Horizons

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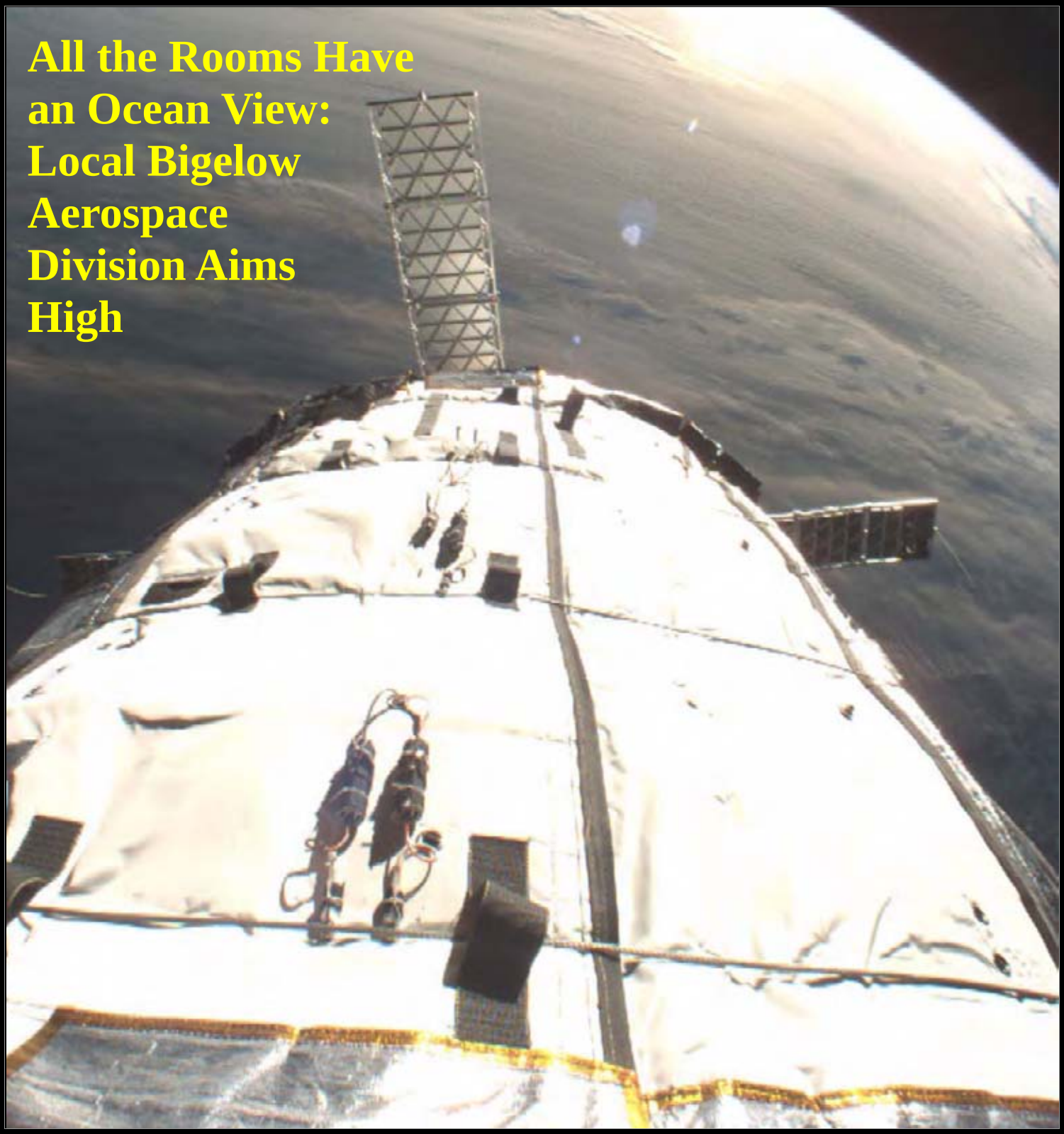

All the Rooms Have an Ocean View: Local Bigelow Aerospace Division Aims High

July/August 2006

AIAA HOUSTON
American Institute of Aeronautics and Astronautics

Horizons is a bi-monthly publication of the Houston section of the American Institute of Aeronautics and Astronautics.

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2005 2006

Cover: Genesis I. Image courtesy Bigelow Aerospace.

Galveston Bay sunrise image at top by Cheryl Empey, Seabrook.

From the Editor Communicating Visions

JON S. BERNDT

A **column by Editor-in-Chief Elaine Camhi** in last month's issue of Aerospace America begged an answer:

> *Americans are willing to face great risks, if the cause is just or the dream is rich. But so far, we have failed to make that case. This is absolutely the time for soaring rhetoric, replete with a true articulation of what we hope to achieve, first by returning to the Moon, and then by taking that great leap into the unknown and venturing on to Mars. Make us believe that the vision is real, that it is worth the chances that will be taken, and the costs it will incur.*
>
> *Tell us why.*

It took Christopher Columbus several years to obtain backing for his *Vision* – his "Enterprise of the Indies" idea, which Columbus developed during the decade prior to his 1492 expedition. He was met with some skepticism, and sometimes other state matters distracted his audience. His final attempt to attain backing was eventually accepted through the influence of friends and others. What kind of reasoning did Columbus use to convince his backers to fund the Enterprise? There was at least the *hope* of a payoff. But nothing was known about what would be encountered by sailing directly west.

We have a much clearer picture of what is physically out "west", today, having been to the Moon already, and having studied several planets remotely. What is perhaps not so clear to some are the payoffs. In the current issue (October 2006) of Aerospace America there is **an article by retired astronaut Tom Jones, "Space Exploration's Biggest Challenge: Explaining Why**". His article presents some good reasons why we should explore space, and also exhorts NASA to present its mission to the public more effectively.

That got me thinking. How can NASA communicate with the public more effectively – not necessarily just regarding the Vision, but overall? There may be an as-yet-untried way for NASA to help get the picture across. During the years from about 1930 to 1960, news items were spliced together into short "newsreels" and shown at the local theatre before a feature film. Imagine the ET-cam footage, or a selection of Saturn or Mars images presented on the big screen prior to a movie.

To be fair, the NASA Select television channel already broadcasts continuously. The news networks carry manned launches live. There are educational programs, outreaches, etc. that NASA is involved with in several ways. Frankly, NASA hosts perhaps the single largest, publicly accessible, repository of knowledge that I am aware of via their web presence. Having become very familiar with a wide range of NASA web features over the past few years, I have been consistently impressed. Many of the web sites featured in our "Staying Informed" column refer to NASA web sites where you certainly might learn something – contrary to what one popular space-related web site suggests.

In fact, the question of "Why" is explicitly addressed at the **NASA history web site** in a series of articles, "**Why We Explore**". A related topic is covered in an excellent publication, "**Risk and Exploration: Earth, Sea, and the Stars**". Neil Armstrong explains why we explore in a video introduction at the **Vision for Space Exploration web site**. NASA also uses other venues to interact with the public. The Exploration Systems Mission Directorate (ESMD) has a 72-foot tractor-trailer that houses a Vision for Space Exploration exhibit. The exhibit can be requested from organizations that **submit a request**. NASA ESMD has a calendar of events that show when and where they will have a presence. At the recent AIAA Space 2006 conference Ames Research Center director **Pete Worden gave a captivating keynote speech**, some of which was

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During the years from about 1930 to 1960, news items were spliced together into short "newsreels" and shown at the local theatre before a feature film. Imagine the ET-cam footage, or a selection of Saturn or Mars images presented on the big screen prior to a movie.

Chair's Corner

JAYANT RAMAKRISHNAN, AIAA HOUSTON CHAIR

Happy New Section Year 2006-2007! Each July the Houston Section kicks off a new administrative year, and this one promises to offer a lot of content and variety as a service to our membership and community. We have several new faces in the ranks of our officers this year. We started the year with three of our section leaders attending the Regional Leadership Conference (RLC) in Sacramento, CA. The next four months will be exciting and stimulating with a national conference in December on Space Exploration at the George R. Brown Convention Center in Houston.

At the RLC, Houston Section was showcased and I had the privilege of representing the section in a talk on "Going for Gold – Lessons Learned from the AIAA Houston Section". Past Chair Steve King and his team are to be congratulated for an excellent 2005-2006 year. We will build on Steve's successes from last year and we are off to a great start. As I write this, we have completed our first Lunch and Learn program on "Plug & Play Satellites" and have confirmed our first dinner meeting for September 6, 2006. JSC Center Director Michael Coats will address the section on the "State of the Johnson Space Center". We also have a workshop on MATLAB and Satellite Tool Kit (STK) planned for November 2006.

Our technical committees will be hosting a diverse selection of lunch n' learns and we are working to secure dinner meeting speakers to discuss topics ranging from perspectives in airplane design to exploring Mars. All of this will be complemented by outings, socials, tours, our Annual Technical Symposium, and much more. Stay tuned in for details.

Making all this possible comes from the teamwork and volunteer time of members serving on the Section's Executive Council and its committees. I have often heard **TEAM** as being an acronym for **T**ogether **E**veryone **A**chieves **M**ore. The Houston Section is fortunate to have teammates that give of their time and can be counted upon in turning our plans into reality. We are always looking to add to our team and get more members involved. Whether your interest is in technical exchange, professional development, community outreach, public policy or networking, there is a place for you. Ever wonder what's happening outside of your local work organization? Getting involved can open up a whole new world of interaction with others regardless if they are competitors, executives, elected officials, educators or students. In addition, you might not be aware that some employers will cover all or part of your AIAA membership based on your level of involvement.

This year is a great year to get involved with the local section with all the local and national events that are planned around the strides in space exploration. As we await NASA's direction on the COTS and CEV program and look forward to the CLV program, it is apparent that now is the time to be in Aerospace and Houston. May your association with AIAA serve you well as we seek to explore.

