

Horizons

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Artwork courtesy of John Frassanito & Associates



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Site
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Cover: Ares-V Liftoff, courtesy of John Frassanito & Associates.

From the Editor ISS: A Valuable Endeavor

JON S. BERNDT

Jeff Kluger wrote an interesting piece in Time magazine last August. In that article, he described the “risky” mission then about to be taken:

“The Endeavour crew will be delivering a two-ton truss segment that will help hold solar arrays and will require three risky spacewalks to install. If the ISS were doing good science at an arguably reasonable price, those risks would be worth taking. But it's doing almost no science at all at an exorbitant price — an estimated \$100 billion a year ...”

I was immediately impressed that NASA was able to coax “\$100 billion a year” out of its annual budget of roughly \$16 billion! I guess I shouldn't be surprised to see such simple factual mistakes like this in print. I fired off an immediate letter to the

editor of Time pointing out the error, but as far as I can tell, there never was a retraction. In any case, Mr. Kluger seems to have decided for himself what the value of the space station is.

I can't count how many times I have read the tired lament about how the space station (and the space shuttle) only goes around and around and never gets anywhere - which sounds a lot like some columnists, to me. Of course, the path that ISS takes is governed by physics. While it operates in the vacuum of space, I think that the International Space Station is providing value far beyond what is normally considered. I think it's value is getting shortchanged in the press, despite its purported budget getting inflated.

First of all, I find it amazing – and encouraging – that ISS has

weathered so many political storms [including some “category 5” storms] spanning several administrations to get to where it is today. There are some who question today whether or not a long-term human spaceflight program can be undertaken successfully outside of the special circumstances that drove the Apollo program. I believe there is enough bipartisan support to sustain the Vision for Space Exploration.

The International Space Station undoubtedly has provided a means to further develop strong working relationships around the world in the area of space exploration. The late astronomer Carl Sagan wrote in the July 18, 1989 issue of Parade magazine an article entitled, “The Gift of Apollo”.

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Orion docking with ISS. Image courtesy of John Frassanito & Associates.





Chair's Corner

DOUGLAS YAZELL, AIAA HOUSTON CHAIR

There are no mistakes, only lessons, someone wrote. This year of service leadership by many volunteers in AIAA Houston Section is looking good from my point of view.

Planning is ongoing for our region's (region IV: Texas, New Mexico, Oklahoma, and Arkansas) Student Paper Competition (SPC), hosted this year by our section, led by Sarah Shull. The NASA/JSC Gilruth Center rooms are reserved for this on Friday and Saturday, April 18-19, 2008. The more student papers (graduate and undergraduate) we attract, the better.

Sean Carter is leading our section's Annual Technical Symposium (ATS). This is typically held on a Friday from 8 am to 5 pm in the NASA/JSC Gilruth Center in April or May. The tentative date is now May 9, 2008.

I am pleased that AAS (the American Astronautical Society) asked AIAA Houston Section to co-sponsor Yuri's Night this year. We can say yes to that, since their track record of organizing and executing this event in Houston is excellent. This celebrates the 1961 Yuri Gagarin flight and the 1981 STS-1 flight, both of which occurred on April 12. The first Yuri's Night event took place in 2001, so we can see that 2021 will be a natural target for a big Yuri's Night Celebration. The 2001 event was reportedly a product of the Space Generation Advisory Council of the United Nations Program for Space Applications. The International Space University chose its date of formal creation as April 12, 1987, in honor of the 1961 flight. As we go to press, Space Center Houston is the most likely venue. April 12, 2008, is a Saturday, which is good news for our event planning.

Our young professional (under 35) chair Jim Palmer organized a money management workshop attended by a crowd of about 50 people on September 25, 2007, in the JSC Gilruth Center Coronado room. Speakers Lance Hutchins and Tarl Anderson gave presentations about the stock market and real estate, respectively.

The speaker for our dinner meeting of November 15 was James Oberg,

a local resident who is an author and journalist and a former NASA/JSC contractor aerospace engineer. He spoke about the Soviet and Russian space programs. An enthusiastic crowd of about 50 people attended this event.

David Fuller presented his lunch-and-learn on Friday, November 30, 2007, in room 111 of building 16 at NASA. He spoke about "Leaving the Big City and Working for a Startup". He now works for TGV Rockets in Norman, Oklahoma. About 15 people attended and they asked plenty of questions. Mr. Fuller's event was organized by our section's guidance, navigation and control technical committee, chaired by Robert Beremand.

