

Southeastern Space Supporter

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

Volume 5, Number 1 — January–February 1996

FIRST WORD

A Special Membership Issue

(by Ronnie Lajoie, SSS Editor)

This special issue of the *Southeastern Space Supporter* is going out to current and past members of HAL5, as well as to many local members of the National Space Society (NSS) who have yet to join their local chapter.

This special membership renewal issue is devoted to informing you — our past, present, and (hopefully) future members — of all the benefits associated with HAL5 membership. Since this is the **last** issue you will receive if you do not join, we wanted to make the most of it.

In this issue, Greg Allison summarizes the past, present, and future of HAL5 and Project HALO; Ronnie Lajoie lists the benefits of membership to HAL5; Philomena Grodzka describes the HATS benefits and services for HAL5 members; Bob Ehresman offers special Internet access rates; and Tim Pickens and Larry Scarborough tell of exciting times on Project HALO. Read on! ☆

HAL5 Program Night

Wednesday, January 24, 1996
7 to 9 p.m. (with social afterwards)
Huntsville Public Library Auditorium

“DC-XA: Testbed for SSTO”

Guest speaker will be DC-XA Project Manager Dan Dumbacher of the NASA Marshall Space Flight Center.

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

Welcome to the New HAL5!

(by Gregory Allison, HAL5 President)

I want to take a moment here to bring our previous, current, and hopefully future members up to speed on HAL5 latest activities. HAL5 is today a dynamically different organization from what it once was; you'll simply be amazed at our latest endeavors! Even some of our most active members may be surprised to see just how broad our programs have been.

In the following series of articles, I will describe the many kinds of activities in which your local chapter of the NSS is involved — and in a leadership role!

HAL5's Project HALO

(by Greg Allison, HALO Program Manager)

We in HAL5 distinguish ourselves as doers. We no longer waste great amounts of time deliberating on what others should be doing (typical for most organizations); we do it ourselves.

Project HALO, for “High Altitude Lift-Off”, was conceived to explore the scientific and economic potential of using high altitude balloons as launch platforms for rockets. This concept, known as a “rockoon”, was first used by Dr. James Van Allen in the 1950's to conduct pioneering studies of the upper atmosphere. Once large military rockets became available, the rockoon concept was abandoned by most researchers.

HAL5 thus started Project HALO as a means to use today's better balloon and small hybrid rocket technology to push the rockoon concept to its full potential as an economical means of reaching extremely high altitudes.

Project HALO Phases

Project HALO will consist of several distinct steps, each of which in itself will provide opportunities for HAL5 to build the managerial and technical skills and resources to proceed to the next step. Each step will also provide unique opportunities for student involvement, original space research at the edge-of-space, and perhaps suggest commercial uses of rockoons.

Phase 0: Balloon tests of rocket subsystems to altitudes of 20 miles.

Phase 1: Rockoon Proof-of-Concept: Rockets launched from balloons.

Phase 2: Operational hybrid rockoons providing cheap access to space.

At this moment, we are now nearing the end of Phase 0. The final motor test is scheduled for February 17.

Hybrid Rocket Motor Status

For safety reasons, Project HALO is using a hybrid rocket motor, which combines a solid fuel grain with a liquid oxidizer. The fuel we are using is asphalt — better known as street tar! The oxidizer we are using is nitrous oxide — better known as laughing gas!

Huntsville Alabama L5 Society

President — Gregory Allison
Day: 971-1041, Eve: 859-5538
Vice-President — Ethan Scarl
Day: 461-2747, Eve: 534-3993
Treasurer — Ronnie Lajoie
Day: 461-3064, Eve: 721-1083
Secretary — Larry Scarborough
Day: 881-1944, Eve: 881-4363
Membership — Philomena Grodzka
Day: 837-4287, Eve: 536-8638
Communications — Ron Creel
Day: 881-8016, Eve: 881-8016
Special Projects — Alfred Wright
Day: 876-8037, Eve: 420-6273

Southeastern Space Supporter

Volume 5, Number 1
January / February 1996

The Southeastern Space Supporter is a bi-monthly 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://www.cici.com/~hal5/index.html>
Courtesy of Community Internet Connect.
Contact Bob Ehresman for info: 722-0199

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 35758
Day phone/message: 205-461-3064
Night/Weekend phone: 205-721-1083
FAX number: 205-461-2772
Electronic mail address: hal5@cici.com

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

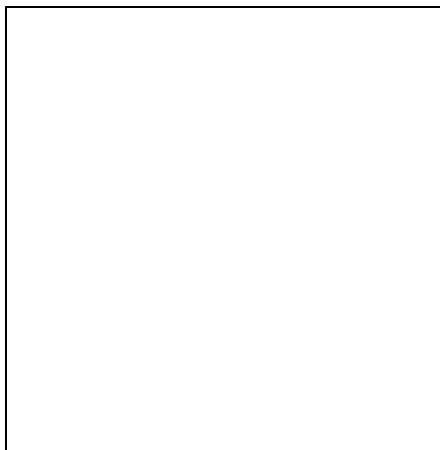
Preferred format for text is ASCII on a diskette or sent by E-Mail. Preferred format for text with graphics is Word on a diskette. Also acceptable are letters and articles sent by mail or faxed; however, the more retyping required, the less likely the acceptance. HAL5 is not responsible for receipt of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

On November 12, HAL5 successfully achieved 340 pounds of thrust from our hybrid rocket motor. The motor had a specific impulse (pound-of-thrust per pound-of-fuel-flowed) over 200 seconds — better than the Space Shuttle solid rocket boosters! With this motor, our rocket performance and mass fraction should take the rocket into space on a ballistic trajectory to an altitude of over 50 nautical miles. If we can get our mass fraction down with a fiber-wound casing we may be able to attain a 68 nautical mile altitude.

Our hybrid rocket will be launched from a high altitude balloon, floating 20 miles high. The rocket should reach the very edge of space, exceeding an altitude of over 50 nautical miles.

