

Southeastern Space Supporter

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

Volume 6, Number 2 — March–April 1997

FIRST WORD

A Little Pause at the Ragged Edge of Greatness

(by Greg Allison, HALO Program Manager)

We have stood tippy toed on the ragged edge of greatness, ready to leap into history and the chasms of the great unknown, yet to make sure we had everything as right as it could be, as indeed it should be — we paused — for a moment.

Well there we were on the 22nd of March ready to go. The skies were clear and there was little wind, the balloon was inflated, the rocket was fueled, electronics checked out, the FAA said go, our recovery boat had dispatched into the Atlantic. All systems were go. Safety shunts were removed, rocket and launcher systems were activated and running.

(see First Word on page 3)

HAL5 Program Night

Wednesday, April 23, 1997
6:30 to 9 p.m. (with social afterwards)
HATS Office, 4900 University Square
(across from Bookstar), Suite 29

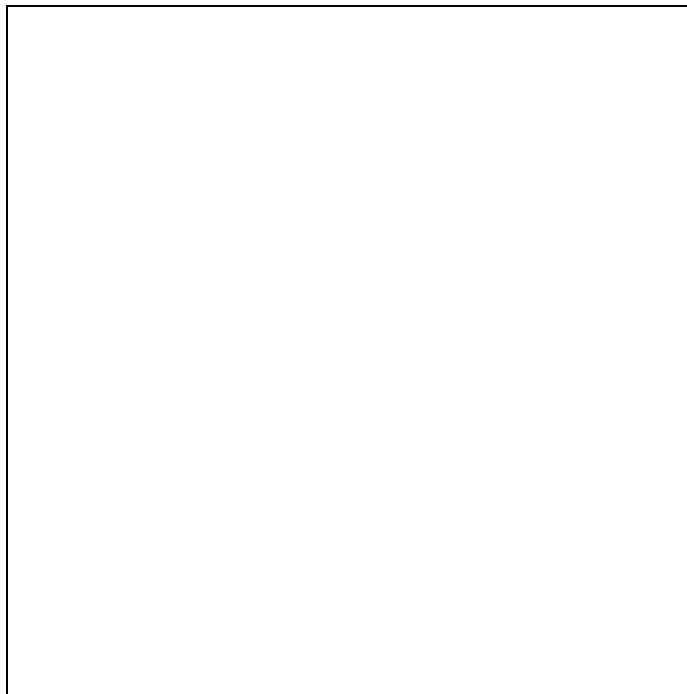
“Meet Gordon Woodcock”

Guest speaker will be Mr. Gordon Woodcock, Executive Vice-President of the National Space Society, and Chairman of HAL5 Board of Advisors.

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

PROJECT HALO NEWS

HAL5's first rockoon launch attempt on March 22 was scrubbed just prior to the balloon launch due to a balloon gondola electronics problem caused by radio interference. The HALO rocket is fine



HALO rockoon ready for launch, prior to the scrub

and is ready for another attempt sometime in early May (pending FAA approval). The gondola has been thoroughly examined and has been enhanced so that the problem will not recur. Final testing will be performed this weekend (April 19-20).

Thanks to HAL5 press releases and the commotion created by our first attempt, Project HALO is capturing the attention of people from all over the U.S. and the world, especially the English-speaking countries such as Great Britain and Australia. What follows is a sampling.

WHAT THEY SAY

In this issue, I would like to treat you to what other people are saying about HAL5 and its Project HALO — in their own words. Granted, some of these words came from us originally (in the form of press releases, articles, and interviews). But these publishers and commenters made the final decisions about what to print.

NSS Chapter Attempts First Amateur Rocket Launch into Space

(from April 4 *SpaceViews*, made from HAL5 press releases)

A combination of an electrical problem, increasing winds, and increasing air traffic resulted in a scrub of the first attempt to launch the HALO Space Launch 1 rockoon on Saturday, March 22. With winds forecasted to be breezier on March 23, the Project HALO team decided to scrub for the weekend and to try again at a later date. The group has tentatively selected

May as the month for the second attempt.

The electrical problem has been traced to a electronic timer in the gondola electronics package — part of the backup safety system for the rockoon. The timer, which was to have triggered seven hours after switching to internal battery power, instead triggered less than ten minutes later. The most probable cause was radio interference from an ATV (amateur television) transmitter.