Let us continue the journey…

Highlights in This Issue

- The Houston AIAA Section has once again won recognition from National AIAA. See page 23 for a full list of awards.
- The next dinner lecture will be given on October 16, "Exploring Mars: The Journey of the Mars Exploration Rovers". See page 16 for details.
- The AIAA Aerospace Sciences Meeting will be held in Reno in January. Local authors have been very busy and a list of papers to be presented by local authors is presented beginning on page 20.
- The slower summer pace has given way to an increased number of lunch and learns and dinner lectures. The activity calendar is located on page 16.
- Reminder: If you have any comments for publication or would like to author an article for Horizons, contact the editor at editor@aiaa-houston.org.

Bigelow Aerospace *Genesis I* Takes Flight

GARY JONES, BIGELOW AEROSPACE, HOUSTON DIVISION

Feature Article

Bigelow Aerospace is the leading private company for space habitat destinations, and is the only private company with a spacecraft currently in orbit, the Genesis I (see cover image).

A Small Step for a Space Program, a Giant Leap for Private Space Companies

Bigelow Aerospace believes the future is bright for the human spaceflight commercial-aerospace industry. To this end, Mr. Robert T. Bigelow and his company are investing themselves in developing an alternative to the traditional government-led approach. Realizing that the government has proven that human space travel is possible, Mr. Bigelow has taken the proverbial baton and decided to make the last frontier accessible to a larger community. Indeed, there is a tremendous amount of support for the commercial industry to begin providing safe, cost-efficient and timely alternatives to the current government-led solutions.

Previously, conversations about opening up the commercial human spaceflight arena would end with statements like, "That's a lot easier said than done…," "It is just too expensive" and many other no-start comments. The Bigelow Aerospace response to those statements is simple and straight to the point: "Believe." You will witness that type of philosophy in every corner of Bigelow Aerospace — from hardware design to vendor relationships. We believe simplicity will reduce cost, increase safety and provide efficiency throughout the life of our spacecraft.

Launch of Genesis I Makes Seers Out of Believers

Being a part of this burgeoning industry is truly historic and you can bet that every Bigelow Aerospace employee "believes." We have recently added substance to that belief with the successful launch of Genesis I, our first orbital vehicle. The core mission goals have already been met and the spacecraft's performance has exceeded our expectations thus far. The success goes far beyond what one can see in the data coming down from the vehicle alone.

To get to this point, the company has gone through many project cycles that were aimed at finding cost-efficient solutions to our design requirements. We have been successful by applying simple, low-cost design solutions to many of the complex problems of space travel. Our job is not done by any means, but we continue to make great strides toward the company goal of providing commercially supplied destinations in space.

Below: **Genesis I mission control.**

Facilities in Las Vegas, Houston, Washington Lead Bigelow's Mission

To meet the challenges of opening the door of access to space, Bigelow Aerospace has established three facilities to handle the work. Our corporate headquarters and main manufacturing facilities are located in Las Vegas, Nev. Here, you will find a high-quality manufacturing and production facility where primary vehicle components are manufactured, and the actual integration, assembly, and testing of the flight vehicles are performed.

The company's manufacturing facility is designed to go straight into production runs of future vehicles. As we move toward larger vehicles, we are also establishing the necessary infrastructure to fully process human-rated flight hardware. Also located at the same facility in Las Vegas is a recently completed, state-of-the-art Mission Control Center. The center has been in operation 24/7 since just prior to the launch of Genesis I. Mr. Bigelow put many personal touches into this center and the spirit of the mission truly comes alive during operations.

Bigelow Aerospace has also established a research and development facility in Houston, Texas. This facility is focused on provid-

(Continued on page 6)

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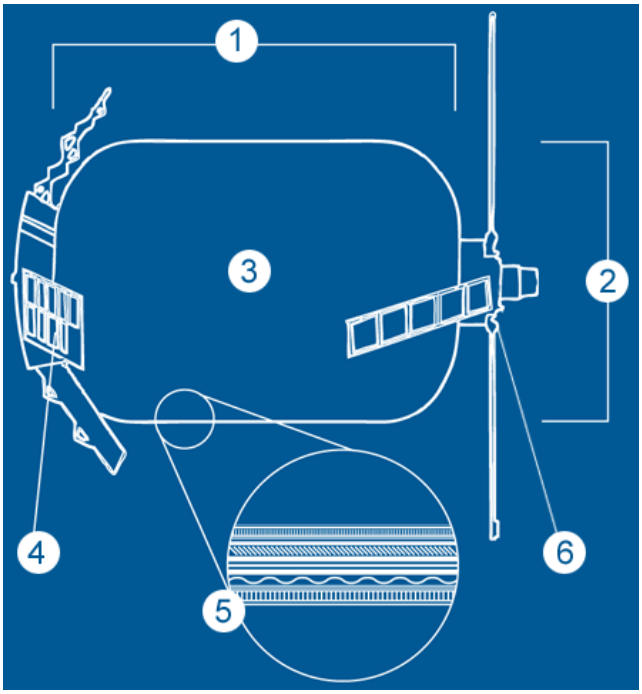


Above left, a Russian Dnepr rocket lofts Genesis I. Above right, a diagram of the Genesis I module. Below, Bigelow's Genesis I mission control room.

(Bigelow, Continued from page 5)
ing front-end design, development, testing, and assembly of flight hardware components and systems. The R&D facility also facilitates the establishment of working relationships with NASA field centers, such as the Johnson Space Center. Tapping into NASA's significant engineering expertise and knowledge-base helps our company — and the developing commercial aerospace community — to meet our goal of opening up the space frontier to a wider global audience.

Bigelow Aerospace also has a strong legal team based in Washington, D.C. This team has been critical in establishing critical relationships with the U.S. and other governments, and executing the myriad of procedural and legal processes that must be performed.

Building Inspiration, Motivation and the Future

DONALD C. BARKER, MAXD, INC.

"*The mediocre teacher tells. The good teacher explains. The superior teacher demonstrates. The great teacher inspires."* — William A. Ward

Space exploration, and more importantly human space exploration has a unique and vast ability to positively engage the imagination, and is arguably humanities greatest feat of control over the natural world next to the harnessing of primordial fire. Rocketing skyward and breaking earthly bonds humans now live and work just outside Earth's thin, fragile life-protecting atmospheric vial. Just short of half a century, and as a direct result of space exploration, the boundaries of human experience and understanding have been expanded more rapidly than throughout all recorded history.

This author, as with many other space and aviation enthusiasts, was and is today inspired by ongoing feats and accomplishments in space exploration. In wanting to continue to engender others with a similar passion, a concept for an edifice based on inspiration and motivation is presented herein as a means of representing, preserving and utilizing the Johnson Space Center (JSC) Rocket Park to a greater extent than currently exists or presumably has been planed.

The purpose of this design treatise is simple – to inspire. All too often we dispassionately lumber through our daily affairs having never been enthralled or reminded of our great space heritage; and through such indifference put in motion a fall into silence the importance and utility of such an inspiring history. It is time we reconsider this path of indifference and direct efforts towards the creation of edifices and monuments of lasting importance.

In working for the space program for over a decade, this author has had the fortune to visit a country, Russia, which throughout childhood was considered an adversary and who now is our partner in the exploration of space. Consequently, many friends have been made during these travels. The experience has proved intriguing and has instilled respect for how this deep-rooted culture expresses, in many forms, its pride in duty and deed. One of the most prominent expressions is through the creation of monuments and statues intended to last generations. The best example being the 42 year old, 300 foot tall monument To the Conquerors of Space in Moscow (see Figure 1).

Additionally, one has only to visit the myriad of historical human creations throughout the world. The Mediterranean itself is circumscribed by an overabundance of enduring wonders that exemplify what our species is capable of constructing (e.g., the Pantheon and Coliseum of Rome, Giza in Egypt, Sophia Hagia in Istanbul, and the plethora of medieval cathedrals and castles). Some created for the greater good and some by the avarice of the powerful, yet all long-standing, engaging and inspiring in some fashion.

Upon return to the United States, on several occasions, a feeling of disillusion and sadness encroached when searching for similar memorials and artifacts of homage. Baring a few examples and specific locations (e.g., battlefields or Capitals), our youthful culture presents itself as one that only produces monuments to commerce, rapid self-indulgence and gratification, with little or no sense of permanence or direction. Our space program, youthful as it is, is endowed with a special and unique ability to fill this perceived gap and provide a sense of identity, inspiration, awe, gratification and goodness (if permitted and presented properly).

Lasting architecture and human achievements both have in common a basic premise, the need for a strong, well-assembled foundation. Much like the mortar in great buildings, inspiration and wonder cull motivation and impetus and lay the foundations for humans to pursue ever-greater undertakings. Future generations draw on historical accomplishments, especially when they are prominently displayed and remind us of our capability to grow and attain greater feats than previously thought.

The Saturn V at JSC has recently undergone an intensive restoration

(Continued on page 8)

Figure 1 (above) To the Conquerors of Space, Moscow, ca. 1964

Figure 2 (below) High aerial view of "Saturn Center" at JSC.

Figure 3 Saturn Center from Saturn Lane.

Figure 4 Aerial view of Saturn Center

(Continued from page 7)
in order to preserve this legacy for future generations; yet, it is enshrouded in a bleak, uninspiring, 10-year temporary protective structure. As far as this author can surmise and given the continued construction of accompanying facilities and amenities, little or nothing additional has been considered nor will anything be done to implement a long-term plan to present, in a more befitting manner, this or any other historical article (e.g., a retired Space Shuttle) beyond the current structure. The 'grey-box' will be another temporary-permanent JSC facility.