Our section's International Space Activities Committee (ISAC) is working to create sister sections in Russia and elsewhere. Working with our partners in France, we succeeded in creating the sister section relationship with the Toulouse – Midi-Pyrenees branch of the Association Aeronautique et Astronautique de France (AAAF). In Houston, we will work to keep the ISAC web page (<http://www.aiaa-houston.org/tc/isa/>) up to date as we make this come alive in the next three years and beyond.

We scheduled a lunch-and-learn for January 11, 2008, with speaker Marianne Dyson (www.mdyson.com), author and former NASA/JSC flight controller. This event is sponsored by our section's astrodynamics technical committee.

Captain High of the 1940 Air Terminal Museum (www.1940airterminal.org) agreed to be our contact person for the nomination of this building as an AIAA Historic Aerospace Site, so we submitted that nomination to Emily Springer of the national AIAA History Technical Committee.

Our January 25, 2008 dinner speaker will be NASA/JSC Center Director Michael Coats, speaking about the state of the center. The event is planned to include a panel of three major program managers. Three later dinner meetings are scheduled for March, April, and June.

We have over 800 professional

members in our section, and our org chart (www.aiaa-houston.org/orgchart) has 45 boxes. Only one vacancy remains, the chair of the communications and tracking technical committee. Lisa Voiles is our new membership chair. We welcome BeBe Kelly-Serrato as chair of the space operations & support technical committee. Linda Phonharath is our new college and co-op chair, and she is supporting SPC in addition to supporting our student sections (which includes finding speakers for their meetings). Munir Kundawala is our new public policy chair. Venkat Vardhini is our new professional development chair. Professor Jaehyung "Joshua" Ju is our new honors & awards chair. Ludmila Dmitriev-Odier is the new chair of our International Space Activities Committee (ISAC). And we welcome new councilors Lorenn Vega-Martinez and David Segrera.

Our newsletter editor post will be empty once this issue is online, though Jon Berndt will be here to advise his successor. Jon aimed at being the Aviation Week of the Houston Clear Lake area, and he made a lot of progress in that direction. Thanks in part to his cover stories, editor's columns and a new look for Horizons, each quarterly and online-only issue is downloaded about 6,000 times, though our section has less than 1,100 members. Current and past issues are visible at www.aiaa-houston.org/horizons. Candidates may apply using contact information on our web site (www.aiaa-houston.org) or by e-mailing chair@aiaa-houston.org. Please spread the word as we search for a new editor.

We will need a new slate of twenty candidates for our elected officers in a few months. Our new year will start on July 1, 2008. Please join us in this rewarding volunteer work.

Someone wrote, "There are no problems, only solutions." Many of our AIAA Houston Section volunteers will find important solutions this year thanks to our working to be of service to our profession.

Visualizing the Mission: Frassanito & Associates

JOHN FRASSANITO, MEMBER AIAA, IDSA

Feature Article

When President Kennedy first declared NASA's goal of landing on the Moon, he set a standard for United States world leadership in space. As we entered the 21st century, senior NASA managers and policy makers, under Executive direction, began to outline clearly defined goals and a roadmap that could secure our national leadership in space for coming generations. The results of their efforts culminated in the announcement of the Vision for Space Exploration (VSE) on January 14, 2004. One of the teams that crafted this policy announcement was headed by JSC's Space Operations Mission Directorate and included an early contributor to strategic planning of US space endeavors—John Frassanito.

Frassanito's NASA design and engineering team credits include many of NASA milestones: Skylab, the International Space Station, Lunar inflatable habitats, Reusable Launch Vehicles, Crew Exploration Vehicles, First Lunar Outpost concepts, technical support for Earth to orbit (ETO) transportation, the Space Exploration Initiative, and, now, the Vision for Space Exploration.

His team of architects, engineers, and visualization specialists are now supporting JSC's Constellation program, including Ares, Orion, and CEV, as well as programs at NASA Headquarters and Goddard's Science Mission, Vehicle Systems, and Aeronautics Offices.