(see *SpaceViews* on page 4)

Huntsville Alabama L5 Society

President — Gregory Allison
Day: 895-2415, Eve: 859-5538
Vice-President — Larry Scarborough
Day: 881-1944, Eve: 881-4363
Treasurer — Alfred Wright
Day: 876-8037, Eve: 420-6273
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Communications — Peter Ewing
Day: 876-5151, Eve: 536-9334
Special Projects — Ronnie Lajoie
Day: 461-3064, Eve: 721-1083
Programming — David Dean
Day: 922-4897, Eve: 379-3661

Southeastern Space Supporter

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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://iquest.com/~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 35758
Day phone/message: 205-461-3064
Night/Weekend phone: 205-721-1083
Electronic mail address: hal5@iquest.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.

TABES 1997 in Huntsville

The Technical And Business Exhibition/Symposium (TABES) is the premier symposium addressing critical issues in today's changing global marketplace, particularly in the area of space, defense, business, emerging technologies, and the environment. TABES '97 symposia will address the theme "Information Technology: A New Dimension."

TABES '97, will occur May 12-15, 1997 at the Von Braun Center and will include the following exciting offerings:

- Space, Defense, Business, and Education Symposia (May 13 and 14).
- Evening Technical Papers (Monday, May 12, 6:30 - 9 PM). Sessions include Materials and Processes, Propulsion, Software, Controls, MAGLEV, and Defense Topics.
- Poster Presentations (Tuesday, May 13, 3-5 PM) in the Exhibit Hall. Authors will be present by their posters to discuss their presentations or to answer questions.
- Morning presentations (Thursday, May 15) sponsored by the Air Force 2025 Project, Air University, Maxwell AFB, AL. Themes: Air and Space Education, "Information Technology – Education National Security Leaders for the 21st Century."
- Exciting high-tech exhibits from companies and organizations from around the world. This year we welcome Taiwan, Australia and Canada as exhibitors. Representatives from other nations will also be attending, among which will be a delegation from Hubei Province, China. The Honorable N. Han, Vice Governor of Hubei Province, will be a member of the delegation.

TABES also hosts the annual Professional of the Year Awards dinner. **Look for the Nomination Form in this newsletter**, and nominate the HAL5 member who deserves an award! ☆

1997 ISDC in Orlando, Florida

The 16th annual NSS International Space Development Conference (ISDC) will be held during Memorial Day weekend (Thursday, May 22 to Monday, May 26) in Orlando, Florida at the Omni Rosen Hotel.

Program Tracks & Sessions

The 1997 ISDC will focus on the increasingly international nature of space exploration and development in several tracks, including:

Economic Opportunities in Space

Solar Power Satellites
Communications Satellites
Resources
Tourism/Recreation
Materials Processing
Remote Sensing

Space Frontier Enabling Technologies

Vehicles
Propulsion
Robotics
Life Support

Space Policy & Legal Issues

Treaties
Regulations
Space Agencies
Law (Contract, Tort, Property)

Advanced Concepts

Nanotechnology
Exotic Propulsion

Exploring The Space Frontier

Robotic Planetary Exploration
Robotic LEO Exploration
Space Station
Human Exploration of the Moon
Human Exploration of Mars

Activism

Fundraising
Communications
Strategic Planning
Organization

Space Education Workshop**NSS Chapters' Assembly Meeting**

Ron Lajoie and other HAL5 members plan on attending the ISDC. If you would like to travel or room with them, or just meet them there, contact Ron at 205-461-3064 (day) or 205-721-1083 (evening) or email: hal5@iquest.com. ☆

(First Word, continued from page 1)

Just as we were about to launch the rocket one of the cutdown squibs which was intended to bring down the launcher and balloon after the mission fired. A moment later another one fired, the third one fired. We had a problem....

We huddled and determined that each cutdown squib had fire in program sequence, just a few orders of magnitude sooner than we had programmed them to. We determined that the problem was

err on the side of caution and take the system back home for further testing. It was decided that there could be no doubt. (Testing once we returned home validated Ed Myszka's contentions.)

Now to make matters clear there was no danger of the rocket firing prematurely. The rocket firing logic did not depend upon timers. It was command uplink controlled. Furthermore those electronics had been system tested extensively with the ATV downlinks running.

all those who wish to follow us lay on our shoulders. If we had taken actions that even appeared to border on the side of irresponsibility the FAA might never grant such flight waivers again. And remember, we had an approval to fly a space mission in an age in which people are afraid of anything bearing a rocket crossing aviation airspace. That is a trust worth guarding.