Subsystem Testing is Key

So far, we have conducted almost 40 hybrid rocket motor firings. This is just the tip of the motor development iceberg. Testing is key to every thing we do on Project HALO. We have conducted several dozen igniter tests, many under vacuum and extreme cold. We have performed thermal analysis and extreme cold tests of our nitrous oxidizer tanks, numerous valve tests, and tank burst tests. For more on our hybrid rocket motor development, see article by Tim Pickens on page 10.

**Rockoon Balloon Launch Systems**

We have also flown our subsystems to the edge of space — 20 miles high, where the atmospheric pressure is only

one percent of that at sea level. Bill Brown, with over 50 high altitude balloon launches under his belt, has lead HAL5 through our first three balloon flights to the edge of space. With the help of Bill's electronics, we were able to view live color video of our subsystem tests in action.

Dr. Larry Scarborough is currently building our flight gondola system. A subscale version was recently tested at UAH. See Larry's article on page 9.

Student Involvement in HALO

We have recruited many UAH Students for the Exploration and Development of Space (SEDS) members, and several high school students, to assist with the hybrid rocket research and production. These students are already directly involved in the rocket system design, component and subsystem testing, and vehicle construction. Many of these SEDS and high school students are now integral members of the Project HALO team. Several students have already begun writing papers for school. HAL5 is now planning for the flight of student experiments on ground based rockets, high altitude balloons (which reach the edge of space), and ballistic space-qualifying rockoon missions.

Project HALO Student Achievement

This is our flag-ship educational project for Project HALO. The HALO education committee is finally near completion on the HALO Achievement project, which seeks to educate kids in the class room on space science topics modeled after the Junior Achievement approach. In this hands-on team oriented approach, students will gain a broad knowledge of space while planning space missions.

At the fifth grade level, a series of nine sessions will lead the students for planning to send a comic character to Mars. As Junior Achievement (under whose banner we plan to gain access to school systems) has had permission to use Garfield in their programs we have built our text around that. As there is

now some question about whether or not Junior Achievement has maintained that license (which we are looking into) we are developing a new character, Rascal the Rockoon Raccoon (name not final), as an alternate. We may also directly approach Jim Davis, creator of Garfield for a licensing agreement.

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

High school students would develop their projects to fly on high-altitude balloons and/or rockoons. They would participate through the Senior Cadet Foundry. Just imagine high school students flying payloads into space! The HALO Education Committee will present an overview of the Project HALO Student Achievement Program during our HAL5 Program Night on Wednesday, February 28.

Project HALO at STEDTRAIN

On March 1 and 2, HAL5 members will gather at Alabama A&M to help showcase the Project HALO Student Achievement Program at the Science and Technology Education Training conference (STEDTRAIN), sponsored by HATS. We are readying a professional exhibit to display photos and information on Project HALO.

HAL5's Goals for Project HALO

It is our hope that Project HALO will demonstrate that extreme altitudes are reachable by amateurs; that by pushing rockoon technology to its limits, we will inspire ourselves, others, and those who participate with us — as either student experimenters, scientific researchers, or commercial developers — to push us all to reach even higher. Ad Astra! ☆

HAL5's Public Outreach

(by Gregory Allison, HAL5 President)

While Project HALO has certainly kept us busy this past year, we nevertheless have and will continue to meet our obligations to the NSS and to ourselves to keep the general public aware of space research and development, and to provide assistance where possible.

Monthly Lecture Series

Last year, HAL5 sponsored public lectures on Project HALO, private moon bases, space tethers, and the latest from the U.S. Space and Rocket Center.

With the help of additional volunteers, HAL5 is returning to sponsorship of our traditional monthly library programs. These regular public lectures are important for getting information out on a wide range of topics. Additionally they provide good recruiting grounds for HAL5 members and Project HALO participants. We have already selected topics and speakers for six out of ten topics for this year. We skip November and December due to the holidays, and the month of our regional conference.

On January 24, Dan Dumbacher, the DC-XA Project Manager, will update us on the latest developments on the DC-X which promises to develop technology for cheap access to space. On February 28, Dr. Larry Scarborough, Martha Feld, and I will present an overview of HALO Achievement. On March 27, Dr. Ray Moses will present a plan for rendezvous with Comet Wilson Harrington. Later this year, Dr. Moses will describe his infinite specific impulse experiments with laser pulse jets. Most likely in May we will have a project HALO update. If everything works out, we should be describing how we reached space!

Von Braun Space Forum

Last year, the National Space Society co-sponsored the Space Forum and arranged for it's past president and current Board Of Governors Chairman Hugh Downs to speak. We in HAL5

participated by supporting the NSS co-sponsorship through providing mailing labels and attending the program and the banquet which followed.

This year, HAL5 hopes to co-sponsor the Space Forum itself. Who knows, if we successfully launch the first amateur rocket into space, we will be the honored guests of the Space Forum!

HAL5's "Mission to Planet Earth"

Last year, HAL5 began support for the Huntsville City School System's project Helping Observe Planet Earth (HOPE), formerly known as Teaching Observation of Planet Earth (TOPE). We donated a 7-foot balloon and sent personnel to assist 3rd-grade students to perform remote sensing experiments.

This program is like a grade school Landsat program. A camera is flown aboard the tethered balloon to an altitude of 150 feet. The photographs are then "ground truthed" by the students to develop techniques for matching plants, pollution, and resources to colors and patterns found on the returned photographs. HAL5 has lead the way recently toward expanding this program into Georgia. You might call our support of this program our "Mission to Planet Earth"!

Space Development Conference

Now that we have rested from the 1993 ISDC, we are looking into planning for a smaller regional NSS conference. The first Southern Space Development Conference (SSDC) will be held here in Huntsville in September or October. Much of the programming will be based on the Project HALO program. This conference will feature chapter development sessions, the Foundry, sessions on hybrid rocket development, high altitude balloon flights, rockoons, and HALO Achievement. The Junior Cadet Track will feature HALO Achievement programming. More about this event will appear in subsequent newsletters. With the SSDC, HAL5 will take full charge of building a stronger NSS Region 5! ☆

The Foundry Project Incubator

(by Gregory Allison, Foundry Chairman)

Many of you remember the Foundry from the 1993 ISDC. I will chair the Foundry meeting at the 1996 ISDC in New York City. This is a two day project incubator workshop. You can think of it as focused networking. The goal is to permit groups to form teams, organize their concepts, and build networks to initiate new projects and advance projects already in progress.