Figure 5 Saturn Center at JSC Rocket Park.

In order to bypass this burocratic fate, a concept entitled the Saturn Center is being unfurled herein. Figures 2 through 5 below show the design concept in place, whereas Figures 6 through 8 provide more detailed examinations. This design provides an example of an integrated edifice for housing the Saturn V and future space flight memorabilia that is intended to protect, encourage and inspire. This 21st century conceptual facility explicitly promotes the great scale of the Saturn V and preserves the ability to view its immensity and grandeur from both the ground and the air (a perspective few regularly consider). Adjacent structures provide room for expansion and the display of other space flight articles including one of the, to-be retired, Space Shuttles. Associated structures provide for an inspirational setting as well as a functional two-story (28,000 ft^2) conference, auditorium and banquet facility. Special emphasis has been placed on the functional and structural design in order to enable it to long survive the hot-humid and hurricane prone Houston environment. Concept requirements purport self-sufficiency by including energy efficient materials, novel environmental controls and on-site solar power production.

Funding for the development of such a facility could be arranged through a number of non-traditional government sources including endowments, charitable trusts or even private commercial sponsorships similar those received by athletic stadiums and facilities. It is believed that the cost of this or similar facilities which protect and promote our space heritage greatly outweigh the short term monetary investment by providing an icon of inspiration and motivation for future generations.

Ultimately, such a venue would continue to support the current tourist operations conducted by the nearby Space Center Houston while further having the ability to attract the interest of a variety of scientific conferences and NASA functions. In some cases possibly even recovering conferences such as the Lunar and Planetary Science Conference, lost locally due to the changes in JSC security and facilities over the last few years.

Only by providing locations, structures and monuments that preserve, edify and bear witness to the magnitude of our achievements are we able to inspire and show future generations that the long trodden labors required to follow similar paths are truly worthwhile. It is the intent of this author to point out a displaced piece of our JSC space culture and to rouse those space enthusiasts and dreamers to consider and hopefully be moved to act in a forward thinking manner and provide a long lasting and inspirational pinnacle to space exploration.

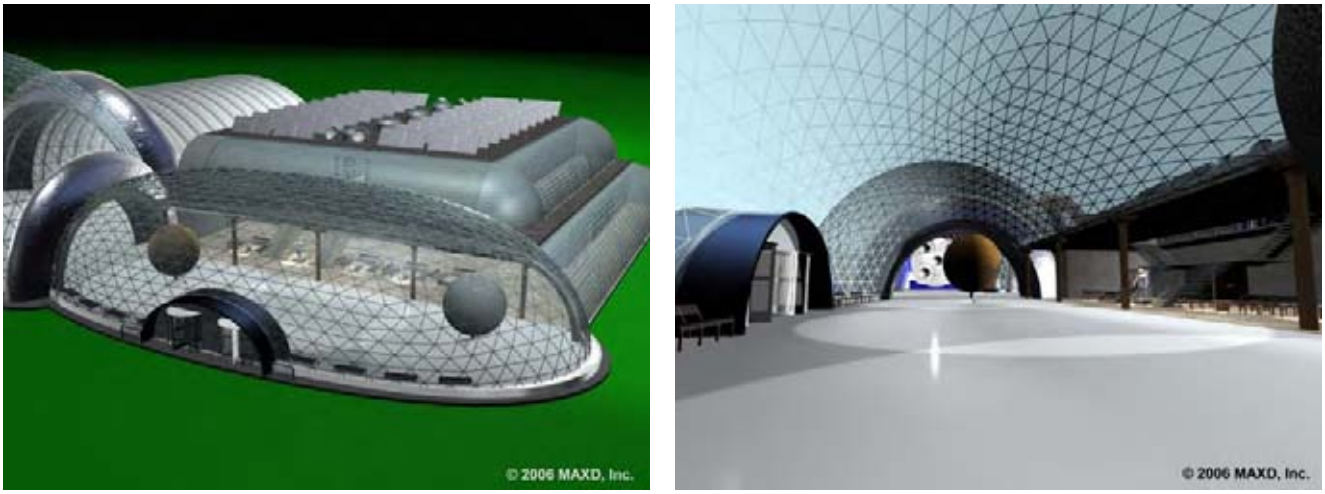


Figure 6 Saturn Center Conference Facility, exterior (left) and interior (right).

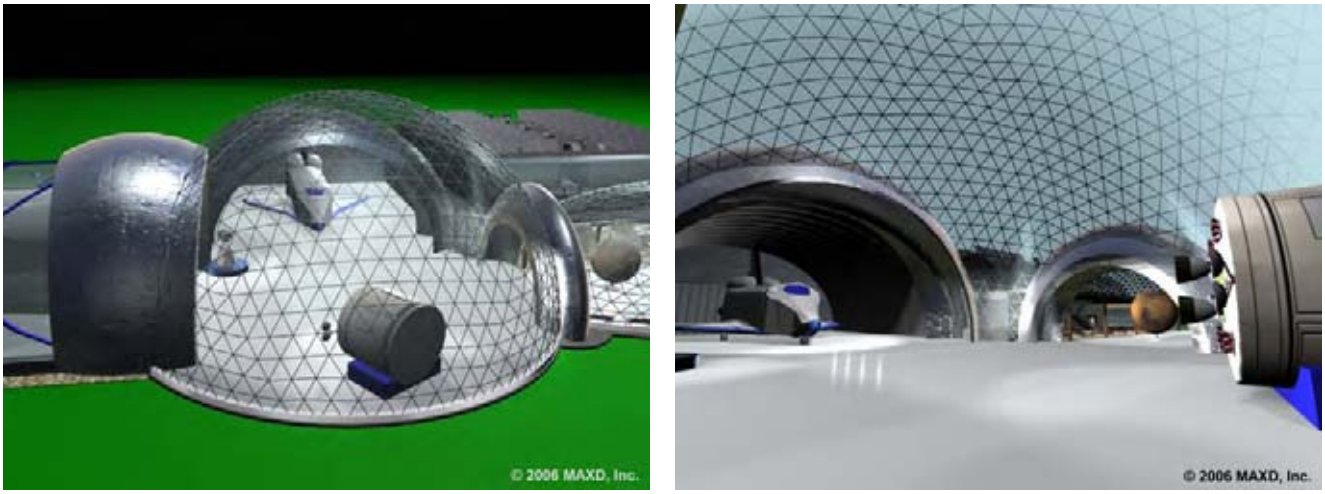


Figure 7 Saturn Center Central Dome, exterior (left) and interior (right).

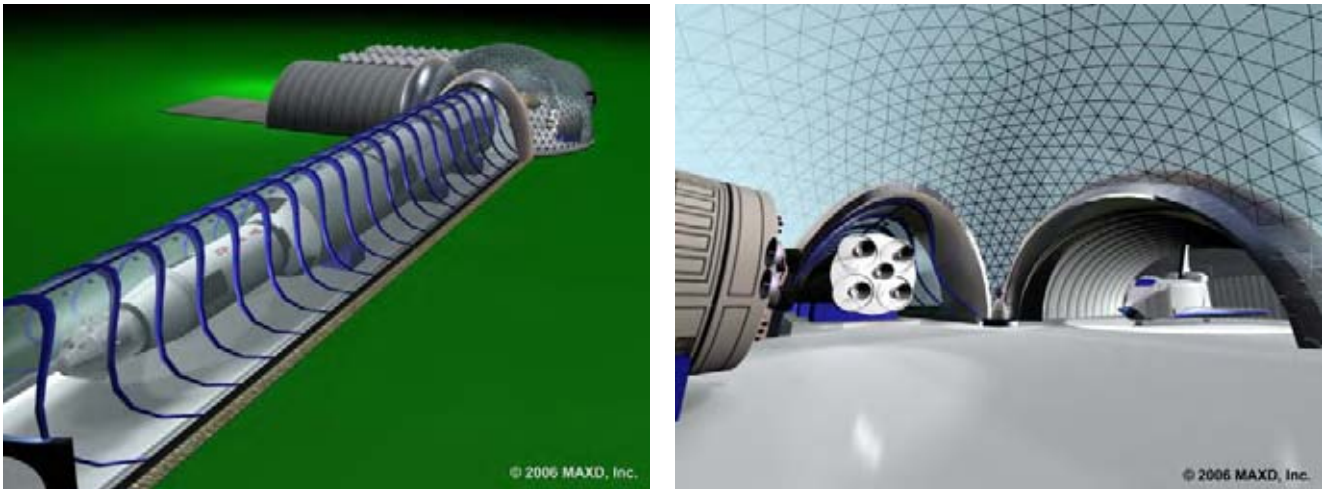


Figure 8 Saturn Center *Saturn Hall,* exterior (left) and interior (right).

Lunch and Learn Summary Report

Emerging Software Tools for Satellite Design

DOUGLAS YAZELL, CHAIR-ELECT, AIAA ASSOCIATE FELLOW

Dr. James D. Turner delivered this lunch-and-learn to an audience of about 20 engineers on Friday, September 22, 2006 at NASA/JSC in building 16, rooms 111 and 113. The sponsor for this event was the AIAA Houston Section Guidance, Navigation and Control (GN&C) Technical Committee. I heard Dr. Turner give a similar presentation at the recent AIAA conference in Keystone, Colorado, and he later accepted my invitation to speak at this lunch-and-learn. The publicity flier contained the following description of the talk and this short biography of our speaker:

"Design of advanced engineering concepts demands an understanding of the system performance requirements as well as powerful tools for iterating notional system concepts. The availability of physics-based analysis tools for modeling and simulation is a key step in ensuring effective optimized design iterations. Two emerging software technology development efforts are presented that hold significant promise for accelerating engineering design, optimization, and control development for complex systems.