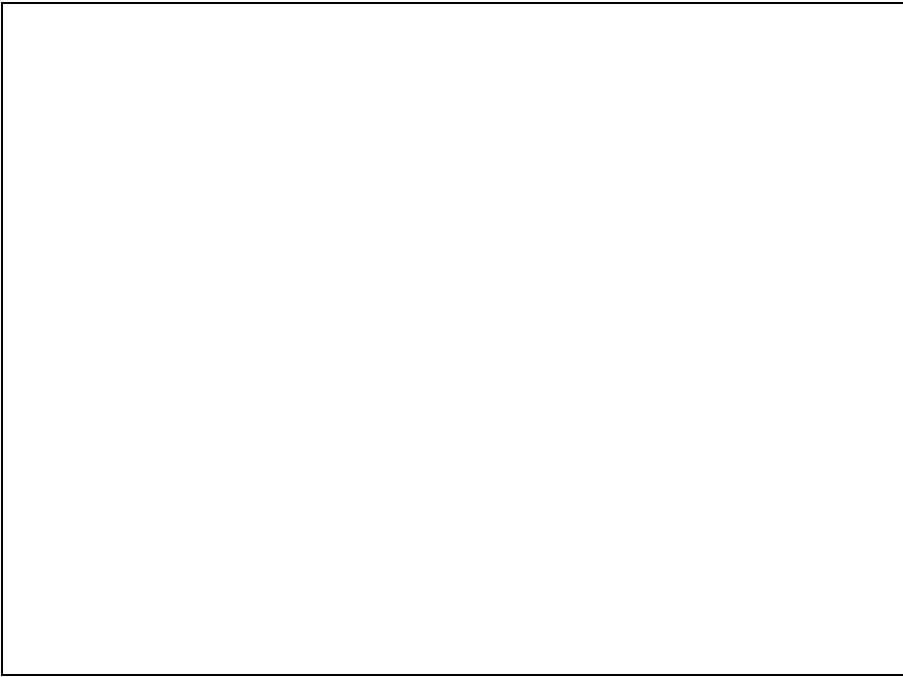
I ask all those that would follow us to swallow their pride and follow our lead when the occasion calls so that we may keep the skies open for amateur space shots. It is not easy to scrub a mission that can fly when you have worked on it for two and a half years, when you've organized all the logistics, when you have to destroy a \$1,200 balloon, vent \$500 worth of helium, and call back a \$300 recovery boat.

I commend the HALO team for staking out a course of responsibility and standing tall when the decisions were tough. These guys made stupendous sacrifices to make that day happen. The HALO team proved its heroic character on the 22nd of March. I must say that I am extremely proud of each one of these members for their courage to make the tough decision, and their drive to continue on beyond that.

Back at it Again — History Beckons!

We are preparing for our next launch attempt. The timers on the cutdowns are gone. Everything now is command uplink. Mil-standard type enclosure boxes and connectors are fully incorporated. Everything is being fully system tested. Now we are ready to make history and launch into space! If the FAA will permit we want to fly on the 3rd on May, else shortly after.

Join with us in this moment of greatness! This time we launch into space! As you can see this is a very exciting time to be in HAL5. We are going to space! We will go again and again! You can be a part of these history breaking missions. Just contact us and we will find a place for you! Ad Astra per HALO! ☆



HALO team members pose with the flight-ready Space Launch 1 rocket. Pictured L-R: Gene Hornbuckle, Tim Pickens, Greg Allison, Steve Mustaikis, Gene Young, Peter Ewing, and Clay Sawyer

caused by interference between the Amateur TV (ATV) transmitters and the timers which controlled the cutdown squibs. As it turned out these timers, which were on the gondola, had not been subjected to an end to end systems test with the rest of the gondola electronics. As our dear friend Murphy would have it they had a shielding problem which made them susceptible to this failure mode.

Our lead electronics man Ed Myszka said he was 99.98 percent sure the interference was the reason for the failure. His logic seemed to be dead on target. But in the end we felt it better to

One other point is worth bearing in mind. There was nothing wrong with the rocket; there was nothing wrong with the balloon. We could have flown that mission on the 22nd of March. The last rocket attempt out of that area (conducted by the South East Community College) did not even have cut-down squibs. The FAA does require redundant systems to bring down an unmanned balloon, however our mission termination point would have been in international waters where FAA regulations cannot strictly be applied.