The Foundry workshop will model a project development/design review cycle. Participants will consist of members of project teams, members of the Foundry Integration Team (which will run the workshop) and a Foundry Board of Advisors.

Special steps have been developed to account for the abbreviated nature of conducting a project development workshop over the span of just two days. Since time is limited, as many prospective participants as possible need to do some homework in advance to prepare themselves for the event. Outlines to assist these participants accomplish this have already been drafted and will be provided in advance.

The Foundry is not just an event. It is a process, like Total Quality Management, yet more to the point. This is an enabling process destined to catch on like wild fire and spread into other organizations. Recognition is already spreading outside the space community. The Foundry was a feature article in the December 1995 issue of *Compressed Air*, a magazine of applied technology and industrial management.

An organization is needed to maintain the Foundry process. Since we created it, I propose HAL5 to be the Foundry Keeper. To maintain continuity we will conduct the "Founders Foundry" at annual SSDCs, which we will sponsor here in Huntsville. We, along with the NSS Chapters Assembly and ISDC Host Committees, will also coordinate Foundry sessions at each ISDC. I must

point out, I may be the Foundry Chairman, however, that I am the only HAL5 member on the International Foundry Committee formed in Toronto. The Foundry is an international project. We plan to use regional Space Development Conferences (SDCs) as feeders to Future Foundries. I do think that one permanent SDC, such as the SSDC, needs to be established as the lead. That is where HAL5 fits in. ☆

Projects in the Wings

(by Gregory Allison, HAL5 President)

Several projects begun by HAL5 in years past have been simmering on the back burners for far too long. It is time to turn up the heat!

HAL5's Habitat Project Reborn

The Long Duration Gravitational Environment (LODGE) project, initiated by HAL5 almost ten years ago, is a concept for a long duration habitat conceived to house over 100 people in a greater than one sixth gravity centrifugal environment. This facility was envisioned as being a first stepping stone between the International Space Station and O'Neill's Island One Space Colony. The entire facility could be constructed with only 14 flights of a Space Shuttle derived vehicle. It would take thousands of flights of a Delta Clipper to accomplish the same objectives. There is still a lot to be said for Heavy Lift Launch Vehicles.

Several new concepts merit a return to the LODGE project. As we grow in membership and more volunteer manpower becomes available, we need to reconsider how the first beachhead for the human habitation for space can be established. I continue to work on LODGE in my Spartan spare time. In time it will once again become a full borne HAL5 project.

Time to Fertilize the Phone Tree

We in HAL5 once had an active phone tree. It served as a direct chapter

activity alert system and was used to inform HAL5 members of NSS National Phone Tree Alerts which were used to alert members to call and write members of congress and the President regarding space legislation and issues.

The first activity of the L5 Society (our original parent organization) phone tree was in response to President Reagan's Office of Management and Budget (OMB) director's (David Stockman) proposal to build just two space shuttles. The new L5 Phone Tree buzzed the president's office with thousands of calls to restore funding to build four space shuttle orbiters. President Reagan agreed. The L5 Society Phone Tree was credited as having made the difference.

It was then calculated that for every phone call to the White House, over 150 thousand dollars were returned to the program. Think of it, two minute phone calls each paid for an engineer and a secretary to work for an entire year. Find a return on investment like that! Early in the space station days, L5 played an important role in getting funding established. The continuance of the DC-X program is due in large part to our lobbying for it. One committed HAL5 activist could enable us to reopen this capability to HAL5. This is something worth considering.

Other Project Ideas

At a recent HAL5 Program Night, Tim Pickens began a discussion with Tommie Blackwell of the Space and Rocket Center about an exhibit for amateur rocket developers. Others have suggested displays about the future. Ron Lajoie has been slowly researching a 24-hour TV network devoted to space.

What About Your Ideas?

What about you? Don't make us come up with all the ideas. This is your club after all. What do YOU want HAL5 to do? What projects do YOU want to work on? Please take the time now to fill out your 1996 HAL5 Survey, and mail it in the enclosed envelope. ☆

In Memory of Challenger

January 27, 1986

(by Larry K. Scarborough)

Did they set out like lemmings,
unaware,
From crowded precipice to
firmament?
Or after long brow-knitting
choose to bear
The risk inherent when the
rules are bent.

No doubt undreamt impulses
circulate
Beneath that misty tissue's
fissured plane,
With limbic whispers over
cerebrate,
Convincing blinded leapers
they are sane.

What mortal mind could hope
to ravel out
The rhyme from reason in us
intertwined,
Or say, so doing, what we're all
about?
Is thought alone the hallmark
of our kind?

Or but a brighter fiber in the
thread,
Woven in the canvas on which
we,
With Mona Lisa smile still
ochre-red,
Beam on when looms and
shuttles cease to be.

The HAL5 Donation Program

(by Ronnie Lajoie, HAL5 Treasurer)

As the previous articles by club President Greg Allison indicate, HAL5 is involved in a lot of activities. In another article (see next page), I describe the benefits that you receive for your membership dues. Now I would like to tell you how you can help benefit HAL5 and its many current and planned projects — by making a donation of money and/or equipment to HAL5 or Project HALO.

Project HALO is being funded from its share of the net revenue of the 1993 ISDC, as well as from donations from HAL5 members and local companies. Your donation to “HAL5 Project HALO” will allow us to shift from Phase 1 (Rockoon Proof-of-Concept) to Phase 2 (Operational Rockoons), when we can start launching student and amateur space experiments. If you prefer, you may earmark your donation for the “Technical” or “Educational” parts of Project HALO.

Other activities of HAL5 are funded from the HAL5 account, as long as there are adequate funds. Your donation to “HAL5” will allow us to host more ambitious monthly programs, advertise our activities and promote our cause more effectively, and initiate new HAL5 projects (such as a display at the U. S. Space and Rocket Center). If you prefer, you may earmark your donation for the “Programs”, “Advocacy”, or “Projects” parts of HAL5 activities.

