

HAL5 seeks volunteers to work with local students in the classroom for the HALO Student Achievement Program. This Program consists of:

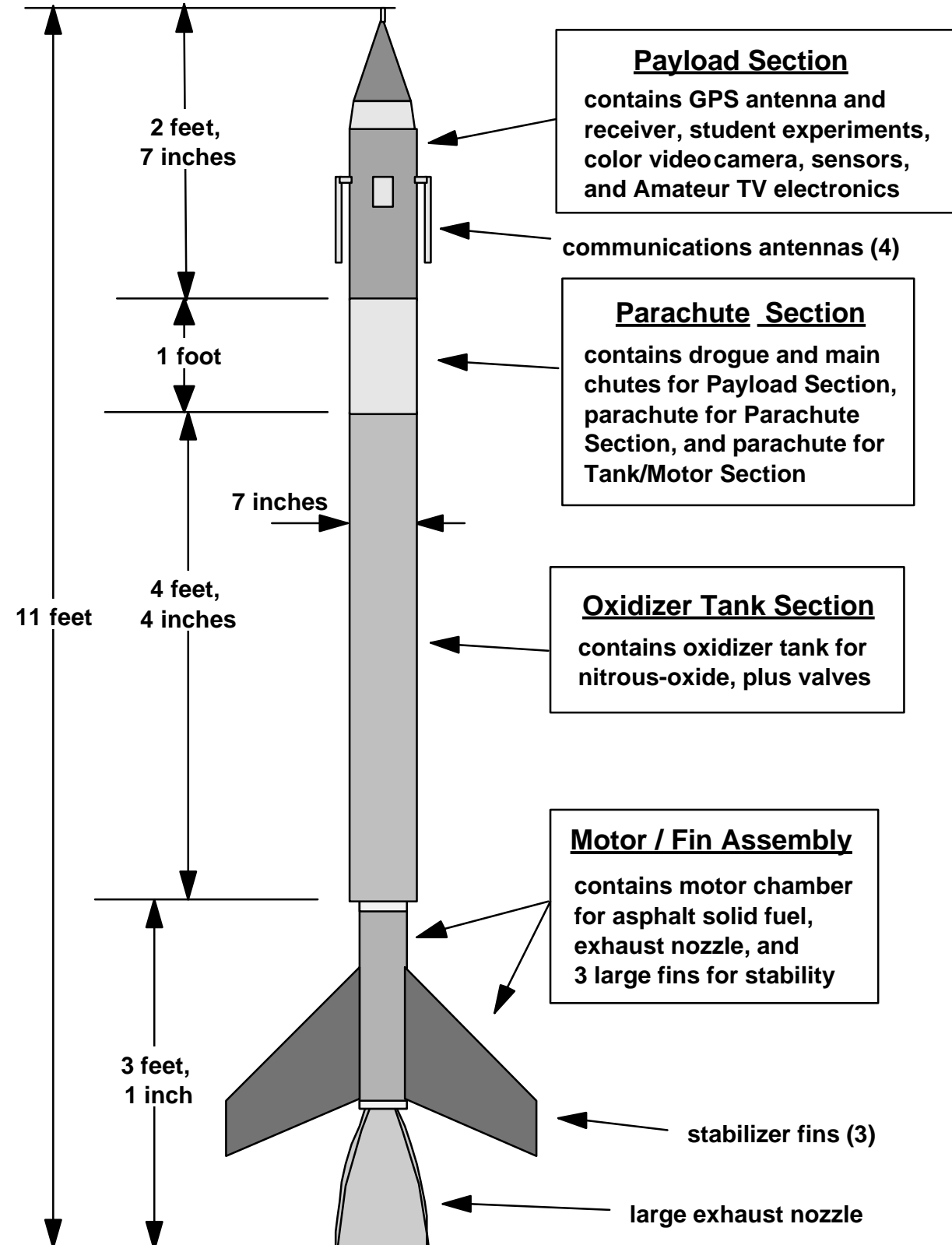
1. **Project HALO**, which launches student experiments on ground-based rockets, tethered balloons, high altitude balloons (which reach the edge of space), and rockoons (rockets which launch from high altitude balloons and fly on ballistic trajectories into space).
2. **Project HALO Achievement**, which takes space education directly into the classroom.