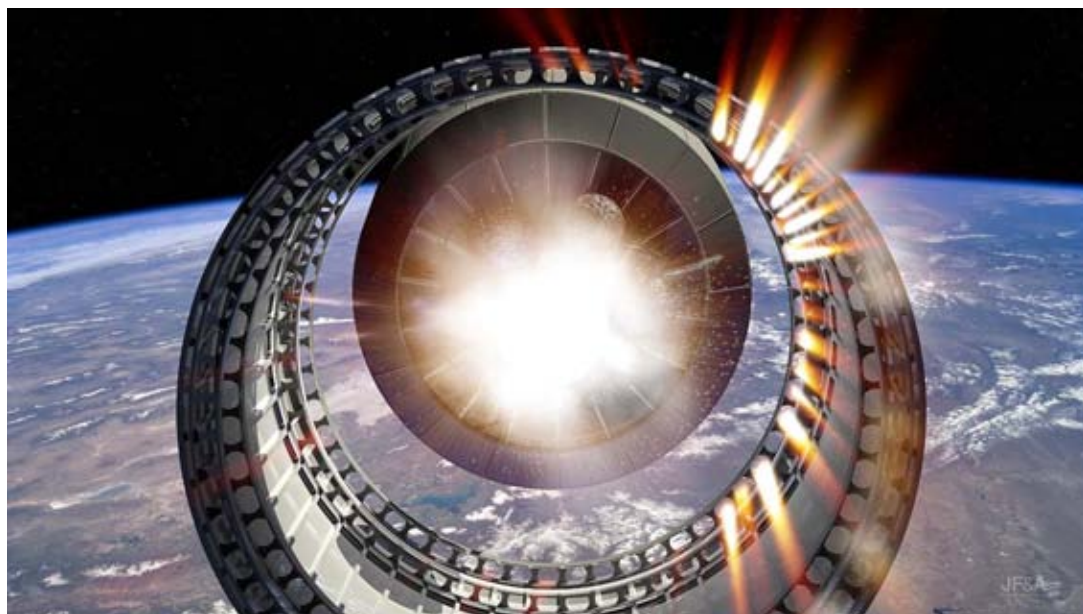
Frassanito's first NASA project, as part of the famed Raymond Loewy and William Snaith design team, was to design the interior of Skylab, America's first space station launched in 1973. He had been recruited by Loewy/Snaith after completing his industrial design degree at Art Center in Los Angeles in 1968.

A co-founder of Datapoint Corporation in 1969, Frassanito then began his own design firm

designing products for companies such as Scott Paper, Texaco, Sani-Fresh, Daniel Industries, General Foods, and EMI Corporation. His computer designs for Datapoint during 1969-1972 marked the start of the personal computing industry. He has been a strategic planning, mission and spacecraft design consultant since 1985 to NASA engineering, scientific and planning teams for the Agency's future space missions, making those scientific visions come alive for specialists and the general public alike.

VSE mission, particularly for space transportation aspects, rationale and benefits, historical perspective, as well as many other aspects of the policy basis.

The major elements of the mission designs had to be explained in a non-technical, compelling way as well as to be technologically viable. A big part of JF&A's contribution was via the firm's Strategic Visualization® process, an integral part of the VSE planning process that, ultimately, provided many of the images and animations used for



Ares-V staging. Image courtesy of John Frassanito & Associates.

For the decision process and eventual announcement of the current exploration program, JF&A worked on various mission designs, the locations and characteristics of Earth, Lunar, and Martian venues, and the articulation of the benefits in terms of the key imperatives of the policy—national security, economics, and science. These three tenants of the policy were inspired in part by Theodore Roosevelt's concept of a Blue Water Navy—a policy that eventually established the United States as the dominate world presence. JF&A also provided technical support in developing the elements on which to base the

the worldwide broadcast announcements, NASA and industry websites, and national and international publications.

With this Strategic Visualization®, JF&A captures the ideas and contributions of individual members of a technical team and converts them to a visual vocabulary that supports the planning process. JF&A condenses volumes of data into powerful images that clearly communicate missions, technologies, and plans to engineers and managers as well as the general public. JF&A's NASA presentations are used for

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everything from Congressional briefings, broadcast television, and magazine articles to high-level technical exchanges and publications worldwide.

In the abstract of *Strategic Visualization and Space Exploration* [1] (from the Workshop on Moon Beyond 2002), Douglas Cooke and John Frassanito explained the role of visualization in the space program:

“NASA teams, such as the NASA Exploration Team (NEXT), utilize advanced computational visualization processes to develop mission designs and architectures for lunar and planetary missions. One such process, STRATEGIC VISUALIZATION®, is a tool used extensively to help mission designers visualize various design alternatives and present them to other participants of their team. The participants, who may include NASA, industry, and the academic community, are distributed within a virtual network. Consequently, computer animation and other digital techniques provide an efficient means to communicate top-level

technical information among team members.

“Furthermore, once the team has developed a sound mission design, STRATEGIC VISUALIZATION® is used to communicate that concept to the general public. This is a vital step that Dr. Werner von Braun used to enhance public support for space exploration. ... when *Collier's (Magazine)* presented the American public with a bold and feasible vision of excursions to Moon and other planets. Today, STRATEGIC VISUALIZATION® is used extensively both in the mission design process within the technical community, and to communicate the value of space exploration to the general public. Movies and digital images have been generated and shown on nationally broadcast television and the Internet, as well as in magazines and digital media.”