Donor Status will be Cumulative

Your status as a HAL5 or HALO donor will be cumulative. We at HAL5 believe that you are equally generous whether you make one big donation or many little ones over the years. Thus, your total contribution to HAL5, or to HALO, will be used to determine your donor status. Tables 1 and 2 summarize the cumulative donation requirements for each donor level. Please note that Corporate donor levels are purposefully set to ten times that of individual donor levels.

Table 1. Individual Donor Levels

Donor Level	Total Contribution
Donor	\$ 0 – \$ 49
Contributor	\$ 50 – \$ 99
Supporter	\$ 100 – \$ 249
Provider	\$ 250 – \$ 499
Guarantor	\$ 500 – \$ 749
Patron	\$ 750 – \$ 999
Sponsor	\$ 1,000 – \$ 1,499
Benefactor	\$ 1,500 – \$ 1,999
Bestower	> \$ 2,000

Table 2. Corporate Donor Levels

Donor Level	Total Contribution
Donor	\$ 0 – \$ 499
Contributor	\$ 500 – \$ 999
Supporter	\$ 1,000 – \$ 2,499
Provider	\$ 2,500 – \$ 4,999
Guarantor	\$ 5,000 – \$ 7,499
Patron	\$ 7,500 – \$ 9,999
Sponsor	\$ 10,000 – \$ 14,999
Benefactor	\$ 15,000 – \$ 19,999
Bestower	> \$ 20,000

Recent Donors to HAL5 and HALO

Recent individual donors to HAL5 include Ronnie Lajoie (Supporter) and Ed Stluka (Donor, in memorial). I soon will be going through our past financial records for previous donations to HAL5.

Individual donors to Project HALO include Tim Pickens (Bestower), Ronnie Lajoie (Guarantor), Larry Scarborough (Supporter), Peter Ewing (Contributor), and Ethan Scarl (Contributor).

Corporate Donors to Project HALO include Wyle Laboratories (status TBD), Morton Thiokol (status TBD), MHC&S Load Cell (Donor), and Toroid Corporation (Donor).

I encourage everyone to give what you can to HAL5 and/or Project HALO. It's for a good cause — Space for us all! ☆

HAL5 Membership Benefits

(by Ronnie Lajoie, HAL5 Treasurer)

Why should you renew your HAL5 membership, or join for the first time? This is a very good question, especially in these tough economic times. In this article, I intend to convince you that you will get a lot of benefits for your membership dues.

Review of 1995 Income and Expenses

First, of all, let me tell me where your money has gone in the past year. Last year, 73% of HAL5's \$725 operating budget came from membership dues for 42 members, 18% came from member donations, and 9% came from NSS rebates (for enlisting new NSS members using HAL5 membership forms).

A total of \$647 was spent in 1995. Of this, 59% went to fund the 6 bimonthly issues of the HAL5 newsletter, mostly for copying and postage expenses. All of the writing, editing, and printing is done using volunteer labor.

21% went to fund our HAL5 not-so-monthly public lectures, mostly for advertising and member notice copying and postage expenses. In 1995, HAL5 received an NSS Chapter Excellence Award for the public lecture series it held in 1994. (If you missed these programs — shame on you!) With the help of more volunteers, we hope to reestablish our monthly lecture series in 1996. Use the enclosed HAL5 Survey Form to list your favorite space-related topics and to tell us whether the 4th Wednesday, 7–9 pm slot is good for you or not.

The final 20% was used to cover HAL5 administrative expenses, 62% of which covered our mailbox rental and annual dues to HATS and the NSS Chapters Assembly. The rest paid for copies of membership forms and cards and Annual NSS Chapter's Report postage.

The surplus \$78 from 1995 (made possible by the donations) will be added to this year's operating budget.

Direct Benefits of HAL5 Membership

If you are employed between the ages of 22 and 64, membership to HAL5 costs \$20. If you are under age 22, over age 64, retired (over age 55), or otherwise unemployed, membership costs only \$8. What do you get for your money?

As you can see from our operating expenses, much of your dues covers your subscription to the *Southeastern Space Supporter*, which costs between \$8 and \$10 annually per person. (This year, HAL5 is offering an option to just subscribe to the newsletter for \$10.)

The next part of your dues covers your "space-qualified" membership card. Each card will be flown aboard a Project HALO rocket or high-altitude balloon. This year is especially exciting in that your card will be flown aboard the **first** (hopefully) amateur-built rocket ever to reach space (an altitude over 50 nautical miles) — as long as weight and regulations permit. In case we lose the rocket, a duplicate set of membership cards will be flown aboard the balloon gondola, which is expected to reach 100,000 feet — 3 times higher than you can fly in a commercial jet!

Another part of your dues covers your notices of HAL5 hosted or recommended programming activities. Flyers announcing space-related programs and conferences will be periodically inserted into your newsletter. At other times, postcard announcements will be mailed directly to you. If time is short, we may telephone you and/or send you E-mail. As long as you are interested, HAL5 will keep you informed of upcoming space-related events in Huntsville and vicinity, as well as those times for action when space policy issues arise.

Discounts for HAL5 Members

HAL5 members will receive discounted rates to all HAL5-sponsored events and conferences for which there is an entrance fee. HAL5 is in the process of planning a regional NSS conference to be held in either late September or early October. Also, HAL5 members have a

continuing offer of discounted rates for Internet access with CICI (see page 8).

Other Benefits of HAL5 Membership

One of the major benefits of being a HAL5 member is having access to the services of the Huntsville Association of Technical Societies (HATS). HATS, which hosts the annual STEDTrain (March) and TABES (May) educational and industrial conferences, provides free and reduced-cost administrative services to members.

HATS also runs a Job Seeking and Referral Program (JSARP) which sends member resumes out to all of its technical societies. Craig Presson, HAL5's previous Vice-President, found a job via JSARP. If you need a job, this may be your best benefit yet! See page 11 for more on HATS and JSARP.