It is imperative that we find the keys to motivate young students to achieve in academic excellence. That is not only the key to maintaining our civilization, but the key to a brighter future.

Where YOU Can Help

We need help in converting the text-based charts into something 5th graders will appreciate. We need volunteers who like to work with students. We also need help raising enough money to make this a national educational program. Please contact Committee Chair Greg Allison at 205-859-5538 for details. ☆

HALO SL-2 Rocket Description



HALO SL-2 Gets a Face-Lift!

(by Tim Pickens, Rocket Systems Lead)

Well, we've all had a good vacation since HALO SL-1. Now it's time to pour the eggnog out and put away the Christmas tree, because there is lots of fun work that's waiting on us. This should turn out to be an interesting trip to the Gulf of Mexico. Oh yeah, that is where we are launching from this next time on a big 'ole barge. The idea is, on this huge NASA provided barge, we will be able to lay out the balloon and tack with the wind as the helium enters the balloon; which should provide a happy and relaxing environment to all.

HALO Sky Launch 2 (SL-2) Rocket

The rocket for the SL-2 mission is similar to the last one, but it will have twice the total fire power as the SL-1 vehicle. It also will be propelled by our famous nitrous-oxide and asphalt fuel combination that has a proven track record for performing. The rocket, as shown in the diagram on page 3, will stand about 11 feet in length and 7 inches in diameter.

The nose cone will be an exact replica of the one for SL-1, including a GPS antenna located in the nose tip section. Beneath the antenna will be an area to accommodate the student payload experiments. Beneath the experiments will be an upper electronics bulkhead containing connectors to disconnect antennas when electronics accessibility is required. The electronics have been upgraded since SL-1 in order to ensure better data and video images. Extensive antenna design and tests have been performed by Gene Young in order to help enhance transmission signal strengths regardless of vehicles orientation. In addition to GPS and video, we will have receive real time acceleration data in order to verify peak altitude.

These items mentioned will be housed in an aluminum can (labeled Payload Section) 7 inches in diameter and 18 inches tall. It will be sealed by water proof seals at each end, which will also seal off the nose cone section.

Rocket Parachutes and Recovery

Beneath the Payload Section will be the Parachute Section. Unlike the SL-1 parachute systems, this one will be much more conventional than the last one, which had to be laced up like a pair of farm boots. The drogue and main chute will be located between the electronic Payload Section and the Oxidizer Tank.

Shortly after reaching apogee, a parachute separation charge will be fired and the combined Oxidizer Tank Section & Motor/Fin Assembly will separate from the Parachute Section, allowing them to independently descend to earth. Meanwhile, a drogue chute will slow the combined Payload and Parachute Sections. At a predetermined altitude, these two sections will also separate, and a main chute will be deployed to allow the Payload Section to land more gently. Recovery of the Payload Section will have priority, but it is intended that all sections could be recovered.

SL-2 Rocket Oxidizer Tank Section

Beneath the Parachute Section is the oxidizer fill and vent valve which are connected to the oxidizer tank. On SL-1 we were able to utilize two aluminum fire extinguisher tanks that proved to work extremely well for their weight. We are currently building a custom aluminum oxidizer tank that will have a carbon wrap over its shell. It should prove to be a much lighter tank for its volume than was flown before.

The SL-1 launch tower provided a frame work for insulation to keep the rocket's nitrous-oxide at a temperature of about 70°F. With no tower, the SL-2 rocket will instead have a layer of insulation surrounding the tank; and the tank itself will have an internal heating element.

SL-2 Rocket Motor/Fin Assembly

The motor case will look very much like SL-1, which was a 3.5-inch diameter phenolic tube wrapped in carbon fiber. The SL-2 motor case will be a 5-inch diameter composite tube wrapped in fiberglass.

The fins will be roughly the same as for the SL-1 rocket, and will be attached to the motor casing with "creative" fiber glassing. The SL-1 balloon gondola was a launch tower which guided the rocket body and fins for its initial (and critical) 8 feet. The SL-2 balloon gondola will only be a small canister housing uplink control hardware and other avionics systems. For SL-2, the rocket will instead be launched from a hook to be located near the nose cone on the rocket.