"The first software package provides a comprehensive library for analyzing quaternion calculations for engineering applications. Capabilities are presented for all standard library functions, as well as linear-, quadratic-, and matrix-equations, including inversions, and eigensolutions. The second S/W package provides Fortran 90/95 object-oriented operator-overloaded capabilities for automatically generating first through fourth order mixed sets of partial derivatives. The analyst only codes familiar math models; the S/W builds all of the partial derivatives without user intervention. Examples are presented for equation of motion generation, and generalized Newton-based optimization algorithms.

"Dr. Turner is the Director of Operations for the Center for Autonomous Space Systems (CASS) at TAMU. He is responsible for managing a research program for AFRL that is concerned with all technologies related to robotics for space-based assembly as well as repair of satellites."

Dr. Turner generously agreed to publish his presentation on our technical committee's web page at http://www.aiaa-houston.org/tc/gnc/.

Alexander Hamilton, the "discoverer" of quaternions.

From his presentation, I will quote a few things related to his quaternion toolbox and quaternion history. Alexander Hamilton (1805-1865) "discovered" quaternions on October 16, 1843, while walking to a meeting with the Irish Academy. He recorded this by carving a short equation on the Brougham (pronounced "broom") Bridge in Dublin. His goal was to generalize complex analysis to 3 dimensions. That carving is no longer visible, but a plaque commemorates that event and repeats the equation. Quaternion applications include aerospace (control and attitude determination, robotics, and orbital mechanics), computer science (graphics, 3-dimensional rotations, and signal processing) and physics (electromagnetics, fluid mechanics, quantum mechanics, and relativistic mechanics). The well-known rules for taking the product of two quaternions can be stated in one form that includes vector dot and cross products, but Hamilton originally derived the product rule in component form. Willard Gibbs introduced the dot and cross products in 1881, almost 40 years after Hamilton's original discovery. Hamilton's discovery identified the need for including this cross product.

My coworkers have experience using quaternions on their space shuttle work, and a related NASA/JSC Quaternions Supplemental Workbook (QUAT-S 2102) was published in November of 1984. My experience with Space Station Freedom and the International Space Station (ISS) includes working with the space station quaternions, using ISS standards defined in a two-page Appendix for a 1997 GN&C Technical Description Document, which include a "post-multiply convention" for vector coordinate transformation.

The AIAA Houston Section GN&C Technical Committee's members and contact information are listed on our web page at http://www.aiaa-houston.org/tc/gnc/, along with our charter, goals, speaker presentations, etc., and we are always looking for more qualified professional and student members.

The 1940 Air Terminal Museum at Hobby Airport

Field Trip

DOUGLAS YAZELL, CHAIR-ELECT, AIAA ASSOCIATE FELLOW

On a recent Saturday I took Airport Blvd from I-45 past Hobby airport, turned south on Telephone Road, took the second left turn and traveled two blocks, and turned right to go another block or two to 8325 Travelair Road, the home of the 1940 Air Terminal Museum. An owl flew east over Travelair Road and into an empty, run-down airplane hangar. My best guess at its identity is from a photo found at http://wildtexas.com/parks/galvisp.php, a beautiful barn owl. Maybe it is the owl that was displaced from the Saturn V by the rocket's renovation at NASA/Johnson Space Center?

It was the 3rd Saturday of the month, so the museum, which is only partially restored, offered their special Wings and Wheels Saturday program for $10 (and $5 for kids 12 and under). Wings and Wheels Saturdays include lunch, static aircraft tours, special programs in the Starliner Theater, museum tours, and admission to the museum. During most days of operation, admission is $2 for adults, $1 for children, and free for members of the United States military, law enforcement, firefighters, and their families. I had already eaten lunch, so my wife and I visited the museum briefly the following day on a Sunday afternoon. Only the north wing is ready for visitors—it's on the left as one enters the building.

The museum's web site at http://www.1940airterminal.org/ provides an excellent overview with plenty of photos and includes a Houston aviation history timeline starting in 1910 and ending on December 17, 2003. The terminal was dedicated on September 28, 1940, with Eastern Airlines and Braniff Airways serving wealthy and powerful travelers. The architect was Joseph Finger, and he used the art moderne style. Douglas DC-2's and DC-3's were common airplanes at the time. Houston International Airport was renamed William P. Hobby airport in 1967. All scheduled airline service moved to Houston Intercontinental Airport in 1969, and in 1970 Hobby airport was a ghost town. In 1971 Southwest Airlines began service from Hobby Airport.

Being 6 feet 4 inches tall, I ducked my head to get out the door leading to the back of the building. Benches provided a pleasant seat with a view of air traffic through a sturdy fence.

The museum is closed on Mondays. Tuesday through Saturday hours of operation are 10:00 am to 5:00 pm, and hours of operation on Sundays are 1:00 pm to 5:00 pm. My father-in-law and I will enjoy the visit(s) there when he comes from France for a visit this winter, since he worked for years as an airplane and helicopter mechanic. Many thanks to the Houston Aeronautical Heritage Society for this inspiring restoration project. I heard about this museum from a neighbor who volunteers there, but if asked, maybe you can tell them you heard about it from the AIAA Houston Section.

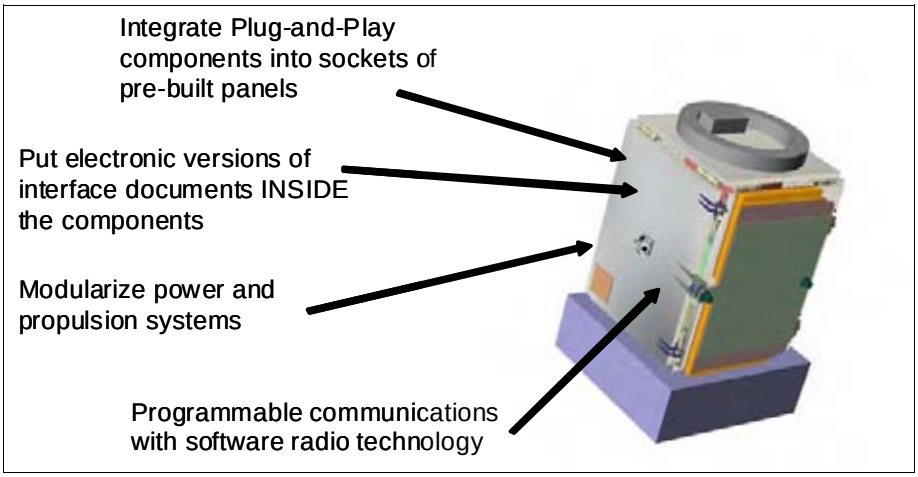
Lunch and Learn Summary Report

Plug –n– Play Satellites

DOUGLAS YAZELL, AIAA ASSOCIATE FELLOW

An enthusiastic audience of about 15 people attended this lunch-and-learn on Thursday, August 10, 2006, in room 113 of building 16 at NASA/JSC. The speaker, Mr. Don Fronterhouse of SSI, was able to fit this into his schedule during his business trip to Houston. A short summary from the publicity flier is presented below.

"Developing space systems takes too long and costs too much. Sometimes, its 10 years before a mission concept can become a flyable reality. This is too long for the world's most capable space force to deal with emerging and rapidly-adapting threats.



"We'd like to make that 6 days. To do this requires a fundamentally different mindset about almost every facet of aerospace systems development. The Air Force Research Laboratory (AFRL) at Kirtland Air Force Base, New Mexico, is developing innovative technologies that get to the heart of this issue. Normally, we focus technologies on making aerospace systems more capable. In this case, we want to focus technologies such as Plug and Play on how to make complex systems extremely quickly.

"Mr. Fronterhouse is one of the leaders in the development of technologies for the Responsive Space Program. He is the Chief Engineer for the Responsive Space Testbed where many of these technologies are developed and tested. He is also the Chief Engineer on the Plug and Play Satellite (PnPSat) Program that is applying these technologies to near term satellites."

One way to find more details on this subject is using the first link returned from a google search of "SSI plug play satellite", which begins with www.responsivespace.com/Papers. That link leads to briefing charts on this subject.

Please join us in our volunteer AIAA work as we organize more lunch-and-learns like this. Contact information on the title page in this issue and at www.aiaa-houston.org.

"Where those settlements should be, however, is another question. Various scientists make their case for Mars, the moon or habitats orbiting the Earth. While the question is not a pressing one for most people, for the futurists mapping the humans path to space, the destination makes all the difference in the world."

- Move Into Space, But Where?
Wired Magazine

Staying Informed

COMPILED BY THE EDITOR

Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future
http://www.hq.nasa.gov/office/oer/nac/documents/Gathering_Storm.pdf

Office of Science and Technology Policy
http://www.ostp.gov

Issues Affecting the Future of the U.S. Space Science and Engineering Workforce: Interim Report
http://www.nap.edu/catalog/11642.html

A Risk Reduction Strategy for Human Exploration of Space: A Review of NASA's Bioastronautics Roadmap
http://www.nap.edu/catalog/11467.html

Visible Earth
http://visibleearth.nasa.gov/

AIA Aerospace Statistics Chart Gallery
http://www.aia-aerospace.org/stats/charts.cfm

Move Into Space, But Where?
http://www.wired.com/news/technology/space/0,71838-0.html?tw=wn_index_3

Assessment of NASA's Mars Architecture 2007-2016
http://www.nap.edu/catalog/11717.html

New Members

ELIZABETH BLOME, MEMBERSHIP

We had a great month! If you see one of the folks at the next section event, please make them feel welcome.