But, Who Pays for Project HALO?

As you may have noticed, not one penny of your membership dues funds Project HALO. So where does it get its money. The initial funding for HALO is coming from HAL5's share of the net revenue of the 1993 ISDC. Thus far, about half of this money has been spent. Additional financial support has come from donations of dollars (from HAL5 members) and surplus equipment and parts (mostly from local companies).

By far the greatest asset to Project HALO, as was for the 1993 ISDC before it, is the small group of highly dedicated HAL5 and SEDS volunteers who are working long hours to help bring about personal access to space.

Once we have a successful flight under our belt, HAL5 will be seeking funding from a variety of sources. With adequate resources, Project HALO could help spawn a whole new industry!

It's Decision Time

I hope I have convinced you that you get a lot for your money. If you can spare the price of a movie video, it's time for you to rejoin or join HAL5! ☆

HAL5 CALENDAR OF EVENTS (Post Me!)**January 1996**

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
14	15	16	17 HALO Gondola Design Review 7pm at Tim's	18 HAL5 Executive Comm. Meeting Noon at Ponds	19	20
21	22	23	24 HAL5 Program Night 7pm at Library	25 HAL5 Executive Comm. Meeting Noon at Ponds	26	27
28	29	30	31	HAL5 Program Night at the Huntsville Public Library "DC-XA: Testbed for Single-Stage-to-Orbit" with guest speaker Dan Dumbacher, Program Manager Wednesday, January 24, 7 to 9 p.m.		

February 1996

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Project HALO Main Event — Hybrid Rocket Motor Test Day #10 Testing of the flight-ready rocket motor in preparation for ground-launch 12 – 6 pm, Saturday, February 17 at the HALO Rocket Motor Test Facility in Gurley (home of Herman Pickens) — Maps at Program Night				1 HAL5 Executive Comm. Meeting Noon at Ponds	2	3 Tripoli Rocket Society Launch Manchester, TN
4 Tripoli Rocket Society Launch Manchester, TN	5	6	7	8 HAL5 Executive Comm. Meeting Noon at Ponds	9	10
11	12	13	14	15 HAL5 Executive Comm. Meeting Noon at Ponds	16	17 HALO Rocket Motor Testing 12pm, Gurley
18	19	20	21	22 HAL5 Executive Comm. Meeting Noon at Ponds	23	24
25	26	27	28 HAL5 Program Night 7pm at Library	29 HAL5 Executive Comm. Meeting Noon at Ponds	HAL5 Program Night at Library HALO Education Program by Greg Allison & Larry Scarborough Wednesday, February 28, 7–9 pm	

March 1996

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
The Huntsville Association of Technical Societies (HATS) presents the 2nd annual Science and Technology Education Training Conference (STEDTRAIN) with a booth promoting Project HALO's technical and educational activities March 1 and 2 at the Alabama A&M University, in the Dawson Building Auditorium					1 STEDTRAIN Noon to 5p Alabama A&M	2 STEDTRAIN 9 a.m. to 5 p.m. Alabama A&M
3 HALO Rocket Ground Launch Manchester, TN	4	5	6	7 HAL5 Executive Comm. Meeting Noon at Ponds	8 Inputs to HAL5 newsletter due	9
10	11	12	13	14 HAL5 Executive Comm. Meeting Noon at Ponds	15	16 HAL5 1996 Race for Space 9 a.m. at NASA

HAL5 on the Net — an Update

(by Ron Lajoie, HAL5 Web Page Manager)

I am proud to report that the HAL5 World Wide Web site is alive and well, and is poised to become the most sought after of all NSS chapters. (A Web site is a linked collection of Web pages which can be accessed by anyone in the world via the Internet). After just seven months, our Web site already receives the second highest number of "hits" of all sites hosted by our Internet provider.

As reported in the July–August issue, thanks to a generous donation from member Bob Ehresman, HAL5 now has direct access to the Internet and its own site on the World Wide Web. In exchange for a Supporter-level (new for 1996) membership, Bob will continue to provide HAL5 with free Internet access via his company Community Internet Connect, Incorporated (CICI).

HAL5 Electronic Mail Capability

The CICI account gives HAL5 a stable and easily memorable electronic mail address: "hal5@cici.com". HAL5 is already on the E-mailing lists of various space organizations, including the NSS, the Experimental Spacecraft Society (ESS), and *SpaceViews*, the NSS electronic newsletter. HAL5 members with E-mail capability should send messages and newsletter articles to the "hal5@cici.com" address.

HAL5 members without E-mail capability can have their electronic mail sent to the "hal5@cici.com" address, as long as they restrict such use to HAL5-related business, and they inform the sender to add an "ATTN: Member Name" in the message header. I, or another E-mail manager, will telephone you with the contents of the message.

HAL5 Web Site

The HAL5 Web Site is fast becoming a major club asset. The location of the main HAL5 Web page is as follows:

<http://www.cici.com/~hal5/index.html>

From this Web page, viewers can get general and specific information on HAL5 and its activities. Of most use to members is the HAL5 "Calendar of Events" which contains the most up-to-date information on HAL5 and Project HALO planned activities, as well as future space-related programs and conferences sponsored by other groups.

Other HAL5 information available via the Web page includes a summary of HAL5 (from founding to present), information about the current HAL5 Executive Committee, and information about the *Southeastern Space Supporter* as well as the latest back issues (minus the pasted-in photos).

There are also many links to take viewers to other Web pages associated with other space-related groups, both professional (e.g., NASA, HATS, AIAA, Boeing, etc.) and grass-roots (e.g., NSS, Chapters Assembly, SEDS). Members should E-mail corrections, additions, and other suggestions to the "hal5@cici.com" address.

More HAL5 Web Pages on the Way

Once this issue is published, a Web page listing membership benefits and having a on-line membership form will be added. New members will still have to mail in a check to join HAL5.

Another possible Web page would be a complete HAL5 membership listing, so that members would have access to the most-current addresses and phone numbers. This would greatly aid HAL5's Phone Tree efforts and allow us to reach members more quickly. It will also allow members to see their own data and to E-mail HAL5 with corrections when necessary.