SL-2 Balloon "Gondola"

The command uplink module will be in a canister located directly beneath the exit nozzle at the rear of the vehicle. This canister (alias the SL-2 "Gondola") will also provide the systems that arm all pyrotechnic devices, including igniters and cable cutters. Calibrated bellows switches will be used to arm them only once a predetermined altitude has been achieved by the balloon; thus keeping everyone on the barge safe. The canister will be detached from the exit nozzle at ignition and will parachute back to the Gulf of Mexico.

Where We Stand

To date, only 5 percent of the rocket structure has been built. We need all the help we can get on this project if we are going to beat the competition. We have already done 90% of the motor testing on our latest 750-pound thrust hybrid motor. We plan to do another firing on March 21 that you won't want to miss.

We are making improvements to the test stand, including a portable test trailer which will allow us to do a near complete test setup at my work shop and tow the trailer out to the test site on the day of testing. This should make a test day go pretty quick. We also will be having a sand bag "load and stack party" in the next month or so (good work out).

Many of the changes made from SL-1 to SL-2 are an attempt reduce the total vehicle weight to enhance our vehicle performance. We need it if we are going to hit that historical 50 nautical mile mark. See ya at the shop! ☆

HAL5 CALENDAR OF MEETINGS AND EVENTS

January 1998

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
“Creation, Cosmology, and Chaos: A Scientist’s Point-of-View” by Mr. George McKay 7:00 to 8:30 PM, Wednesday, January 28, Huntsville Public Library, 915 Monroe Avenue						
18	19 HALO Rocket Work Party 6 pm at Tim’s	20 Project HALO Tech. Meeting Noon at Ponds	21	22 HAL5 Executive Comm. Meeting Noon at Ponds	23	24 Voyager 2 at Uranus, 1986
25	26 HALO Rocket Work Party 6 pm at Tim’s	27 Project HALO Tech. Meeting Noon at Ponds	28 HAL5 Program “Cosmology” 7 pm at Library	29 HAL5 Executive Comm. Meeting Noon at Ponds	30	31 Explorer 1 launched, 1958

February 1998

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	2 HALO Rocket Work Party 6 pm at Tim’s	3 Project HALO Tech. Meeting Noon at Ponds	4	5 HAL5 Executive Comm. Meeting Noon at Ponds	6	7 First untethered spacewalk, 1984
8	9 HALO Rocket Work Party 6 pm at Tim’s	10 Project HALO Tech. Meeting Noon at Ponds	11 “Antimatter Propulsion” 7 pm at UAH	12 HAL5 Executive Comm. Meeting Noon at Ponds	13	14 St. Valentine’s Day
15 Galileo born 1564	16 HALO Rocket Work Party 6 pm at Tim’s	17 Project HALO Tech. Meeting Noon at Ponds	18 Pluto discovered 1930	19 HAL5 Executive Comm. Meeting Noon at Ponds	20 John Glenn, 1st American in orbit, 1962	21
22	23 HALO Rocket Work Party 6 pm at Tim’s	24 “Effective Resumes” 7 pm at HATS	25 HAL5 Program “Delta IV / EELV” 7 pm at Library	26 HAL5 Executive Comm. Meeting Noon at Ponds	27 1998 IEEE Computer Fair 9a - 5p at VBC	28 1998 IEEE Computer Fair 9a - 5p at VBC

March 1998

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1 “March Storm” Week begins	2 HALO Rocket Work Party 6 pm at Tim’s	3 Project HALO Tech. Meeting Noon at Ponds	4	5 HAL5 Executive Comm. Meeting Noon at Ponds	6 “March Storm” Week ends	7
8	9 HALO Rocket Work Party 6 pm at Tim’s	10 Project HALO Tech. Meeting Noon at Ponds	11	12 HAL5 Executive Comm. Meeting Noon at Ponds	13 Uranus discovered 1781	14 Einstein born 1879
15	16 HALO Rocket Work Party 6 pm at Tim’s	17 Project HALO Tech. Meeting Noon at Ponds	18 Alexei Leonov, 1st space walk 1965	19 HAL5 Executive Comm. Meeting Noon at Ponds	20	21 HALO Rocket Motor Firing 12p at H.Pickens
22	23 HALO Rocket Work Party 6 pm at Tim’s	24 Project HALO Tech. Meeting Noon at Ponds	25 HAL5 Program Night 7pm at Library	26 HAL5 Executive Comm. Meeting Noon at Ponds	27	28

HALO Student Achievement Program Description

(by Greg Allison, HALO Education Chair)

The HALO Achievement Program is set up like a pyramid. The base is in the lower level grade classroom activities. At the apex of this pyramid is a proverbial "carrot at the end of a stick" designed to lure the students on through the program toward academic excellence. That carrot is the opportunity to fly experiments into space! What's more, the HALO program strives to develop systems which can fly student payloads within the course of a single school year at extremely low mission cost.