Since the '04 exploration plan announcement, John Frassanito & Associates, Inc. has continued to support the Exploration Systems Mission Directorate (ESMD) at a number of levels including the

Administrator's rollout of the Exploration Systems Architecture (ESAS), the Lunar Reconnaissance Orbiter, the CEV/Constellation program, and other program elements. The firm archives and updates a library of current architectures in 3D formats that it provides to its NASA clients as part of its services so, when a new component or mission is under development, the project team has the tools at hand to help do the job.

JF&AI's work in Strategic Visualization for the space program has been recognized in major public exhibitions including the Art Institute of Chicago and, currently, The Intrepid Aircraft Carrier Air, Sea, and Space Museum in New York City, as well as in general public and technical journals such as *Popular Science Magazine*, *Aviation Week*, *Space News*, *Men's Magazine*, and in the book *Space Architecture, The Work of John Frassanito & Associates for NASA* by John Zukowsky.

References:

[1]APPLYING STRATEGIC VISUALIZATION® TO LUNAR AND PLANETARY MISSION DESIGN.

By J. R. Frassanito and D. R. Cooke, Douglas R. Cooke, Advanced Development Office, Johnson Space Center

Ares-I liftoff. Image courtesy of John Frassanito & Associates.



"And the Angels Sing"

EMERY TUTTLE

World War II has faded into the past, but for Emery Tuttle, the memory of those days still lingers on. He recently published his memoirs, "And the Angels Sing," which chronicles the account of his experiences during the war that left behind what has been called the greatest generation.

Tuttle was born in 1920 in Wisconsin. With five of his best friends, he joined the Wisconsin National Guard October 15, 1940, for one year of federal military service. But before their one year commitment was up, the U. S. Congress extended all military service for the duration of the emergency. The attack on Pearl Harbor extended their service until the end of the war.

Most Americans remember well where they were on that fateful December seventh in 1941. A few weeks after being on leave in Wisconsin, Pfc. Tuttle and two of his friends were in New Orleans looking for a friend who had invited them to join him on his yacht for the week-end. When they approached the yacht that Sunday, the captain of the yacht announced, "All servicemen are ordered to return to their posts. The Japanese have attacked Pearl Harbor." Their first question was, "Where is Pearl Harbor?" Before that momentous day, Pearl Harbor was not familiar to most Americans.

Aviation Cadet Tuttle completed his primary, basic and advance training. Upon completion of his pilot training, he was given several choices. He chose B-24s transition at Fort Worth, Texas. He was then transferred to the Anti-Submarine Command at Langley Field, Virginia. Next, he was sent to Charleston, South Carolina to join the Sixteenth Anti-Submarine Squadron. From there, the entire squadron was sent back to Langley Field for two weeks of B-24 transition ... a second time for Tuttle. No sooner than the 16th was back at Charles-

ton Air Base, it was immediately ordered to Hammer Field, Fresno, California.

At Hammer Field, he fully expected to be flying B-24s. But, can you believe it? There wasn't a single B-24 on the field. The field was full of brand new B-25s. They were the new kind that not one of them had seen before. They were all B-25Gs with a solid nose and a 75mm cannon sticking out of the front.

On October 18, 1943, Tuttle was sent to Hamilton Field in San Francisco and the next night, departed for Hickham Field in Hawaii.

Lieutenant Tuttle flew fifty-one missions in the B-25G bomber in the Central Pacific Theatre where the Japanese held most of the strategic islands. Before the war ended, their squadron was bombing Japan. The overall mission was to fly from their newly captured base to neutralize all the islands in the Marshall Chain northwest of Tarawa, to and including Eniwetok, which was a distance of seven hundred and fifty miles. They also flew southwest to neutralize Ocean and Nauru Islands, a distance of over five hundred miles. Lieutenant Tuttle received the Distinguished Flying Cross three times and the Air Medal six times.

One of the missions of the WW II era Tuttle recalls was the capture of a Japanese flag by a B-25G airplane. It is described in the following excerpt from his book, "And the Angels Sing." Tuttle commented:

"In this part of my story, I'll tell you some of the strange and extraordinary things that happened during those thirteen months in combat.

"We had twenty-four planes in our squadron. Nine of these planes went on a mission to the island of Wotje, and when they came home, they reported that,

after they dropped their bombs, they saw a ship across the lagoon. Some of the crewmen thought it might be as large as a light destroyer.

"Our commander, Major Esau," Tuttle explained, "sent James Scott Brown, George Leggett, John Hogan, and their crews to sink it. By virtue of being George's co-pilot, I was in on that three-plane mission. It was bizarre enough that it was written up in the Army's "Stars and Stripes" newspaper.