The page will not be set up until a fail-safe password system can be installed to protect the data — and unless most HAL5 members agree. If there are only a few dissenters, their data will not be posted, even with the password system. Please E-mail your comments to the "hal5@cici.com" address, or telephone me at 461-3064 or 721-1083.

Project HALO on the Internet

Because of its large scope, Project HALO deserved its own "home" page. From there, viewers can access Web pages describing the project and reporting on its activities. The reports were taken from previously-published issues of the *Southeastern Space Supporter*. Soon to be added are pages describing the education program and information on HALO team members.

Special Offer for HAL5 Members

Use of the CICI account is free to all HAL5 members who need to do HAL5 business. For those members who want access to the Internet for reasons other than HAL5 business, Bob has very generously created special rates for HAL5 members (see below). ☆

Special Offer from CICI

(by Bob Ehresman, CICI President)

Community Internet Connect, Inc. (CICI), host of the HAL5 Web Page, is proud to announce three special rate options for dues paying members of HAL5.

1. **Standard Access** — Unlimited dial-up PPP or SLIP access to the Internet for \$25/month or \$20/month on a 1 year contract commitment. The latter rate equals the best unlimited service offered by other local providers.
2. **Net Shell Access** — Shell access from elsewhere on the Internet for \$8/month. Set up your own Web page!
3. **USENET Only Access** — NNTP access to my web server from the Internet address of your choice for \$4/month.

For more information, send an E-mail message to Bob Ehresman at "ehresman@cici.com", or call me at home 345-3344, or at work 234-2343. ☆

PROJECT HALO NEWS**Rocket Launcher Test Success**

(by Larry Scarborough, Gondola Team Lead)

On December 16, 1995 the HALO gondola design was put to its first test. After input from Al Wright, Bill Axenroth, Ron Creel and other, less official members of the design committee, I constructed a 40% scale model from wood and cardboard. This mock-up was constructed to give concrete thinkers such as myself something solid to contemplate.

The real gondola will be called upon to carry the HALO rocket via balloon to 100,000 feet. The rocket must arrive there without freezing in the near-space environment. Having risen above most of the drag of the Earth's atmosphere, the gondola must then orient the rocket nearly to vertical to insure the highest possible trajectory upon launch.

One major challenge for the gondola team is how to keep the rocket properly aimed as it leaves this carrier. The diameter of the HALO rocket is not uniform. The top part will house the oxidizer tank. The bottom part consists of the solid fuel tube. This narrow end of the rocket is trimmed with exaggerated fins. They have to be big to be functional in the rarefied air twenty miles up.

The mock-up was made to study how a system of rails running parallel to the gondola's axis might give a rocket a good start. Some of the rails contact the front (or fat) end of the rocket. Another series of rails confines the fin tips, steering the back (or skinny) end of the rocket.

To hold the gondola (and therefore the rocket's flight path) vertical, an outrigger or boom was suggested as a counter-weight. 3-point suspension was devised as a way to minimize swaying.

The stand-in for the rocket in the 40% gondola mock-up was a paper towel roll with a plastic 7-up bottle glued to one end. Masonite fins were attached to the

other end. This crude model slid smoothly along the rails of the gondola when pushed by hand.

When this demonstration of the rail system was brought before the assembled multitude of rocket scientists and engineers who are building the actual HALO rocket, I saw Tim Pickens' eyes light up. In the techno-babble that laymen such as myself find so confusing and at the same time awe-inspiring (like "fat end" and "skinny end"), Tim made a suggestion: "Slap a D-motor on that sucker's tail and we'll see how that gondola-thang is really gonna work."

Knowing the frailty and imprecision of my cardboard mock-up, I must confess to a moment of doubt. Could Tim be pulling my naive, non-rocket scientist leg? But then I remembered the legend of Tim Pickens and his flying steam iron. So per his instructions, I slapped a D-motor on the tail end of the cardboard tube.

The morning of December 16 dawned crisp and clear. Tim and Gene Hornbuckle were already at the UAH ballfield when I got there. Tim devised an aluminum spar from which the gondola was suspended. It bobbed and swung and then twisted slowly in the wind.

We observed the gondola for stability. The three-point suspension limited the swaying. We attached various tails to the boom to see whether maintaining a constant orientation to the wind (a la a weather vane) would increase stability (it did not).

So the thing could hang straight. But could it stay vertical as the rocket exited? Could the rocket even get out without its fins getting tangled in the rails? The real test was yet to come. Greg Allison showed up in time to preside over a brief countdown.

Up to this point in my life, my engineering feats have been, for the most part, earthbound. Things like screening in the porch or paving the sidewalk. And they have not come under the scrutiny of real rocket scientists. Rather

than aeronautical and astronautical (up in the sky for all to see, successful or not), my experiments have tended toward the biological, basement projects in which failure could be easily and privately dealt with on a dark night with a shovel in the back yard.

In the brief seconds of that countdown, I played the whole scenario over in my mind. The rocket would disintegrate on launch; the D-motor would spew sparks onto the gondola and my contribution to the conquest of space would go up in smoke; Greg's hair would redden in anger; Tim would roll his eyes; Gene would utter a thoughtful, "Hmm."

I would retort defensively, "Dadburn it, I'm a doctor, not an engineer."

The strangely dilated time of that countdown finally ran out. Greg closed the circuit. The rocket rose cleanly from the gondola. And quickly. Before the gondola had time to spin or tumble out of control from the recoil of that mighty D-motor, that sucker was out of there (see how well I have mastered the technical jargon?).

We lost sight of the projectile as it arched like a suicidal Scud back to the ground behind some local dormitories. The sleeping Steve Mustaikis was roused by what must have sounded to him like a sonic boom (even rocket scientists sleep in on Saturday when they are students). But I knew that the loud crack that announced the rocket's re-entry could only be the impact of a plastic 7-up bottle on the unforgiving December earth.

The post-mortem was brief. "Shoulda had a parachute" was the harshest criticism I heard. Neither the bottle nor the cardboard tube would ever fly again. But while the rocket bit the dust (quite literally), the gondola survived entirely intact and proved the basic soundness of its design and construction.