Project HALO Achievement, developed along the guide lines of the Junior Achievement Program, is designed to encourage students' academics through building an excitement for space. Like in Junior Achievement, the key to this program is the guest instructor concept.

The guest instructor concept brings members of industry, government, and academia into the classroom to enrich the curriculum with real world experience. This program will demonstrate to the students the importance of the fields of science, mathematics, and language arts for the exploration and development of space.

The students will learn many basics of science, about energy, Planet Earth and how it fits into the space environment, how to combine ecology and biology to develop deep space life support systems they will develop a new appreciation for life on Earth and the environment, learn the effects of the space environment, rocketry, aerodynamics, about space-flight, navigation, communications, psychological and sociological aspects of spaceflight, and about Planet Mars. Most of all, the students will learn that there is hope for the future, that they can make a difference.

All of this is presented at their grade level. To keep the students' interest, the program combines several different formats. There are class presentations, and field day activities. The key format

of activity to build the students' interest and develop teamwork and leadership skills will be team projects. In this hands-on team-oriented approach, students will gain a broad knowledge of science and space while planning space missions.

Elementary School Program

At the fifth grade level a series of nine sessions will lead the student teams into planning missions and simple spacecraft system concepts (based on what they learn about the space environment) to send a comic character, Rascal the Rockoon Raccoon, to Mars. Rascal will help us humor the students and keep their interest.

Middle School Program

Middle school students will develop their projects to fly on ground-based rockets and high-altitude weather balloons. To coach them in project development we are establishing the Junior Cadet Foundry, which will be modeled on the Foundry project incubator workshop we initiated at the 1993 International Space Development Conference (ISDC). With the Junior Cadet Foundry we will coach the students all the way through the project development phase.

High School Program

High school students would develop their projects to fly on high-altitude weather balloons, and rockoons. They would participate through the Senior Cadet Foundry. Imagine high school students flying payloads into space!

Student involvement in this program runs deep and touches every aspect of the HALO Program. College students from the Students for the Exploration and Development of Space (SEDS) played a key role in the design, testing, and fabrication of the HALO rockoon system. SEDS students may also be expected to fly experimental payloads on the rockoon missions into space on future HALO missions.

It is planned to have various system components constructed by vocational-

technical programs. In short, the HALO Program plans to prototype an educational approach which can be duplicated in many regions to offer opportunities for hundred of thousands of students to touch space. The availability of these opportunities are up to us. It is only a matter of how much we are willing to assist them.

Session and Team Breakdown

The fifth/sixth grade program is broken down into nine one hour sessions, of which three are optional. These sessions are listed as follows:

- 1 Introduction
- 2 Fundamental Characteristics of Space
- 3 Training/Preparation
- 4 Planning Rascal's Mission
- 5 Why We Go To Space
- 6 Launch Phase (Optional)
- 7 Field Day
- 8 Rascal En Route To Mars (Optional)
- 9 Rascal Explores Mars And Returns Home (Optional)

The students are broken down into six discipline oriented teams to assist Rascal accomplish his mission goal of reaching Mars. Accommodations have been made in these teams for students that have greater interest in the arts and humanities than in the pursuit of technical/scientific interest. Each team is equipped with its own workbook to guide members through the project. The student teams are broken down as follows:

- Spacecraft Structural Design Team
- Navigation and Mission Planning Team
- Communications and Publicity Team
- Raccoon Factors Team
- Energy Production and Management Team
- Environmental Control Team

HALO Achievement 5th Grade Program — Rascal To Mars!

The fifth grade HALO Achievement Program, which HAL5 began developing in 1988 is now almost ready for classroom field testing. The student handbooks have already had a successful trial run through the Mountain Gap Elementary School's Science Club. We now have teachers in three schools who want us to present this program to their classes as a part of our HALO Achievement pilot project curriculum development.