"We left in the middle of the night to get to our target at daybreak. We arrived in dim light and took the Japanese by total surprise. We came in on that ship below deck level, first firing our cannons, then our machine guns. Then at the latest possible moment, each pilot dropped eight two-hundred-pound bombs, pulled up abruptly, and was gone. The pilot did it all. Well, not quite, I should mention that the navigator loaded the cannon. We had an optical sight for the cannon and machine guns. We dropped our bombs by sight and timing. All that practice, dropping flour sacks against a snow fence on Molakai, was now paying off. Everything went well.

"However," Tuttle clarified, "the ship was not a destroyer; it was a three-hundred-foot wooden sailing vessel that had two huge wooden masts. The Japanese had equipped it with engines, and they were using it as an inter-island

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History, Book Excerpt



Emery Tuttle is an 87 year-old veteran of WW II who served in the Central Pacific flying 51 missions as a B25G bomber pilot. He received the Distinguished Flying Cross three times and the Air Medal six times. He was born in Johnson Creek, Wisconsin, graduated from SMU, and has lived with his wife, JoAnne, at Cedar Creek Lake for the past 20 years. His recently published book, "And the Angels Sing," has received great raves both locally and throughout the country. In addition to his writing, he was awarded Best Speaker of the year by the Johnson Creek, Wisconsin, Historical Society. He built his two-story house at age 71; received his private pilot's license at age 76; and at age 87, still flies his 200mph RV6A airplane out of Harbor Point Airstrip. His motto is: "It's not over, 'til it's over."



type of young man who made a good butt for a lot of our jokes. William Shagner, George Leggett, James Brown, Doc Ovesey, and I lived in the same tent, so we were keeping the joke in the family.

Tuttle pointed out, "Eventually, the plane was able to climb back up to five hundred feet and maintain that altitude. So instead of going back to Tarawa, we headed for the nearest landing strip. On arrival,

James started up the feathered engine and went in for a normal landing. George and Hogan followed Brown in and parked next to his plane; then we all got out to look at the damage.

In his book, Tuttle goes on to explain, "James had hit the big wooden mast of the ship, all right. The leading edge of his wing, between the left engine and the pilot's cockpit, was crushed against the main spar of the wing. This had crushed the oil line going to the oil gauge. The engine had normal oil pressure; it was just

showing zero on the gauge. About twenty feet of one-inch steel cable was wrapped around the propeller. I could see a deep imprint, where it had slapped the underside of the wing as it wound up on the propeller. The elevator was moderately shredded, but not enough to affect the control of the airplane.

Tuttle continued, "We removed the pipe from the bomb bay door. One of James' crew said, 'Boost me up, and I'll get the cable off of the propeller for a souvenir.' So, a couple of his crewmembers boosted him up. It wasn't the cable that was the souvenir, but a much bigger prize. He reached into the engine nacelle and pulled out a Japanese flag. He also retrieved an eight-inch, mushroom shaped, wooden piece that had been the finished topknot of the mast.

"The captured Japanese flag was a twenty four-inch square piece of canvas, on which was hand painted a red rising sun with red and white radiating rays. I have a picture of James and his crew holding the flag, and now you have one. James Brown was from Pennsylvania and was married to a girl from San Antonio. She sent him the San Antonio paper with the headline: "San Antonio Boy Captures Japanese Flag."

Oh, well, who's counting?"

(L to Rt) Staff Sgt. Allen C. Thorton, 2nd Lt. William Shagner, 2nd Lt. Walter E. Carlton, 1st Lt. James Scott Brown, unknown, unknown.

Brown and Shagner lived in the same tent with me for 10 months and from my old records I have found the names of the other two.—Emery Tuttle

(Continued from page 7)
supply ship. We blew that ship to kingdom come, and were gone.

His account of the incident continued, "James Scott Brown immediately reported that he was in trouble. His left engine oil pressure gauge registered zero; so, James shut down the engine and feathered the prop. He was losing altitude, and his bomb bay doors wouldn't close. From our vantage point on his wing, we could see why. There was a ten-foot length of pipe driven through one of the doors, and it was dangling there. We knew then that he had hit the mast of the ship. His crew began throwing out everything that was loose: machine guns, ammunition, and cannon shells.

"When the plane continued to lose altitude, George called over to them, saying, "Throw out the Navigator." James' navigator was William Shagner; he was the



Wernher von Braun's Long Road to Mars

DOUGLAS YAZELL, AIAA HOUSTON CHAIR

Our section's astrodynamics technical committee welcomed our own chair, Dr. Albert A. Jackson, as our lunch-and-learn speaker for Friday, September 28, 2007. We expected a small crowd in a room at NASA in building 16, but the number of advance signups outgrew that room. We



moved it to the building 30 auditorium which holds 135 people, and the final count for attendance was 130!