I learned that day that you don't have to be a rocket scientist to make even technical contributions to Project HALO. Ad Astra per ammo-tourism. ☆

1995 Great for HALO Rockets

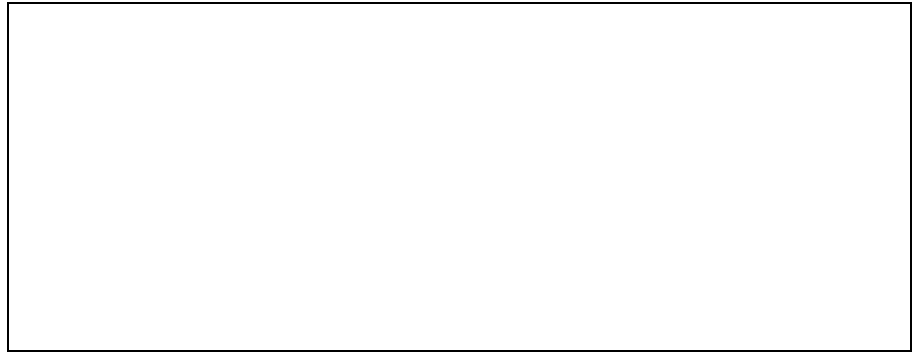
(by Tim Pickens, Propulsion Team Lead)

What a year it has been in the world of HAL5 Hybrid Rocket Development 101! We have learned so much from the “School of Hard Knocks”, and have traveled far, but the journey is not over. We have finalized our proven designs and are in the process of constructing our hybrid vehicle. This is a very good time to come aboard and help build the components that will contribute to making history.

The 1995 Rocket Year in Review

We have done and learned so much in 1995. To date, we have tested over 40 motors at our Gurley Test Facility! We have tested solid and hybrid rocket motors for industry, as well as for our Project HALO. We have tested motors that were capable of producing over 350 pounds of thrust for 10 seconds! We have tested motors that produce 50 pounds of thrust. McDonnell Douglas had us testing a series of hybrid fuels as a possible candidate for our space shot.

We tested all kinds of hybrid rocket fuel/oxidizer combinations — from rubber (PBAN, HTPB, etc.) and gaseous oxygen (GOX) or nitrous oxide (N₂O) to Project HALO’s successful asphalt and N₂O. We had many great successes! And “yes”, we also had a few minor mishaps (no one got hurt). We have had a lot of fun along the way, and it has all been very rewarding.



Gene Hornbuckle's asphalt and nitrous-oxide hybrid rocket motor.

Rocket Entering Final Design Stage

All the preliminary testing has been done on the fuel and oxidizer for Project HALO, and now it is time to build a space-worthy vehicle. We have decided that this first mission will be accomplished using asphalt for fuel and nitrous oxide for the oxidizer.

We have done extensive testing, including a scaled-down rocket that has flown at least three times achieving altitudes of over 4,000 ft from the ground! This effort was embarked upon by fellow member Gene Hornbuckle as an attempt to make flying rocket models more affordable. Normally this kind of model would cost about \$35 per flight to fly, but Gene was able to get it done for only about \$2.50 per flight!

This is what our Project HALO team wants to do on a larger scale; we want to make space affordable, and achieve it through innovation, resourcefulness, and our ability to design and build with commonly available material and processes. We don’t see asphalt or nitrous oxide in our long term future, but we do see it carrying us the long haul in our short term objectives.

Rocket Work You Can Take Home

We have had many parts of our technical program being done out of our member’s own homes. For many, this offers great convenience, without the necessity of going to my house, or meeting at HATS, etc. All our needs have been defined and there is a clear path of the tasks at hand.

Via this “HALO Home Program”, team members have been designing rocket fins, conducting igniter tests, making mechanical drawings, performing N₂O thermal analysis, designing balloon gondolas and building scale models, preparing and pouring asphalt fuel, and many, many, other successful efforts.

Plenty for Non-Rocket Scientists

Most of the people that I mentioned, like myself, are not “Rocket Scientists” by degree — we are “Rocket Scientists” by heart. We all share the desire to make space history and learn a lot along the way. Our team has business majors, non-majors, mechanics, clerks, technicians, teachers, doctors — and even some real bonafide engineers — **BUT WE STILL NEED YOU!**

As this deadline approaches us, there are rocket fins to build, rocket and gondola recovery systems to construct, rocket airframe components to build, electronics to integrate, motor casings to finish, motor extension nozzles to carve, gondola and supporting hardware to build, and reliability testing on many components to be performed.

The items mentioned are big and small, some boring, some exciting, some challenging, others not; but all must be addressed for us to succeed. We live in a time when people will donate “stuff” and sometimes money, but time is something that we all seem to be short of. Be a part of this history-making effort and you too will make the difference! Please call me at 971-1566. Ad Astra per YOU! ☆

Our homemade graphite nozzle.

HATS Benefits for HAL5

(by Philomena Grodzka, HATS Office Exec)

HAL5 is an Associate Member of the Huntsville Association of Technical Societies (HATS). HATS is a non-profit 501(c)(3) association of Huntsville area technical and professional societies dedicated to the advancement of science and engineering. Founded in 1969, HATS has grown from seven charter societies to the current 67 organizations — representing about 21,000 individuals.

HATS provides a number of services to its member organizations and their members, including the following:

- ◆ Information Outreach: Bimonthly HATS newsletter which can include your activities.
- ◆ Anytime fax call to all societies for special promotion of your event.
- ◆ Media Releases to all TV, Radio, and newspapers in the area.
- ◆ Secretarial Services at cost (discounts on printing, copying, mailing, etc.)
- ◆ Member links on the HATS World Wide Web site.
- ◆ Office as an information center: A place for general public to call to get information on joining your society.
- ◆ Bringing technical professional concerns to the attention of business and community leaders.
- ◆ Incubating business (via TABES) and education (via STEDTRAIN) with the help of technical professional liaisons.
- ◆ Encouraging and promoting science and technology education in local schools.
- ◆ Enhancement of technical professions through the Professional of the Year program (Ron Lajoie was HAL5's in 1995) and other promotional and public relations activities.
- ◆ Providing a meeting room for moderate size meetings.