Seth Alberts
Xiaoli Bai
Yuanqiang Bai
Jim Baker
Christan Balnius
Shannon Cagle-strimple
Michael Coats
Nicholas Davaul
Will Decker
Rex Delventhal
Brian Derkowski
Sean Duffy
Ryan East
John Frassanito
Anita Gale
Gabriel Garrett
Joseph Hammond
William Hedger
Nicole Jordan
Robert Kowalski
Kara Kranzusch
Don Nelson
Molly Olson
Dwayne Orr
John Ramsey
Christopher Rendall
Gabriel Sanchez
Matthew Schwaab
Patrick Spaller
Jeffrey Sutton
Bryan Tu
Wallace Tuthill
Jinming Xu

Important notes:

- *Not a member? See the end page.*

New Associate Fellow Members

Associate Fellows are individuals who have accomplished or been in charge of important engineering or scientific work or have done original work of outstanding merit or have otherwise made outstanding contributions to the arts, sciences, or technology of aeronautics or astronautics.

This year's new Associate Fellows in the Houston Section are:

Sivaram Arepalli, *NASA Johnson Space Center*
Yildiz Bayazitoglu, *Rice University*
Ted E. Goetz, *The Boeing Company*
Jerry R. Goodman, *NASA Johnson Space Center*
Tim W. Propp, *The Boeing Company*
Douglas J. Yazell, *Honeywell*

Update Your Membership Records

ELIZABETH BLOME, MEMBERSHIP

It is often said that the aerospace industry is the only place where you can have the same job for five years and work for five different companies. That is especially true given the industry wide consolidation that has happened in the last few years. As companies have changed so have the building signs and the business cards. Additionally, our environment provides most people with the ability to move from one company to another as we try to expand our occupational horizons.
With all of these potential changes have you verified if your AIAA member record is up to date? Knowing where our members are working is vital to the Houston Section in obtaining corporate support for local AIAA activities (such as our monthly dinner meeting, workshops, etc.). Please take a few minutes and visit the AIAA website at

http://www.aiaa.org/

to update your member information or call customer service at 1-800-NEW-AIAA (639-2422). Feel free to also contact me at 281-244-7121 or by email at elizabeth.c.blome@nasa.gov.

AIAA Standing and Technical Committees

Q: How can I become a member of one of the AIAA Standing Committees?

A: You may nominate yourself or be nominated by another member for membership on an AIAA Standing Committee. You can also nominate other members. A description of the scope and volunteer contact for each of AIAA's Committees is located on the Standing Committees page. If you are interested in participating on a Standing Committee, please complete the online Standing Committee Nomination Form found on the Forms page.

Q: How do I become a member of an AIAA Technical Committee?

A: Any AIAA member is welcome to apply for membership on a technical committee. Technical Committee membership is generally for three consecutive one-year terms. Nominations open 1 August and close 1 November, although midyear placement on a Technical Committee is possible. For more information or to obtain a nomination form, go to the Technical Committee page.

[From the AIAA web site at www.aiaa.org]

Local Industry News and Announcements

SPACEHAB CARRIER TAKES CENTER STAGE DURING NASA SPACEWALK

Houston, Texas, July 10, 2006 – SPACEHAB, Incorporated (NASDAQ: SPAB), a leading provider of commercial space services, announced that the Company's cargo carrier will be the focus of this morning's [7/10/2006] NASA extra vehicular activity, or spacewalk. SPACEHAB's versatile payload pallet, known as the Integrated Cargo Carrier (ICC), is designed to ferry essential spare parts used in International Space Station construction and operation, and is a key asset being used on the STS-121 Space Shuttle *Discovery* mission currently underway.

During this seventh day of the mission, veteran astronaut Piers Sellers and first-timer Michael Fossum will don spacesuits and remove numerous pieces of equipment mounted and stored on SPACEHAB's commercially provided cargo platform. "One of the first tasks to be performed by the astronauts on this spacewalk is to remove a grapple bar and install it on a pump module, both transported to space on our ICC," said Pete Paceley, SPACEHAB Vice President Shuttle Programs. "This bar allows astronauts Lisa Nowak and Stephanie Wilson to grab the pump module with the station's robotic arm and move it to SPACEHAB's on-orbit stowage platform, a modified version of our ICC that was permanently mounted on the International Space Station during the STS-114 mission last year and now serves as a spare parts warehouse."

The astronauts will also remove a new Transfer Umbilical System Reel Assembly (TUS-RA) from the ICC during the spacewalk. The original TUS-RA, used on the space station's mobile transporter that travels the length of the ISS and provides electrical and video connections, was inadvertently severed last year. NASA's new unit is mounted on the top of the ICC for easy access by the crew and will replace the inoperable unit.

SPACEHAB's Integrated Cargo Carrier can accommodate a variety of payloads on both its top and bottom surfaces. This privately owned carrier system can support delivery of power and data services to payloads and comes in a variety of shapes and sizes to meet NASA's assortment of cargo transfer needs. The ICC, provided in partnership with Astrium GmbH, has performed flawlessly on six prior space missions and has received numerous crew accolades.

Furthermore, the SPACEHAB team is preparing for NASA's STS-116 mission scheduled for launch later this year. This flight, also to the International Space Station, will again use the Company's Integrated Cargo Carrier as well as the SPACEHAB Logistics Single Module. The module is a pressurized aluminum habitat that is housed in the orbiter's cargo bay, connected to the shuttle's flight deck by a tunnel, and greatly enhances the onboard working and living environment for the crew. With the ability to store and transport 6,000 pounds of supplies, equipment, and research payloads, SPACEHAB's module system is essential for supporting International Space Station outfitting and crew provisions.

UNIVERSITY OF HOUSTON DEVELOPING NEW PROGRAM

The Department of Health and Human Performance at the University of Houston, in collaboration with its governmental and industry partners, is in the process of developing a *Masters of Science in Space Studies*. This unique academic program is a multi-disciplinary graduate degree that incorporates an integrated blend of project management, space physiology, bioengineering, space architecture and advanced technologies. As part of this effort, input is sought from future program graduates and their potential supervisors/employers on those areas deemed most useful for career development in the field of human space exploration.

Please click on the following link (http://www.hhp.uh.edu/space_survey/survey.htm) to complete a *short* survey to register your opinions on the type of training you as a potential graduate student, or you as a supervisor/employer, would find most beneficial.

HEINLEIN CENTENNIAL

Robert A. Heinlein was one of the most influential writers of the 20th century. At one time or another, his book Starship Troopers has been on the required reading list of all three service academies. For further example, in recognition of Heinlein's influence on readers who would later become aerospace engineers and scientists, the NASA Medal for Distinguished Public Service was awarded to him posthumously in 1988. There is a Robert A. Heinlein Chair in Aerospace Engineering at the Naval Academy as well.

The Heinlein Centennial, to be held in Kansas City, Missouri in July 2007, is being created and sponsored by an association of Heinlein scholars, fans, readers, and admirers to celebrate the 100th anniversary of Robert Heinlein's birth.

This event is planned to have wide scope, and to especially have an emphasis on the nascent but burgeoning commercial spaceflight industry that so closely represents Heinlein's fictional history of space development.

NASA Administrator Dr. Michael Griffin will speak at the Centennial on Friday, July 6th, and the first winner of the $500,000 Heinlein Prize for Accomplishments in Commercial Space Activities, Dr. Peter Diamandis, will also speak.

For more information, see the web site at:

www.heinleincentennial.com

Employment Opportunities

ESC GROUP SEEKS ENGINEERS

The Engineering and Sciences Contract Group (ESCG) at the NASA Johnson Space Center in Houston is currently interviewing for a number of open positions:

Analytical Chemist
Ascent GN&C Engineer
Chemical Process Simulation Engineer
Communication Engineer
Electromagnetic Compatibility Analyst
Engineering Assistant
Entry GN&C Engineer
Facility/Test Mechanical Engineer
ISS CHeCS Console Operator
ISS CHeCs EHS Sys Mgt Rep
ISS Computer Resources & Network Lead
Mechanical Engineer
Mechanical Project Engineer
Mechanical Project Engineer, Sr.
Project Engineer
Re-entry Aerothermal Analyst
Re-entry CFD Engineer
Resupply & Logistics Project Engineer Eng.
Robotic Operations Analyst
Structural Aerospace Engineer
System Safety Engineer
Systems Engineer (SW Analyst)
Test Engineer
Thermal Analyst

We are also looking for Materials and Processes Engineers, and Fracture Mechanics Engineers.

To apply for any of the positions listed above, or to obtain more information, please visit the ESCG Careers web site at: www.jacobs.com under the heading: "Careers", location "Houston (ESCG)". Equal Opportunity Employer M/F/H/V

LOCKHEED MARTIN STAFFS UP FOR CEV

In anticipation of a contract award in support of the NASA Crew Exploration Vehicle (CEV) program in Houston , Lockheed Martin is seeking experienced professionals in the following areas:

Hardware Engineering
Integration & Test
Engineering Analysis
Safety & Mission Assurance
Information Systems
Modeling & Simulation
Systems Engineering
Program Planning
Risk Management

E-mail:

lmcads.jobs@lmco.com
(AD-HOUSTON must be in the subject line).

To apply online, visit the web site at:

www.lockheedmartin.com/careers

An equal opportunity employer.

EMPLOYERS:

Horizons now publishes job opportunities for local positions. Submissions should be less than 175 words, and must be approved by your company's Human Resources department (a contact to your HR should be provided). Submissions are only accepted electronically at this time. Please send submissions to: editor@aiaa-houston.org

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BIGELOW AEROSPACE

We Want You to Join the Adventure

It is quite a sight to see all of the company resources moving out on the projects at hand. Our first mission has revealed many challenges that will need to be met in the future. To deal with these challenges, we are always looking at ways to better engage our current staffs are also recruiting for many new engineering positions at our Las Vegas and Houston facilities. We are always looking for hard-working and driven people with a variety of technical experience to join our team. If this describes your interest and ambition, we look forward to hearing from you.