The following two paragraphs are from our publicity flyer:

"In 1949 between V2 testing and the move to Huntsville Werner von Braun wrote a science fiction novel during the lull. It is about an expedition to Mars. The background technical support for the story was worked up by him and some of his Peenemünde colleagues. When finished the novel was submitted to a German publisher. It was rejected but the editor was ecstatic about the appendix. The publisher convinced von Braun to rework the appendix and publish it as a technical monograph. This appeared as 'Das Marprojekt' in 1950 and was quickly translated by the University of Illinois Press and published as a slim book 'The Mars Pro-

ject'. It was a technical presentation, down to the rivet head, of a 70 man ten ship expedition to Mars. From this small book sprang the 1950's Collier's magazine series on Space Flight. It is one of the most comprehensive popular science magazine series, covering all aspects of space flight from artificial satellites, the design of a space station, space suits, expeditions to the Moon and Mars and much more. The amount of technical material was very impressive; so much so as to leave a firm impression that manned space flight was feasible. The Collier's series led to the Disney space flight TV series and a set of popular books. All this material had a lasting influence on a generation of scientists, engineers, the general public and politicians, and was an influence on space flight as it evolved in the latter part of the 20th century.

"Dr. Al Jackson came to JSC (MSC then) in 1966 and has been involved with crew training during Apollo, flight planning software, planetary science, orbit debris and engineering simulation software for NASA and several contractors. He is currently with Jacobs Engineering on the ESCG contract. Chair of the Houston AIAA section Astrodynamics with many publications in the area of astrodynamics, celestial mechanics and astronautics related areas. Dr. Jackson received his PhD in Physics at the University of Texas in 1975."

Dr. Jackson is also a visiting scientist (<http://www.lpi.usra.edu/lpi/jackson/index.shtml>) at the Lunar Planetary Institute in the Clear Lake area and an AIAA Associate Fellow.

Audience members included veteran aerospace engineers Guy Thibodaux (an AIAA Fellow) and Kenneth Young. They both remember reading the Collier's magazine articles when they were published in the 1950's. Guy was 30 years old and working with

propulsion at the time. Kim Eric Moore also attended. He is an aerospace professional and science fiction writer. We introduced audience members Kornel Rost and Robanna Ogden to everyone. They were our honored guests from the British consul in Houston. Among other duties, they work to enhance prospects for British business in the USA and American business in the UK. They encouraged our section's inquiries into starting a British sister section relationship with a professional society in the UK.

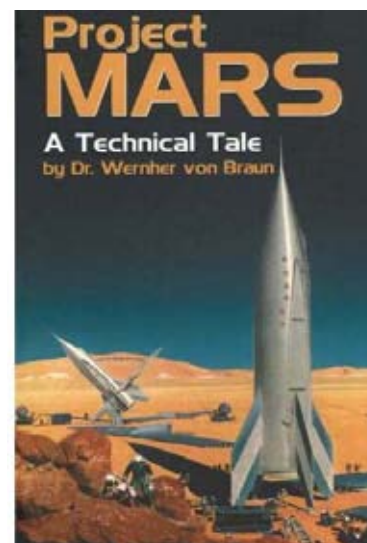
The gift from the JSC Starport gift shop awarded to our speaker was a retro rocket ballpoint pen with its stand made of 3 rocket fins. It looks like the rockets on the cover of the book Project Mars. That book cover picture was used on our publicity flyer.

Thanks to Dr. Jackson, we have more lunch-and-learn speakers lined up, though the schedule may change (see upcoming events at www.aiaa-houston.org). For now, one of those lunch-and-learns will be Friday, January 11, 2008: Marianne Dyson, www.mdyson.com, author and former JSC flight controller, "Space and Astronomy: Decade by Decade", JSC Gilruth Center Coronado room.

Advance signups for these events are recommended using the RSVP links at www.aiaa-houston.org.

Please recall that the AIAA Houston Section Astrodynamics technical committee is always looking for qualified professional members: our contact information is easy to find at www.aiaa-houston.org/tc/astrodynamics. We will also place a link on this web page for today's 34 PowerPoint slides from Dr. Jackson. The link can be used for viewing and downloading.