◆ Use of audio/visual aids (overhead and slide projectors, screen, TV VCR, tape recorder).

◆ Job Seeking Assistance & Referral Program (JSARP) for individual technical professionals seeking employment or career guidance.

Job Assistance and Referral Program

As a professional courtesy to members of HATS organizations, HATS puts their resumes on file at the HATS office. These resumes are available, at no charge, for review by employers.

The process begins when employers provide HATS with a list of keywords that describe the position they wish to fill. A computerized keyword search is conducted on the actual text of each resume on file. The resumes which reflect at least some of the keywords will then be faxed to the employer.

Keywords can be job titles, programming languages, software packages, college degrees, hardware, operating systems, or any other words pertinent to position you seek. HAL5's former Vice-President Craig Presson found a job in this manner.

If you need a job, or a better one, I urge you to submit your resume to the HATS JSARP program immediately. Your career, and your sanity, is at stake!

To Learn More About HATS

The best way to rapidly learn the latest about HATS is to check out the HATS Home Page on the World Wide Web. Our location is "<http://www.hats.org>". Our electronic mail address is "HATS@iquest.com".

For those without access to the Internet, call or drop by the HATS office, located at 4900 University Square (at the end of the street across from Bookstar labeled Broadway), Suite 29.

Our telephone number is 205-837-4287 and our fax number is 205-837-4275. Give us a call, that is why we are here. Ad Astra per HATS! ☆

LAST WORD**On the Verge of Greatness**

(by Gregory Allison, HAL5 President)

Consider the things we are doing in HAL5. It's like we've had a lot of eggs in an incubator and now they are all hatching. Project HALO stands an excellent chance of making HAL5 the first amateur group to reach space. Project HALO Achievement, designed for school systems across the land, could spread throughout America. The Foundry is already getting the attention of outside organizations. Any of these programs stand to earn HAL5 enormous respect.

Add in other programs like the HAL5 Race For Space and you can soon see that HAL5 will soon become very well known for its visionary projects. I expect this will translate into a larger membership. With such a broad array of meaningful programs, I think we may well see HAL5 membership climb to 200 or more. Put shortly, HAL5 stands at the verge of greatness!

The Fun of it All

At each motor firing we have a cook-out, burn rocket motors, talk and socialize. You should try to launch a weather balloon in high winds if you want a little excitement. How about chasing the payload all over hillbilly country in Paint Rock Valley? You should have been there when we flew Gene Hornbuckle's first hybrid rocket in Manchester, Tennessee. It was the first ever free flight of an asphalt motor.

Ever fueled liquid oxidizer into a rocket in the middle of a cow pasture? Well why not? It's pretty fun to come up with a powder charge that will separate the avionics package without burning up the parachute. We also had a lot fun in November when we walked into the Constellation science fiction convention carrying in hand full scale flight rockets and motors. The test of Larry Scarborough's first gondola was great fun. He built a rocket out of cardboard

Top Ten Reasons to Rejoin HAL5 or Join for the First Time

(from the home office in Valhermoso Springs, Alabama)

- Number 10 – Impress your boss with your “space-qualified” HAL5 membership card!
 - Number 9 – Fly your own “experiment” aboard a Project HALO rocket or balloon!
 - Number 8 – Speak your mind in an article or editorial letter for the HAL5 newsletter!
 - Number 7 – Get a job, or a better one, with the help of HATS’ JSARP program!
 - Number 6 – Barbecue burgers & hot dogs and fire rocket motors — all on the same day!
 - Number 5 – Eat “chicken-fried-chicken” at Shoney’s following a HAL5 Monthly Program!
 - Number 4 – Learn just what the “L5” in HAL5 means — and then explain it to others!
 - Number 3 – Rub shoulders with NSS officers at a HAL5-hosted regional space conference!
 - Number 2 – Meet people who won’t laugh at you when you call yourself a space cadet!
- ... and the Number 1 reason to rejoin or join HAL5 . . .
- Number 1 – HAL5 — HAL4 — HAL3 — HAL2 — HAL1 — HALO!! Space, here we come!

tubing and soda bottles for form and fit. We decided to put a rocket motor in it and flew it. If you like burning things you would love our igniter tests. We have tested dozens of igniters.

Reflections On Our Membership

All these things have been possible due to the fantastic crew of active members we have in HAL5. I ask you, what other space club comes close? HAL5 leads with conviction and action. It is our deep-seated belief in space development and resultant action that separates us from the rest of the crowd.

If you haven’t been active in HAL5, you have missed a lot. Join us and support our projects. We need help from members of all backgrounds. Come see what you can do to promote space.

Credibility

So how do we pay for all these Project HALO activities? We raised the seed money ourselves by hosting the 1993 ISDC. We have also received thousands of dollars worth of donations from members and corporations, both in money and materials. We have enough funding in hand to take care of our first rockoon flights and initiate development of our next phase, more capable systems. Our educational programs will be key to obtaining future funding. We are already planning several different future funding avenues.

So, What About the Space Colonies?

So what does this have to do with space? Show me someone else who is talking about flying payloads into space

for a few thousand dollars and we can then talk about space colonies!

Yes, we are currently examining pathways that could lead to orbital systems as an outgrowth of Project HALO technology sometime in the future. For now, the things we are learning and teaching others will provide ample promotion for the development of space.

How many young Von Brauns might we excite toward following a career in space? The problem with the space program today is that the typical “man-in-the-street” cannot identify with it. He cannot conceive that space affects his life. What we are doing is taking space to the streets. Can you imagine a better way to do that than with asphalt space rockets? Ad Astra per Ardua! ☆

Special Announcement

Time to Renew Your Membership

Program Night on “DC-XA SSTO”

Wednesday, January 24, 7–9 pm

See Inside Flyer for Details

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

Non-Profit Organization
U.S. Postage Paid
Huntsville, Alabama
Permit No. 272