CALENDAR

Dates, events, and times are subject to change. See the AIAA Houston web site for more information at: www.aiaa-houston.org

October

16 Dinner meeting at the Gilruth Center, Dr. Mark Adler, Jet Propulsion Laboratory, Mars Exploration Rovers
21-22 Wings Over Houston Airshow Outing at Ellington Field
23 Lunch-n-Learn: "Turning Reality into Fiction that Becomes Reality", Bob Mahoney, former crew trainer, novelist, author of novel, "Damned to Heaven"

November

6 Executive Council Meeting (ARES)
9 Mathworks/AGI workshop at Gilruth Center
16 Lunch-n-Learn: Chuck Knarr and Scott Hartwig, NASA Constellation Program

December

4-6 AIAA National Space Exploration Conference
11 Executive Council Meeting (ARES Corp)
TBD Lunch n' Learn

Contact chair@aiaa-houston.org or events@aiaa-houston.org for further details.

American Institute of Aeronautics and Astronautics
Houston Section Dinner Meeting
October 16, 2006

Exploring Mars: The Journey of the Mars Exploration Rovers

Mars Exploration Rover is a NASA Space Science project which launched two scientific exploration rovers to two different sites on Mars in mid-2003, with both landing successfully in early 2004. After landing, each rover carried out a three-month mission to explore its site and through detailed morphological and mineralogical investigations provide an understanding of the ancient history of each site. As of September 2006, the rovers are continuing to explore in their extended mission.

Speaker:	Dr. Mark Adler, Chief Mission Concept Architect, Jet Propulsion Laboratory. Dr. Mark Adler was the Mars Exploration Rover Spirit Mission Manager at the Jet Propulsion Laboratory.
Location:	NASA-JSC Gilruth Center - Alamo Ballroom. All non-JSC badged attendees must enter the Gilruth Center from Space Center Blvd. at JSC's gate #5.
Cost:	$10.00/AIAA members & their guest, $15.00/non-members, $7.00/students.
Schedule:	5:30 pm Registration & Social (with cash bar); 6:00 pm Dinner; 7:00 pm Presentation; 7:50 pm Door Prizes and Closing.
Entrée Choices:	Corn Meal Crusted Chicken, Flank Steak, & Stuffed Poblano Pepper (Vegetarian). All served with salad, vegetable, bread, dessert and beverages.
RSVP:	This event is open to the public, all are welcome. Make reservations online at http://www.aiaa-houston.org/, or contact events@aiaa-houston.org or call 281-280-3696. Please specify any special menu needs. Dinner reservation deadline is Wednesday, October 11, 2006 at 1:00 pm. Dinner reservations are not required for attending the program only. Cancellations are required prior to deadline, no-shows will be billed.

Cranium Cruncher

BILL MILLER, SENIOR MEMBER, NORM CHAFFEE

Previous Issue Puzzle
Norm Chaffee

In the last issue I asked you to calculate the chances of a player winning a dart game by throwing three darts at random at a dart board with equally sized angular segments having point values of 1, 4, or 7 points. You only win if the sum of your three dart scores is a prime number, and it is assumed all three darts hit the board. The question was: what are the odds of winning if the darts are thrown randomly, and what are the possible scores?

I received several responses and am pleased to announce that the following smart folks got the right answer:

Wes Dafler
Glenn Jenkinson
Douglas Yazell
Frank Baiamonte

Congratulations!

Answer: Each of the three throws of the darts are independent and can score 1, 3, or 7 points. There are 27 possible outcomes/permutations of the three throws. Several of the outcomes produce scores the same as other outcomes, so there are only 7 different scores possible : 3,6,9,12,15,18, and 21. Of these possible scores, only 3 is a prime number, so the chances of winning are one in 27.

Current Issue Puzzle
Norm Chaffee

Now here's one to keep you busy for a few minutes.
Five retired NASA astronauts had a reunion dinner at their favorite restaurant recently, and all sat around a round table. Each ordered something to drink; an entree; and a dessert.

John and Mr. Jackson had martinis. James and Mr. Jones ordered scotch. Mr. Jenkins had cola since he was driving. John and Mr. Jennings ordered steak. Joe and Mr. Jenkins had roast beef. For dessert Joe and Mr. Jordan ate chocolate cake. Jerry and Mr.Jenkins had pie. The other man had ice cream. No one was served an item in common with the two people on either side of him.

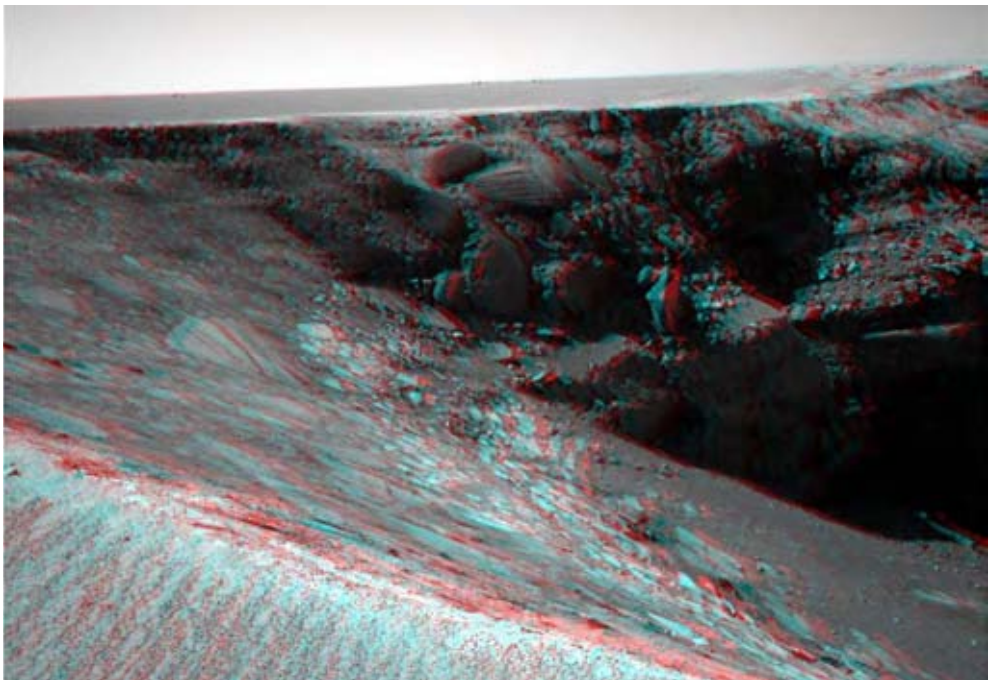
Who had the pheasant? And what did Jack eat?

Email your answers to Norm Chaffee at: norman.h.chaffee@nasa.gov

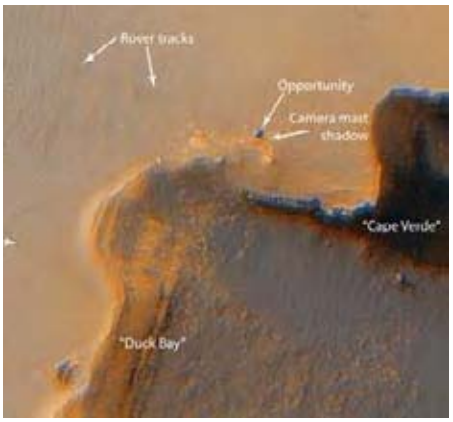
Odds and Ends

SPECIAL EVENTS, PICTORIALS, ETC.

A Boeing 747-45E approaches Vancouver International Airport in British Columbia. This beautiful photograph was taken on July 29, 2006, by Marek Wozniak. Reprinted here with permission of the photographer.



Get out the Red/Blue glasses—This is a recent picture sent back from the NASA Opportunity Mars Exploration Rover. This 3D image was automatically generated from the NASA images, and is located at a web site: www.lyle.org/mars. The image at left shows the view into Victoria Crater. The image below was taken by the Mars Reconnaissance Orbiter and shows Opportunity approaching the edge of Victoria Crater.



Wingtip Vortices—The beautiful image below illustrates trailing wingtip vortices exceptionally well (in addition to being an exceptional photograph). This photograph is of a Boeing 777 approaching London's Gatwick airport. The image was taken on July 10, 2006, by Steve Morris, AirTeamImages. The photograph is reprinted here with permission.

The "Transition"

Terrafugia, which is derived from the Latin for "escape from the earth," was founded by graduates of the Department of Aeronautics and Astronautics at the Massachusetts Institute of Technology and incorporated in 2006. Currently based in Cambridge, Massachusetts, Terrafugia combines solid aircraft design fundamentals with a focus on creativity and customer service. Terrafugia's mission is the expansion of personal mobility through the practical integration of land and air travel.

People have dreamed of "roadable" aircraft since 1918 when Felix Longobardi was issued the first patent for a vehicle capable of both driving on surface roads and flying through the air. The most well known, and arguably most successful roadable aircraft was developed in the 1950s and 60s by Molt Taylor. There are also many visionaries developing their own concepts for a roadable aircraft. This plurality of concepts shows that there is a perceived need for a vehicle of this type. Unfortunately, the cost/benefit of these vehicles never justified serious financial backing – the *real* need was not sufficiently acute to justify the performance sacrifices of a dual use vehicle.

Upcoming Conference Presentations by Houston Section Members

COMPILED BY THE EDITOR FROM AIAA AGENDAS

Information here is taken from preliminary AIAA conference agendas. As such, it is subject to change.