Lunch-n-Learn Summary Report



(Continued from page 3)

In closing, he wrote, “*Whatever the reason we first mustered the Apollo program, however mired in Cold War nationalism it was, the inescapable recognition of the fragility of the Earth is its clear and luminous dividend, the unexpected gift of Apollo. What began in deadly competition has led us to see that global cooperation is the essential precondition for our survival.*” We will shortly see the launch of the European Columbus module to the space station, and with it, the tangible expansion of global spaceflight cooperation.

I believe that ISS also benefits exploration goals. Power systems, Environmental Control and Life Support Systems (ECLSS), structures, attitude control, computer interfaces and networks, and

other systems that comprise ISS must all work continuously. On a long trip to Mars, there will need to be very high confidence that systems and their respective backups will work as expected. In this regard, ISS serves as a relevant test bed for the critical systems mentioned above, in actual use in space. Regardless of whether we are going “around and around” the Earth, the Moon, Mars, or the Sun, our machines will have to work well.

But these kinds of benefits are not often mentioned in columns, and instead we get exaggerations and hype. Another example of this can be seen in a more recent piece, which declares the Vision for Space Exploration nearly dead, or at least dying. I find that assessment to be very

strange given what I see: hardware being built, development labs being opened, abort procedures being refined, etc. There is a lot of fine work being done. Even those who disagree with the launch vehicle approach chosen agree that if anyone can make all this work, it is the NASA/contractor team currently progressing towards that goal.

Finally, on a different subject, this fifteenth revamped issue may well be the last issue of Horizons that I will put together. With my kids getting older and more active, I’m having to cut back on some demands. I’ve also become active with the national AIAA Modeling and Simulation Technical Committee. If there’s still no new editor in January/February, though, who knows ...

“With sixteen participating nations, the International Space Station under construction today is a testament to the perseverance of the United States, Russia, the countries of the European Space Agency, Japan, and Canada, working together on the largest task ever performed by the civilian agencies of the United States or our international partners.

...

The partnership that brought it about has endured tremendous hardships, most especially the loss of the Space Shuttle Columbia, and stands by itself as a monumental international accomplishment.”

Michael Griffin

NASA Administrator
“Space Exploration, A Frontier for American Collaboration”
16 November 2007

Staying Informed

COMPILED BY THE EDITOR

PlanetQuest

<http://planetquest.jpl.nasa.gov>

Space Exploration: A Frontier for American Collaboration, Michael Griffin, 16 November 2007

http://www.nasa.gov/pdf/202099main_Loewy_Lecture.pdf

Remarks at the Transforming Space Conference, Shana Dale, 8 November 2007

http://www.nasa.gov/pdf/196636main_11-08-07_Dale_Transforming_Space.pdf

The Military Space Program—A Brief History, General Thomas S. Moorman, Jr., USAF (Ret.), Remarks at AIAA Space 2007 Conference and Exposition, Long Beach, CA.

http://www.aiaa.org/pdf/public/AIAA_20Sept07_TSMoorman%20Keynotes-rev.pdf

Citizen’s for Space Exploration

<http://www.citizensforspaceexploration.org/>

Bay Area Houston Economic Partnership

<http://www.bayareahouston.com/Home/>

The Basics of Spaceflight

<http://www2.jpl.nasa.gov/basics/>

Sally Ride Science

<http://sallyridesience.com/>

Smart Girls Rock

<http://www.smartgirlsrock.com/>

NASA 50th Anniversary Web Site

<http://www.nasa.gov/50th/home.html>

A Spacecraft System Engineer's Introduction to Emerging Photovoltaic Technologies

DOUGLAS YAZELL, AIAA HOUSTON CHAIR

Dinner Lecture Summary Report

About 55 people enjoyed the social networking and the dinner speech at this event at the NASA Gilruth Center on Wednesday, September 19, 2007. Mr. Craig Cornelius was very generous with his time, flying here from DC to be with us. From the publicity flyer:

"Craig Cornelius is the Acting Program Manager of the U.S. Department of Energy's (DOE's) Solar Program, with responsibility for direction and oversight of all program activities, including research and development, market transformation and technology deployment, policy formulation, and market outreach and inter-governmental cooperation. The program focuses on solar-to-electric technologies – including distributed and central station solar photovoltaics (PV) and solar thermoelectrics (CSP, for Concentrating Solar Power) for utility-scale generation.

"Since November 2005, Mr. Cornelius has led the implementation of the Solar America Initiative, including assessment of solar power technologies, definition of R&D strategy for product development and manufacturing, analysis of solar market dynamics, and engagement with financial markets. Under the Solar America Initiative, the DOE will invest over \$1.5 Billion with the goal of achieving cost parity with grid retail electricity prices nationwide by 2015.

"Mr. Cornelius came to DOE from NASA, where he played a leadership

role in the formulation of the President's Vision for Space Exploration."