Technically we could have flown, so why didn't we fly? That day, the burden of

(SpaceViews, continued from page 1)

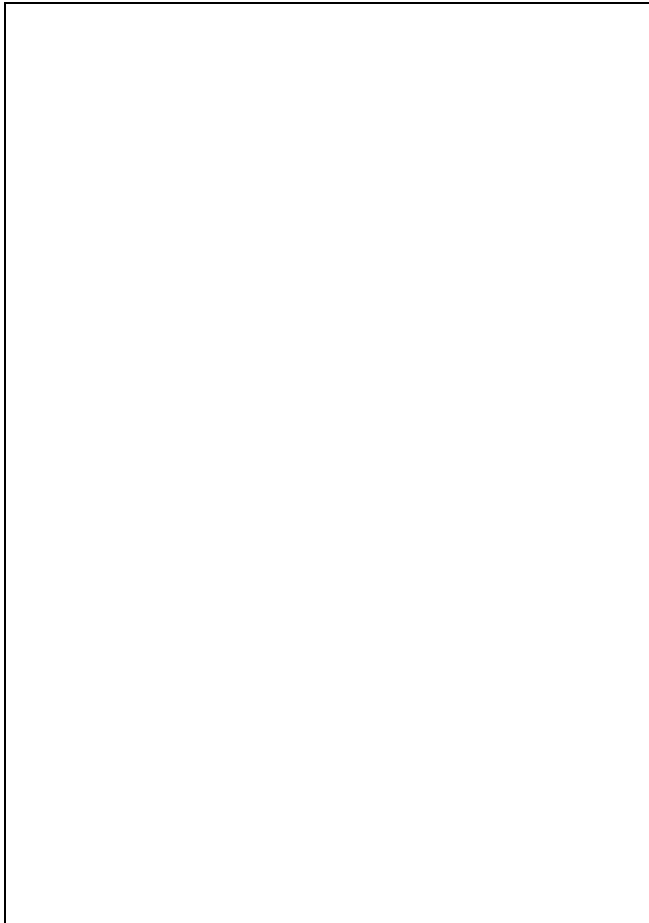
The backup safety system is designed to enable release of the gondola from the balloon in case the balloon drifts off course or the rocket does not fire. (The primary means to release the gondola is for the rocket to launch right through the balloon.) Once released, the gondola would fall and pull on two cords. One cord would deploy the gondola parachute. The other cord would pull open a "tear-out panel" on one side of the balloon, which would allow helium to escape and the balloon to float back to the earth.

The gondola release system is composed of two "cut-down squibs" attached to ropes on either side of the gondola. The cut-down squibs are fired in a pre-programmed sequence triggered either by a coded uplink command or by the backup timer. Despite the timer problem, the sequence did proceed as programmed and both cut-down squibs successfully cut through their ropes. A minute later, as programmed, two other cut-down squibs attached to the tear-out panel cord also fired successfully.

The squibs fired at about 7:20 AM. The Project HALO team was slightly behind schedule due to this being their first nighttime operation. The FAA had been called and had agreed to extend the launch window from 6:30 AM to 7:30; but they warned that air traffic would be increasing after that.

The large plastic helium balloon was inflated and ready to carry the rocket and gondola to 90,000 feet. The SL-1 rocket was fueled and ready for its historic mission to become the first amateur rocket, and the first hybrid rocket, to reach space. Winds had increased overnight, however, and were beginning to become breezy, so the launch was scrubbed.

The Huntsville Alabama L5 Society (HAL5), a chapter of the grassroots National Space Society (NSS), has spent the past two years developing and testing components for a "rockoon". A rockoon is a rocket that is launched from a high altitude balloon. The rockoon approach allows a small rocket to obtain a very high altitude because there is little air to slow it down during launch.



Flight-ready 54 K cu.ft.-capacity balloon held in place by "Kjome launcher". Pictured on either end is Larry Scarborough and Peter Ewing.

HAL5 has updated the rockoon concept using 1990's amateur rocketry and electronics technology. HAL5's goal is to make space more affordable for students, amateurs, experimenters, and researchers. The HAL5 program, started in July of 1994, is called Project HALO, for High Altitude Lift-Off.

The HALO rocket utilizes hybrid propulsion, whereby an inert solid fuel is kept safely away from a liquid oxidizer until the rocket is ignited. The solid fuel

used for the HALO rocket is pure asphalt, the same material used on streets and roofs. The liquid oxidizer used for the rocket is nitrous-oxide, the same "laughing gas" used by dentists. After constructing their own rocket motor test facility in early 1995, HAL5 has since performed over 50 static firings of its hybrid rocket motors. HAL5 successfully launched a test hybrid rocket from the ground in Manchester, Tennessee in April of 1996.