45th AIAA Aerospace Sciences Meeting and Exhibit
8 - 11 Jan 2007
Reno, Nevada, Grand Sierra Resort Hotel (Formerly Reno Hilton)

Assessment of Turbulent Shock- Boundary Layer Interaction Computations Using the OVERFLOW Code
A. Oliver, Purdue University, West Lafayette, IN; R. Lillard, NASA Johnson Space Center, Houston, TX; A. Lyrintzis and G. Blaisdell, Purdue University, West Lafayette, IN

The Human Research Program
D. Tomko, NASA Headquarters, Washington, DC; K. Laurini, NASA Johnson Space Center, Houston, TX; and M. Nall, NASA Glenn Research Center, Cleveland, OH

NASA Utilization of the International Space Station and the Vision for Space Exploration
J. Robinson, NASA Johnson Space Center, Houston, TX

Space- Based Antenna Morphing Using Reinforcement Learning
H. Feldman, Texas A&M University, Magnolia, TX

The Effect of Material Conductivity, Pressure and Interstitial Material on Thermal Joint Resistance: Analytical and Experimental Study
A. Vistamehr and E. Marotta, Texas A&M University, College Station, TX

A Parallel Multigrid Algorithm for Aeroelasticity Simulations
J. Gargoloff, P. Cizmas, and T. Strganac, Texas A&M University, College Station, TX; and P. Beran, U.S. Air Force Research Laboratory, Wright-Patterson AFB, OH

Exploration Life Support Technology Development Challenges
J. Chambliss, D. Barta, M. Lawson and S. Rulis, NASA Johnson Space Center, Houston, TX

In- Situ Resource Utilization for Lunar and Mars Exploration
K. Sacksteder, NASA Glenn Research Center, Cleveland, OH; G. Sanders, NASA Johnson Space Center, Houston, TX

Human Systems Interaction, Surface Handling and Surface Mobility
C. Culbert, NASA Johnson Space Center, Houston, TX; and J. Caruso, NASA Glenn Research Center, Cleveland, OH

Thermal Control System Development for Exploration
D. Westheimer, NASA Johnson Space Center, Houston, TX; G. Birur, Jet Propulsion Laboratory, Pasadena, CA

Acoustic Source Localization and the Echo Problem
S. Beaver and J. Hurtado, Texas A&M University, College Station, TX

Orbiter Gap Filler Bending Model for Re- Entry
C. Campbell, NASA Johnson Space Center, Houston, TX

Precise Distributed Control for Multi- Body Satellittes and Satellite Formations (Graduate Award)
J. Fisher, Texas A&M University, College Station, TX

Micromechanics Analyses of Complex Microstructures (Graduate Award)
D. Goyal, Texas A&M University, College Station, TX

Weighted Compact and Non- Compact Scheme for Shock Capturing
X. Peng, L. Jiang, and C. Liu, University of Texas at Arlington, Arlington, TX

Exercise Countermeasures and a New Ground- Based Partial- g Analog for Exploration
G. Perusek and K. Gilkey, NASA Glenn Research Center, Cleveland, OH; M. Just, Zin Technologies, Cleveland, OH; B. Lewandowski, NASA Glenn Research Center, Cleveland, OH; J. DeWitt and D. Bolster, NASA Johnson Space Center, Houston, TX

Synergies Between Space Research and Space Operations—Examples from the International Space Station
J. Robinson, J. Bartlett, C. Maender and L. Putcha, NASA Johnson Space Center, Houston, TX; A. Sargsyan, Wyle Laboratories, Houston, TX; S. Miller, NASA Glenn Research Center, Cleveland, OH

Shuttle Debris Impact Tool Assessment Using the Modern Design of Experiments
R. DeLoach, NASA Langley Research Center, Hampton, VA; E. Rayos, C. Campbell, S. Rickman and C. Larsen, NASA Johnson Space Center, Houston, TX

Mesh Generation and Deformation Algorithm for Aeroelasticity Simulations
P. Cizmas and J. Gargoloff, Texas A&M University, College Station, TX

High Power Ion Cyclotron Heating in the Vasimr Engine
E. Bering, University of Houston, Houston, TX; F. Chang-Diaz, J. Squire, V. Jacobson and L. Cassady, Ad Astra Rocket Company, Houston, TX; M. Brukardt, University of Houston, Houston, TX

CEV Crew Module Shape Selection Analysis and CEV Aeroscience Project Overview
R. Lillard, T. Truong, C. Cerimele and J. Greathouse, NASA Johnson Space Center, Houston, TX

Flow Loop Experiments using Graphite Nanofluids for Thermal Management Applications
I. Nelson and D. Banerjee, Texas A&M University, College Station, TX; R. Ponnappan, AFRL, Wright-Patterson AFB, OH

An Acceleration Approach for Reduced- Order Models Based on Proper Orthogonal Decomposition
P. Cizmas, Texas A&M University, College Station, TX

Image Base CFD for Blood Flow Analysis
M. Garbey and B. Hadri, University of Houston, Houston, TX

(Continued on page 22)

("Communicating Visions", Continued from page 3)
devoted to addressing the question of why we explore space. Later this month there is a Kid's Day at one of the local shopping malls, complete with NASA Exhibits and speaker.

The NASA message is out there – arguably far more visibly than for any other federal agency. The question of why we explore is so broad and multi-faceted that it would be difficult to answer it in just a few speeches and, even when NASA is communicating the message, who is really listening? Like Columbus' efforts, it's an ongoing process. Considering that the AIAA Mission statement includes the words, "*Advance the arts, sciences, and technology of aerospace...*", and "*AIAA seeks to ... improve the public understanding of the profession and its contributions*", I suggest that we (AIAA membership) accept some of the responsibility of conveying the "why."

One of the reasons often given for exploring beyond our planet (and

conveyed in "soaring rhetoric") is that it is in our hearts that we always want to see what's over the next hill, and that our curiosity and thirst for knowledge will carry us naturally outward "to boldly go where no one has gone before". Some select few have now purchased the thrill of a lifetime and seen the Earth from 200 miles up. There are quite a number of people who have put down deposits to fly on Virgin Galactic's SpaceShipTwo. Bigelow and Lockheed Martin are exploring an orbital partnership. Several other commercial enterprises are shooting for mach 25, as well. Is Earth orbit only the beginning? Where do people want to go today, and where will they want to go tomorrow?

Casting Off: Exploration? Colonization? Both?

A few weeks ago my Cub Scout son and I had the opportunity to stay overnight aboard the **U.S.S. Lexington Museum** on Corpus Christi Bay. It was a great experience for us, and particularly for me, because my father served aboard the Lexington 50 years ago (during the same time, I recently discovered, that a young aviator named **Wally Schirra** was also based on the ship). At 5:30 a.m. I awoke and climbed up to the hangar deck, stepped onto the port sponson, and watched the sun rise over the bay. With the Lexington resting in 16 feet of mud, I could only imagine what it must have been like to have lived aboard her during her operational years. In science fiction we often imagine the vessels of space exploration in terms analogous to a Navy ship. It would be a wonderful experience to be able to tour our solar system aboard a ship like NCC-1701, the fictional starship Enterprise. That would be the way to go, I think. But there are those pesky laws of physics that cannot be defied.

The soaring rhetoric directs us to the Moon, and Mars. Especially Mars. For the scientifically curious, Mars holds special allure. But, it is also squarely in the sights of other groups such as the **Mars Society**, who are not merely proponents of manned missions to the planet, but want to settle it, as well. They list some of the reasons for doing so:

- We must go for the knowledge of Mars.
- We must go for the knowledge of Earth.
- We must go for the challenge.
- We must go for the youth.
- We must go for the opportunity.
- We must go for our humanity.
- We must go for the future.

The first two reasons support the exploration of Mars (either robotic or human) for the advancement of science, but these are not reasons for *settlement*. The other five reasons could also be used to justify the settlement of Antarctica. Antarctica is cold (like Mars), remote (but not too remote), has lots of open area, and it is a challenge to survive there. However, there is an abundant supply of water , the atmosphere is breathable and at a respectable pressure, and there is an established resupply infrastructure. Where would you rather go to endure hostile conditions, and stand where few or none have stood before?

I recently took **an informal, unscientific, poll** among the readers of the **nasaspaceflight.com** website. I asked which spaceflight experiences they would take if given the opportunity (listed in order from most to least desirable, 178 responses):

- I would consider flying to the surface of the moon for a short stay (43.26%)
- I would consider flying to orbit for a short stay at ISS or space hotel (41.57%)
- I would consider taking a trip to the moon for an extended stay (38.76%)
- I would consider taking a suborbital flight into space (35.96%)
- I would consider flying on an excursion to the moon, but not landing (31.45%)
- I would consider flying to Mars for a 6-12 month surface stay (25.38%)
- I would consider relocating to Mars permanently (13.48%)

(Continued on page 22)

("Communicating Visions", Continued from page 21)

- I don't like to fly at all (1.69%)

The votes tapered off with the Mars options, due to the longer travel time. Nevertheless, I was surprised at the number of people who said they would be willing to relocate to Mars permanently. I am skeptical.

Some respondents thought that it would be remarkable to stand on the surface of another planet. That would be true – for at least a few days or weeks. I'd love to see someone else do that, and I'd participate in the endeavor in whatever ground-based way I could. I think having a scientific outpost on Mars with rotating crew assignments would be captivating. But, I don't see Mars as a place to homestead. I've climbed on rocky hills near Twentynine Palms, California that look very much like the pictures coming back from the Mars Exploration Rover, Spirit. The things I remember most about that experience are the unique appearance of the Joshua trees, watching two coyotes at dusk passing by, and the sound of several of them calling off in the distance (and closer) late at night. I've canoed and backpacked in the north woods of Minnesota, seen a moose rise up out of the water directly in front of my canoe, discovered hidden waterfalls, and camped on an island with a black bear (a quiet, sneaky one). I can't imagine moving permanently to a place that is lifeless, cold, and dry – someplace where I cannot walk barefoot on a beach, see a sunset over an ocean, hear the call of a loon across a lake, grill some steaks over an open flame, sense the temperature change and smell of an approaching rainstorm in the spring – or, most important of all, to hear, see, and embrace my family members. And while we know a great deal about what is physically out there, what do we know about the psychological aspects of "extreme isolation?" I wonder how much the fantasy of fictional space exploits has obscured honest consideration of the realities by the supporters of space settlement?