HAL5 is now in the process of recruiting a panel of interested volunteers who could provide one or more hours for a pilot implementation of this project into local classrooms. If you or any you know is interested in volunteering see details below.

HALO Achievement Field Day

The HALO Achievement Field Day program is now three years old. It began with HAL5 donating a 7-foot diameter reusable balloon to the Teaching Observation of Planet Earth (TOPE), now Helping Observe Planet Earth (HOPE) program, headed by Huntsville City School Teacher, Susan Cameroon. This project teaches elementary school students about ground truthing aerial and satellite data to learn about earth resources, vegetation, and pollution.

HAL5 did not end its participation with the simple donation of a balloon. HAL5 members have actively gone to the schools and participated in the student experiments. HAL5 purchased another 7 foot diameter balloon to serve as backup in these events.

The HAL5 HALO balloon has extended the HOPE project to Dalton Georgia. HAL5 also conducts tethered balloon flights at local schools independent of project HOPE. HAL5 is currently active with the science teachers at Mountain Gap Elementary. We are also expanding our programs to Mountain Gap Middle School.

HALO Achievement Edge of Space Balloon Experiments

HAL5's HALO high altitude balloon experiment program has already conducted several missions to the edge of space twenty miles up into the stratosphere above 99% of the Earth's atmosphere. These flights have included three elementary and middle school high altitude student experiments. Students from the UAH SEDS group were actively involved in the design, contraction, and flight of three of the HALO rocket experiment packages which flew in this flight series.

Our second high altitude balloon launch (BL-2, launched in March 1995) supported the SOAR program. HAL5 flew a student x-ray film experiment to look at x-ray penetration at 100,000 feet versus ground level. The experiment package was recovered by UAH SEDS student (now graduated, and working for Lockheed Martin in California) Steve Mustaikis.

In March of 1996, the fourth high altitude HALO experiment (BL-4), conducted at the completion of the first annual HAL5 Race for Space, HAL5 flew corn seed and potato experiments for the 2nd grade classroom of Ms. Farie Bridges of Williams Elementary School. A Madison Cross Roads Middle School student flew an experiment of Triop shrimp eggs.

HALO Balloon Launch 5 (BL-5) flew on Sunday, September 22, 1996 at 7:00 AM from the old Huntsville Airport, off Airport Road. We launched a huge 19,000 cubic foot clear plastic weather balloon carrying a oxidizer tank thermal maintenance experiment, and a complete balloon gondola avionics experiment.

The gondola avionics package was equipped with a Global Positioning Satellite (GPS) receiver, color video camera, with a live video downlink, a transponder, rocket launch control electronics, radio down link, cold gas jet reaction control system, and recovery systems.

HALO Achievement Ground-based Rocket Flight Experiments

HAL5 flew its first full scale ground launch of the HALO Phase I rocket, HALO Ground Launch 1 (GL-1), near Manchester, Tennessee on April 13, 1996. The rocket was estimated to have reached almost 30,000 feet. The rocket produced 340 pounds of thrust and fired for well over 20 seconds. Students from UAH SEDS were intimately involved in the design, testing, and construction of this rocket. It was a hybrid rocket with liquid nitrous oxide as the oxidizer and asphalt as the solid fuel grain.

HALO Achievement Sky-based Rockoon Flight Experiments

HAL5 flew its first HALO Phase I (proof-of-concept) rockoon as HALO Sky Launch 1 (SL-1), from a grass airfield near the coast of Hampstead, North Carolina on May 11, 1997. A 141,000 cubic foot capacity high altitude balloon carried the rocket over 100 miles out to sea and over 50,000 feet in altitude. The hybrid rocket was fired from that altitude — a historical first — and climbed to between 30 and 36 nautical miles. Many students were also involved in the design, testing, and construction of the SL-1 rocket, and provided operations and logistics support to the actual SL-1 mission.

Volunteer Contact Information

HAL5 is looking for volunteers to assist with both the technical and educational aspects of the HALO Program. To learn more call Greg Allison at 205-859-5538 or email at: ghallison@aol.com. To quickly find our HAL5 home page just browse on "HAL5" or "Project HALO".