Due to limitations of recovery boats, the balloon was to be launched inland, from a farm in Cerro Gordo, North Carolina (about 60 miles west of Wilmington). March winds would have carried the balloon ESE as it rises to 90,000 feet. The command to launch the rocket would be sent only once the balloon is safely over open ocean and the rocket pointed away from land.

Floating in the frigid stratosphere, the balloon would have been brittle enough to "pop" when the HALO rocket safely shoots through it. HAL5 successfully launched a smaller 19,000 cu. ft. capacity plastic balloon from Huntsville, Alabama in September of 1996. HAL5 also has successfully sent six smaller latex rubber balloons to the edge of space, which have carried both rocket test parts, electronics, and student experiments.

The second rockoon attempt has been tentatively scheduled for May, contingent upon resolving the electrical problem and on raising sufficient money. About \$5,000 is needed to cover some remaining expenses for the first attempt and to cover the second. Donations from private individuals are more than welcome and would be very much appreciated. For more information, send E-mail to hal5@iquest.com or visit:

<http://iquest.com/~hal5/HALO/>

HAL5 CALENDAR OF MEETINGS AND EVENTS**March 1997**

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
16 Goddard flies first liquid-fuel rocket, 1926	17	18 Project HALO Tech. Meeting Noon at Ponds	19 HALO Rocket Work Party 6 pm at Tim's	20 HAL5 Executive Comm. Meeting Noon at Ponds	21	22 Project HALO SL-1 Attempt 1 North Carolina
23 Palm Sunday	24	25 Project HALO Tech. Meeting Noon at Ponds	26 No HAL5 Program Night	27 HAL5 Executive Comm. Meeting Noon at Ponds	28 Good Friday	29 Mariner 10, first flyby of Mercury, 1974
30 Easter Sunday	31	Project HALO Main Event — Space Launch 1 First Attempt Launch of the HALO SL-1 hybrid rocket to 50 nmi from on-board a 54,000 cubic foot capacity high-altitude balloon floating at 90,000 feet — launched was scrubbed due to a problem Launch would have been at 7:30 AM on Saturday, March 22, from Cerro Gordo, NC				

April 1997

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		1 Project HALO Tech. Meeting Noon at Ponds	2 HALO Rocket Work Party 6 pm at Tim's	3 HAL5 Executive Comm. Meeting Noon at Ponds	4	5
6	7	8 Project HALO Tech. Meeting Noon at Ponds	9 HALO Rocket Work Party 6 pm at Tim's	10 HAL5 Executive Comm. Meeting Noon at Ponds	11	12 Yuri Gagarin, first person to orbit Earth, 1961
13	14	15 Project HALO Tech. Meeting Noon at Ponds	16 HALO Rocket Work Party 6 pm at Tim's	17 HAL5 Executive Comm. Meeting Noon at Ponds	18	19 AIAA Moon Buggy Race 11a at Rocket Ctr
20	21 Lyrid meteors (thru April 23)	22 Project HALO Tech. Meeting Noon at Ponds	23 HAL5 Meeting with Woodcock 6:30 pm at HATS	24 HAL5 Executive Comm. Meeting Noon at Ponds	25	26
27	28 HALO Final Flight Review 6:30p at HATS	29 Project HALO Tech. Meeting Noon at Ponds	30 HALO Rocket Work Party 6 pm at Tim's	HAL5 General Membership Meeting Meet Gordon Woodcock, Chairman of the HAL5 Board of Advisors, and Executive Vice-President of the NSS 6:30p at HATS Office, 4900 University Square, Ste 29		

May 1997

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Project HALO Main Event — Space Launch 1 Second Attempt Launch of the HALO SL-1 hybrid rocket to 60 nmi from on-board a high-altitude balloon floating at 105,000 feet (pending FAA approval) Launch at 6:30 AM on Saturday, May 3, from Hampstead, NC				1 HAL5 Executive Comm. Meeting Noon at Ponds	2	3 Project HALO SL-1 Attempt 2 North Carolina
4 Eta Aquarid meteors (thru May 6)	5 Alan Shepard, first American in space, 1961	6 Project HALO Tech. Meeting Noon at Ponds	7 HALO Rocket Work Party 6 pm at Tim's	8 HAL5 Executive Comm. Meeting Noon at Ponds	9	10 SL-1 Attempt 2 (alternate date) North Carolina
11	12	13 TABES 1997 & POY awards 9a - 5p at VBCC	14 TABES 1997 and exhibit 9a - 5p at VBCC	15 HAL5 Executive Comm. Meeting Noon at Ponds	16	17

HALO SL-1 E-Mail Messages**Ray Moses, remote HAL5 member**

Congratulations to all of you. Please send me an e-mail telling me all about it on Saturday. The space engineers program is a lot of fun but our rockets don't go nearly so high. Our payloads go a little higher but that's because ESA or the Russians are carrying them. See you next Christmas.