Author and SETI Institute Senior Astronomer Seth Shostak lectured at an AIAA dinner meeting here in Houston last year. During his talk he proposed that given the real limitations of our current technology, the rate of technological growth, and the vast distances involved, it's not likely that humans will ever venture to even the nearest star outside our own solar system – certainly not in our lifetime. Barring the emergence of a new propulsion technology that ushers in an age where Starship Enterprise-style ships are possible, we're probably stuck in this vicinity for a very, very long time.

It appears that there may be a growing number of ways for people to reach orbit in coming years. Who knows what opportunities will emerge when the cost of access to space is reduced significantly? Will it open the door for increased human and robotic scientific exploration of the Moon and Mars? That would be great, for the reasons that are consistently given. Will it open a door for colonization of yet-to-be-built locations in orbit, the Lagrange points, the Moon, or Mars? These might be interesting destinations to visit, but when I look around and see the varied, beautiful locations here on this planet, I wonder how one could leave this place permanently. Humans may well be technically able to emigrate from Earth, someday, but just because we *could*, does it follow that we *should*? *That* Vision has not been communicated well, at least in my eyes.

Notwithstanding my preference for living on this planet, there are undoubtedly others who will give a number of reasons why they would readily venture out like Columbus, who sailed west to reach the East, into the mostly unknown for reasons of fame, fortune, and even the divine. The ironic thing is that he never reached the place he originally set out for but what he discovered along the way changed the world.

Upcoming Conference Presentations by Houston Section Members (Cont'd.)

(Upcoming Conference Presentations, Continued from page 20)

Numerical and Experimental Investigation of a Serpentine Inlet Duct
P. Cizmas, A. Kirk, A. Kumar, J. Gargoloff and O. Rediniotis, Texas A&M University, College Station, TX

CFD Simulation of Multi- Cycle Nanotube Laser- Ablation with Reduced Kinetics Model
R. Greendyke, Air Force Institute of Technology, Kirtland AFB, NM; J. Creel and B. Payne, University of Texas, Tyler, TX; and C. Scott, NASA Johnson Space Center, Houston, TX

Impact to Space Shuttle Trajectory from Temporal Changes in Low Frequency Winds
R. Decker, NASA Marshall Space Flight Center, Huntsville, AL; D. Puperi, United Space Alliance, Houston, TX; and R. Leach, Morgan Research, Huntsville, AL

Toward a General Solution Verification Method for Complex PDE Problem with Hands Off Coding
M. Garbey and C. Picard, University of Houston, Houston, TX

Planar Measurements of Supersonic Boundary Layers with Curvature Driven Favorable Pressure Gradients
I. Ekoto and R. Bowersox, Texas A&M University, College Station, TX

Experimental Analysis of Supersonic Boundary Layers with Large Scale Periodic Surface Roughness
I. Ekoto and R. Bowersox, Texas A&M University, College Station, TX; T. Beutner, DARPA, Arlington, VA

Microgravity Phase Separation Near the Critical Point in Attractive Colloids
P. Lu, Harvard University, Cambridge, MA; M. Foale, E. Fincke, L. Chiao, W. McArthur, and J. Williams, NASA Johnson Space Center, Houston, TX; M. Hoffmann, NASA Glenn Research Center, Cleveland, OH; W. Meyer, National Center for Space Exploration Research, Cleveland, OH; C. Frey and A. Krauss, ZIN Technologies, Brook Park, OH; J. Owens, National Center for Space Exploration Research, Cleveland, OH; M. Havenhill, Science Applications International Corporation, ; R. Rogers, NASA Glenn Research Center, Cleveland, OH; S. Anzalone, Science Applications International Corporation, ; G. Funk, ZIN Technologies, Brook Park, OH; and D. Weitz, Harvard University, Cambridge, MA

Numerical Study of Massively Separated Flows
M. Olsen, NASA Ames Research Center, Moffett Field, CA; R. Lillard, NASA Johnson Space Center, Houston, TX; N. Chaderjian and T. Coakley, NASA Ames Research Center, Moffett Field, CA; and J. Greathouse, NASA Johnson Space Center, Houston, TX

AIAA Local Section News

Houston AIAA Section Wins Big

Reston, VA, 18 September 2006 - The American Institute of Aeronautics and Astronautics (AIAA) is proud to announce the 2005/2006 Section Award winners.

The Section Awards honor particularly notable performances made by a section of the Institute working as a unit, and are intended to formally underscore the AIAA conviction that intellectually stimulating section activity is fundamental to a healthy Institute. The first place winners will be honored at the awards luncheon of the 45th AIAA Aerospace Sciences Meeting and Exhibit, being held on Tuesday, 9 January 2007, at the Grand Sierra Resort Hotel (Formerly Reno Hilton), in Reno, Nevada.

Outstanding Section, Very Large Category

1st Place: Houston, Steven King, Section Chair
2nd Place: Hampton Roads, LaTunia Pack Melton, Section Chair
3rd Place: Los Angeles, Charles Kilmer, Section Chair
Honorable Mention: San Francisco, Richard Kwan, Section Chair

Communications Award, Very Large Category

1st Place: Houston, Jon Berndt, Section Newsletter Editor
2nd Place, San Francisco, Richard Kwan, Section Chair
3rd Place: Hampton Roads, John Lin, Section Newsletter Editor
Honorable Mention: Dayton/Cincinnati Richard Snyder, Newsletter Ed.
Honorable Mention: New England, Ray Erikson, Newsletter Editor

Membership Award, Very Large Category

1st Place: Houston, Elizabeth Blome, Membership Officer
2nd Place: Hampton Roads, Jeffrey Flamm, Membership Officer
3rd Place: Dayton/Cincinnati, Jason Slagle, Membership Officer

Harry Staubs Pre-College Outreach Award, Very Large Category

1st Place: Los Angeles, Dean Davis, Pre-College Outreach Officer
2nd Place: San Francisco, Pallavi Shah, Pre-College Outreach Officer
3rd Place: Houston, Joy Conrad King, Pre-College Outreach Officer

Public Policy Award, Very Large Category

1st Place: Hampton Roads, Lee Rich, Public Policy Officer
2nd Place: Houston, Lynn Nicole Smith, Public Policy Officer
3rd Place: San Francisco, Kathleen Starmer, Public Policy Officer

Young Professional Activity Award, Very Large Category

1st Place: Hampton Roads Kurt Severance, Young Professional Officer
2nd Place: Dayton/Cincinnati, Julie Sadadin, Young Professional Officer
3rd Place: Houston, Laura Slovey, Young Professional Officer
Honorable Mention: Los Angeles Stephanie Herczog, YP Officer

AIAA Monthly Meetings are Open

New faces are welcome at our monthly AIAA Houston section executive council meetings. Please review our web site and the org chart at www.aiaa-houston.org before attending, if possible. AIAA membership is not required, though we will be working with you to find a role in our volunteer work. To ensure proper room size and no late changes in time and location, please contact someone from the list below before attending.

Location:
ARES Corporation
1331 Gemini, Suite 120
Houston, TX 77058

Contact List:
Douglas Yazell 281-244-3925
Jayant Ramakrishnan 281-461-9797
Steve King 281-283-4283
Tim Propp 281-226-4692

Seeking Volunteers

The Houston Section is seeking volunteers interested in participating in the following areas:

Pre-College Outreach (K-12)
Professional Development
Programs
Publicity

Opportunity for community service, personal & leadership development, networking, etc.

Contact chair@aiaa-houston.org

2006-2007 "Spirit of Apollo" College Scholarship Award

Jordan Hahn was awarded the Houston Section "Spirit of Apollo" Scholarship of $1000 for the 2006-2007 academic year. Jordan is from Sugar Land, Texas, and is a Sophomore Aerospace Engineering student at Texas A&M University. Jordan not only excelled in his freshman studies, but was also a leader in the Student AIAA Section at A&M -- serving as their Freshman Representative and Publicity Chair. To get some hands-on experience in the aerospace field this summer, he worked as an intern at Atec Inc., a small aerospace firm in Stafford. Jordan was selected by the scholarship committee from among four very qualified applicants that are students at several Texas Colleges.

The "Spirit of Apollo" Scholarship honors the historic accomplishments of the Apollo Space Program by encouraging outstanding students at Texas Colleges to continue their studies in engineering, math or science. Qualified applicants must have completed their freshman academic year with a GPA of at least 3.0 on a 4.0 scale. The qualified applicants must provide an essay, three letters of recommendation, college transcripts, along with a description of extracurricular activities and work experience. Additional information and the application form for our annual scholarship can be found on the Houston Section's web page.

Congratulations to Jordan Hahn as our scholarship winner, and to all this year's applicants for their distinctive academic accomplishments in the engineering and science fields!

Houston Section
P.O. Box 57524
Webster, TX 77598

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AIAA Mission

Advance the arts, sciences, and technology of aerospace, and nurture and promote the professionalism of those engaged in these pursuits. AIAA seeks to meet the professional needs and interests of its members, as well as to improve the public understanding of the profession and its contributions.

American Institute of Aeronautics and Astronautics

Become a Member of AIAA

Are you interested in becoming a member of AIAA, or renewing your membership? You can fill out your membership application online at the AIAA national web site:

www.aiaa.org

Select the AIAA membership option.