Final Word

Help us inspire a new future. Then you can witness our descendants building cities in space, and know you helped make it happen! The key to our collective futures lies in our children. Let us work together to give them the best tools we can for building that future! Ad Astra per HALO! ☆

HAL5 Membership Benefits

If you are employed between the ages of 22 and 64, membership to HAL5 costs \$20 per year, less than \$2 per month. If you are under age 22, over age 64, retired (over age 55), or unemployed, membership costs only \$10 per year.

Much of your dues covers your subscription to the 8-12 page bimonthly newsletter, the *Southeastern Space Supporter*, which costs about \$10 annually per person. HAL5 also offers an option to just subscribe to the newsletter for \$10.

Another part covers your notices of HAL5 hosted or recommended events (see list to right). Flyers announcing space-related programs and conferences will be periodically inserted into your newsletter, and postcard announcements will also be mailed to you.

HAL5 members receive discounted prices on all HAL5 merchandise. Currently, we are selling Project HALO T-shirts at \$10 for members (\$12 for non); as well as the special Education issue of *Ad Astra* magazine for \$1 for members (\$3 for non). HAL5 members also receive discounted rates to all HAL5-sponsored conferences and events for which there is an entrance fee.

HAL5 members have access to the services of the Huntsville Association of Technical Societies (HATS). HATS hosts the annual TABES and STED-TRAIN conferences. HATS also runs a Career Enhancement Program. A list of their upcoming events is included right. Please renew your HAL5 membership!

Upcoming Events of Interest to HAL5 Members

- Wed., Jan. 28 — **HAL5 Program on “Creation, Cosmology, and Chaos”** by George McKay, Aerospace Engineer (retired), at Huntsville Public Library, 915 Monroe Ave.; free; questions: 461-3064
7:00 - 8:30 PM
- Wed., Feb. 11 — **“Antimatter Spacecraft Propulsion”**, by Dr. Jerald Smith, part of **“Space Propulsion Physics for the New Millennium”** series, at UAH TBD; questions: Les Johnson at 544-0614
TBD - TBD PM
- Tue., Feb. 24 — **HATS Career Enhancement Program on “How to Put Together an Effective Resume”** by John Roth, at the HATS Office, 4900 Univ. Square, Suite 30; free; questions: 837-4287
7:00 - 8:30 PM
- Wed., Feb. 25 — **HAL5 Program on “The Delta and EELV Programs”** by Volker Roth, Delta IV Hsv. Program Manager, at Huntsville Public Library, 915 Monroe Ave.; free; questions: 461-3064
7:00 - 8:30 PM
- Thu., Feb. 26 — **National Engineers Week Awards Banquet**, at the Marriott Hotel, near U.S. Space & Rocket Center; tickets \$20 (by Feb. 23); questions: Robert Van Peurse at 533-6617
7:00 - 8:30 PM
- Fri., Feb. 27 to Sat., Feb. 28 — **1998 IEEE Computer Fair**, hardware and software, at the Von Braun Center, Monroe Avenue, Huntsville; free
- Sat., Feb. 28 to Fri., Mar. 6 — **1998 ProSpace “March Storm”**, in Washington, D.C.; space activism to Congress; questions: ProSpace at 937-431-1054
- Sat., Mar. 21 — **HAL5 Project HALO Phase II — SL-2 Hybrid Rocket Motor Test Firing**, at the HALO Rocket Motor Test Facility, in Gurley; free; questions: Tim Pickens at 971-1566
12:00 - 5:00 PM (tentative date)
- Mon., May 11 to Wed., May 13 — **Technical And Business Exhibition/Symposium (TABES ‘98)**, at the Von Braun Center; free; questions: 205-837-4287
- Thu., May 21 to Mon., May 25 — **1998 International Space Development Conference (ISDC)**, in Milwaukee, Wisconsin; \$100 fee; questions: 461-3064
- Sat., Jun. TBD — (tentative date) — **HAL5 Project HALO Phase II — SL-2 Rockoon Mission**, with balloon launch from NASA barge off Louisiana coast; volunteers needed; questions: Greg Allison at 205-859-5538

Special Announcement

Time to Renew Your Membership

**HAL5 Program Night on
“Creation, Cosmology & Chaos”
Wednesday, January 28, 7–9 pm**

HATS / HAL5
P. O. Box 1964
Huntsville, AL 35807
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