Vance Houston, NASA Marshall

Go for it guys! See ya when you come back.

John Powell, President, JP Aerospace

Good luck and wishing you success for your high altitude rockoon launch!!

Steve Hendrix, KA0DEK

I read with much interest your article online about the launch this weekend. Let me wish you the best of luck and weather!

walta@esprittele.com

Please send information on your "Rockoon". I am on the Board of the Space Frontier Foundation and we are all very interested in your innovative project. Please also let me know how your project is funded. I know an organization that may be able to help in this area !!!

Neal B. Brown, WL7NZ, Alaska

I live in Alaska, and doubt national news will carry this very important event. Please let me know if your rocket was successfully launched today.

Tony Lee, TNT Production

Thank you for the information about the upcoming launch. I would like to do a localized story about it, but I will need some type of video to add to it. Can you send a press kit and any previously shot video ... ASAP to my station, KGET.

Michael P. Fleming, N4BME

I think this is pretty cool...

Dave Stephenson, VE3PYG, Ontario

Please send my best wishes for a successful launch to all the HALO team.

Dave Hirzel, Westercon 52

Does your organization have a schedule for giving seminars or attending conventions? It sounds like your group would be a hit at most Science Fiction conventions. I would live to hear a talk on your progress so far.

Harald Feldmann, The Netherlands

This is great ! Do you have a need for a professional (IBM-PC aware) software programmer (free of charge)? I'd very much like to participate in your projects if possible. Good luck with the launch!

Michael Martin-Smith, Great Britain

I have learned both on the Newsgroups, and in the British Daily Telegraph, of Huntsville Chapter's bid to launch the first payload to 50 miles (space) by rockoon. As an English NSS member, and longtime space enthusiast, I would like to offer you my best wishes for the launch, and wish you all every success!

Tony Hodgson, Houston, Texas

I just read about the HALO project. I'm an engineer ... [and] was part of the team that designed the Conestoga family of vehicles, and the Starfire rocket that became the first commercially-licensed launch in the world! ... I'm supporting you psychologically! Go-Baby!!!

Mark Reiff, a faithful friend, Texas

With all of the spamming of media and space types that I did with Ronnie's PR, you guys should get a lot of attention and support. I was really tempted to rent a car here in DC and drive down to North Carolina and watch you guys launch, but I have to get back to San Diego tomorrow night. Hopefully I will see you guys in the news.

Ned Wharton, NPR Weekend Edition

Greg, ... Sorry the mission had to be scrubbed. Please keep us posted about any plans to try another launch.

Amy Houts, researcher, Inside Space

I enjoyed meeting everyone and really look forward to witnessing the HALO launch! HAL5 is a true inspiration to me! Thanks again! ☆

Proud of Space Launch Attempt

(a USENET posting by member Ron Creel)

Yes, I'm very proud of the HALO Space Launch Attempt which ... HAL5 made on March 22 in North Carolina.

Everything was going great – the 54,000 cubic foot [capacity] balloon launch platform (largest balloon we had inflated thus far) was ready. The FAA had given us an extension on our balloon launch window, rocket systems were ready, and the wind was even cooperating.

Then the unexpected jumped up to squelch our efforts. Several squib devices were erroneously activated by their connected timer. The timer was evidently miscued by stray signals from the color TV camera onboard the balloon gondola containing the HALO rocket. This removed our redundancy for assuring that the balloon could ultimately be made safe (i.e. cut down) after the planned rocket ignition over the Atlantic Ocean.

Therefore, for safety reasons, the balloon launch and subsequent HALO rocket launch were postponed. Since we had nearly exhausted our supply of helium and the predictions of wind conditions for the next day were not favorable, (and the all-volunteer team had jobs to go to on Monday) a decision was ultimately made to come back for another launch attempt at another time.

In the face of this extreme disappointment, I am very proud of all of the HALO team. A great amount of time, effort, and funds have been expended by a very dedicated team of "amateurs" to get the HALO Space Launch attempt to this point of progress. Yes, we are very disappointed at getting so close to our goal and being slapped in the face. But we are not discouraged. We are determined; we'll be back! ☆

NSS Campaign for the Future

(by Ronnie Lajoie, NSS member)

If you are not yet a member of the National Space Society, NOW is the time to join. NSS has announced a "Campaign for the Future" membership drive. Until Thursday, May 22 (the start of the 1997 ISDC), NSS has lowered the cost of a one-year NSS membership from \$35 to only \$25. That is \$5 below what HAL5 has offered in the past — including the last HAL5 newsletter.

For those who have been considering making a donation to HAL5, your **first** membership (not a renewal) to NSS also contributes to HAL5. All but \$15 of your membership dues goes to NSS, **the rest stays with HAL5**. Essentially, you are joining the NSS for only \$15 — which is just enough to cover the cost of sending you *Ad Astra*, the colorful and informative magazine of the NSS.

But you get more than a magazine with your NSS membership. You also get discounts to NSS-sponsored events and NSS-produced merchandise, as shown in the brochure you received with the last HAL5 newsletter.

Most importantly, the benefits of your NSS membership are those you get in the future — when space travel is made affordable to you and your children. NSS is the largest grass-roots space advocacy organization, with over 25,000 members — however, this pales in comparison to some environment groups who boasts memberships over 100,000.

Simply put, NSS needs more members. **WE NEED YOUR MEMBERSHIP** — and we need it NOW! There is LOT happening in the space movement beyond the little you see in the HAL5 newsletter. Yes, HAL5 is doing **GOOD** deeds, and because of our association with the NSS, the media and the rest of the world is taking notice (see page 6).

If you would like to join NSS, come to the HAL5 meeting on April 23. Or call me at 461-3064 (day) or 721-1083 (night), or send an E-mail message to: "hal5@iquest.com". Ad Astra! ☆

SPACE NEWS

New Images Hint at Wet and Wild History for Europa

(NASA Press Release 97-66, April 9, 1997)

Chunky ice rafts and relatively smooth, crater-free patches on the surface of Jupiter's frozen moon Europa suggest a younger, thinner icy surface than previously believed, according to new images from the Galileo spacecraft.

The images were captured during Galileo's closest flyby of Europa on February 20, when the spacecraft came within 363 miles of the Jovian moon. These features, which lend credence to the idea of hidden, subsurface oceans, also are stirring up controversy among scientists who disagree about the age of Europa's surface.

Dr. Ronald Greeley, an Arizona State University geologist, said the ice rafts reveal that Europa had, and may still have, a very thin ice crust covering either liquid water or slush. "We're intrigued by these blocks of ice, similar to those seen on Earth's polar seas during springtime thaws," Dr. Greeley said. "The size and geometry of these features lead us to believe there was a thin icy layer covering water or slushy ice, and that some motion caused these crustal plates to break up."

"These rafts appear to be floating and may, in fact, be comparable to icebergs here on Earth," said Dr. Michael Carr, a geologist with the U.S. Geological Survey. "The puzzle is what causes the rafts to rotate. The implication is that they are being churned by convection."

The new images of Europa's surface also have sparked a lively debate among scientists. Dr. Clark Chapman is among those who believe the smoother regions with few craters indicate Europa's surface is much younger than previously believed. In essence, Chapman, a planetary scientist at the Southwest Research Institute, believes the fewer the craters, the younger the region. Clark based his estimate on current knowledge about cratering rates, or the rate at which

astronomical bodies are bombarded and scarred by hits from comets and asteroids.

"We're probably seeing areas a few million years old or less, which is about as young as we can measure on any planetary surface besides Earth," said Chapman. "Although we can't pinpoint exactly how many impacts occurred in a given period of time, these areas of Europa have so few craters that we have to think of its surface as young." Chapman added, "Europa's extraordinary surface geology indicates an extreme youthfulness -- a very alive world in a state of flux."

However, Carr sees things differently. He puts Europa's surface age at closer to one billion years old. "There are just too many unknowns," Carr said. "Europa's relatively smooth regions are most likely caused by a different cratering rate for Jupiter and Earth. For example, we believe that both Earth's moon and the Jovian moon, Ganymede, have huge craters that are 3.8 billion years old. But when we compare the number of smaller craters superimposed on these large ones, Ganymede has far fewer than Earth's moon. This means the cratering rate at Jupiter is less than the that in the Earth-moon system."

Scientists hope to find answers to some of the questions surrounding Europa and its possible oceans as the Galileo spacecraft continues its journey through the Jovian system. "We want to look for evidence of current activity on Europa, possibly some erupting geysers," Greeley said. "We also want to know whether Europa's surface has changed since the Voyager spacecraft flyby in 1979, or even during the time of the Galileo flybys."

The craft will return for another Europa flyby on Nov. 6, 1997, the final encounter of Galileo's primary mission. However, eight more Europa flybys are planned as part of Galileo's two-year extended mission, which also will include encounters with two other Jovian moons, Callisto and Io. ☆

HAL5 Membership Report

The following is a list of the current paid membership of HAL5, which includes 27 renewals and 3 new members, for a total of 30. Last year's membership peaked at 65, which was a new record for the society. Since all memberships expired at the end of last year, more renewals are expected to come in. Also shown are 3 new subscribers to our newsletter. Welcome to all our new and renewed members and subscribers!

- William Adams, Jr. (R)
- Gregory Allison (President)
- John Barnum (R)
- Lorraine Barnum (R)
- Bill Brown (R)
- Michael Coffey (N)
- Thomas Craig (R)
- Bentley Frink (P)
- Beth Furgerson (R)
- Ernest Gilmer, Jr. (R)
- Melanie Hazelrig (R, D)
- James Hopkins (R)
- Gene Hornbuckle (R)
- Bryan Jones (R)
- Nancy Lajoie (R)
- Ronnie Lajoie (Editor, D)
- Larry Larsen (R)
- Randall McCollum (R)
- Timothy McKechnie (R)
- J. Boise Pearson (R)
- Chris Pickens (R)
- Herman Pickens (R)
- Timothy Pickens (R, D)
- Larry Scarborough (VP, D)
- Chuck Schlemm (R, D)
- David Smitherman (R, D)
- Lyle Taylor (N)
- George Von Pragenau (R, D)
- Mark Wells (R)
- Alfred Wright (Treasurer)
- Gene Young (N)

- Larry Kos (S)
- Huntsville Public Library (S)
- Faulkner University (S)

- (N) - New Member
- (R) - Renewed Member
- (P) - Past Member
- (S) - Newsletter Subscriber
- (D) - Included a Donation

HAL5 welcomes back its previous members and also past member Ben Frink. Ben is from Shallotte, North Carolina, and has been of tremendous help in finding locations for HAL5 to launch our first HALO rockoon mission.

HAL5 also welcomes its new members, including Michael Coffey, Lyle Taylor, and Gene Young. Gene Young is a retired NASA engineer, and has already demonstrated that "can do" spirit by providing both electronics and logistical support to Project HALO. He also brings a lot of practical knowledge to the HALO team. Welcome aboard!

HAL5 gratefully thanks the many members who included a donation with their membership. Ronnie Lajoie joined as a Supporter member, and included a donation to Project HALO. Chuck Schlemm and David Smitherman joined as Contributor members. Melanie Hazelrig, Tim Pickens, Lyle Taylor, and Larry Scarborough gave generously to Project HALO. Thank you very much!

School Subscription Donations

The newsletter subscription to the Huntsville Public Library was donated by member Ronnie Lajoie. The one to Faulkner University was donated by member George von Pragenau. Thank you both for your generous donations!

The School Subscription Program is still active. For those of you who would like to donate a subscription to your favorite school, please send in your check with a copy of the form you received with your January newsletter. If you cannot find the form, another can be provided. Call Ron Lajoie at 721-1083 for details. ☆

NOW is a Good Time to Donate

If you have considered making a donation to HAL5 or its Project HALO — NOW is the time. The scrub of our first attempt to launch the SL-1 rockoon mission pretty well drained our HALO bank account. Many HALO team members have stepped in and have made major donations of cash — in addition to their already major donations of time.

The following is a *partial* list of people who have made recent donations to HAL5 or to Project HALO (beyond anything they might have included with their membership, per previous article):

- Gregory Allison HAL5
- Matt Beland HAL5
- Bill Brown HAL5
- Melanie Hazelrig HAL5
- James Hopkins HAL5
- Amy Houts *Inside Space*
- Ronnie Lajoie HAL5
- Timothy Pickens HAL5
- Clay Sawyer HAL5
- Alfred Wright HAL5
- Clear Lake NSS Chapter NSS
- (and others, unknown at press time)

Thank you all for making these donations! But we need MORE! If you have yet to donate, please do so now, whatever you can afford. Ad Astra! ☆

Special Announcement

HAL5 Membership Meeting

Meet Advisor Gordon Woodcock
Wednesday, April 23, 6:30p at the
HATS Office, Univ. Square, Ste. 29

Huntsville Alabama L5 Society
 1019-A Old Monrovia Rd, Suite 168
 Huntsville, AL 35806
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