His document containing 52 slides in .pdf form are online at our section's web site at www.aiaa-houston.org, in the, "Take a Closer Look?" section of the opening web page. The office and program are the Office of Energy Efficiency & Renewable Energy, and the Solar Energy Technologies Program. For more information: www.eere.energy.gov/solar/solar_america.

Market-Based Framework for PV Research & Development (R&D)

PV grew fast from 2000 to 2005, starting from being a marginal power source in the year 2000 in countries like the USA,

Germany, Spain, and Japan, thanks to incentive-driven demand. But foreign incentives and R&D programs have driven worldwide competition past US producers. A chart on slide 8 shows this trend from 1990 to 2006. US markets are opening due to convergence of PV cost reduction, rising electricity prices, and subsidies.

Terrestrial PC Technologies with Promise for Space

Slide 41 contains a nice 3D graph with axes for lifetime, efficiency, and cost, with colored boxes labeled for mobile, power generation, remote, aerospace, and military.

The concluding slide contains a painting and the title, "Best Wishes for a Solar-Powered Future on the Moon!"



Section Activity Wings Over Houston Outing

DOUGLAS YAZELL, AIAA HOUSTON CHAIR

Thanks to our hosts, EAA Chapter 12 of Houston (www.eaa12.org, the Experimental Aircraft Association), we could enjoy shade, seats, and shelter at the first of two days of the Wings Over Houston airshow at Ellington Field on Saturday, October 6, 2007. The outgoing and incoming presidents of this EAA chapter, Chris Barber and Richard Sessions, lease a hangar at Ellington Field. They generously offered its use to our members and their friends and family at the show. This hangar provides an excellent view of the show, though we are too far to make out the words of the enthusiastic airshow announc-

airplane, a Velocity, with an automobile motor, a Mazda rotary engine. Its safety is almost certainly enhanced by the fact that there are only three moving parts in that engine. Richard's airplane is a VariEze homebuilt experimental aircraft, based on the famous design by Burt Rutan.

Coolers with iced soft drinks were provided and plenty of water was available. We provided more food than we could eat. This made the hangar a great place to stay during the show, since walking around at the show always tires most people quickly.

I arrived at 8:30 am at the show after passing the inspection at the entrance. The early morning storms had stopped by about 7:30 am, though they might have convinced a lot of people to stay away from the airshow that day. I was rewarded by being able to take snapshots of beautifully restored WW II era airplanes with their reflections in the standing water. Once our EAA friends arrived at their hangar at 9:30 or 10:00 am with the food and drinks from their early-morning shopping, I was ready and eager to join them, since the walking had tired me by that time.

The owner of Cajun2Wheels (www.cajun2wheels.com) stopped by riding one of those Segway scooters that have always looked like fun to me. Maybe next year I can rent one of those for 30 minutes to roll around the airshow with him and a few friends from an AIAA-EAA event like this.

Mr. Labiche's misfortune was our good luck. When a friend suggested he pay for a display at the airshow, it was too late to advertise his flying sports car concept (www.labicheaerospace.com) at the main part of the show, but he rented a hangar to hangars down from ours instead. We talked with him, looked at his models, watched his video which included

footage of dynamic testing of a scale model, and flew in his simulator. The flight simulator holds four people, and either person in the two front seats can operate the controls. Three screens about 6 feet square each provided visual displays of flying around Hobby Airport, IAH, or one tens or hundreds of airport choices.

I learned quite a few lessons about how to make this event better next year, so I hope we do this together again. I would use our RSVP system (recommended, not required) at www.aiaa-houston.org to estimate attendance by AIAA members, friends, and family. I would try to set up special access to Segway scooters working with www.cajun2wheels.com. I would continue to offer the coolers with loose ice, drinks, food and chairs at the hangar, though we must avoid competing with airshow vendors.

And I would have at least three AIAA members organizing our part of the work. Since EAA provided so much, AIAA's part can always include coolers, loose ice, food and drink, among other things. I learned that the light camping chairs that are easy to carry in their bags over our shoulders cost only \$5 at Academy. Finally, I would continue to look for things that AIAA could add to encourage attendance from AIAA members and their friends and family.

Though it is not a human space programs event, NASA provided a large booth at the main part of the airshow to inform the public with literature and other items and NASA related events. This annual airshow can be an exciting part of AIAA Houston Section's annual activities, but it has been difficult to organize something there in past years. With generous help from EAA Chapter 12 of Houston, we might now have a hangar, shade and shelter, and good conversation every year.



Photograph at Wings Over Houston courtesy of Douglas Yazell.

ers. AIAA and EAA members had several pleasant hours to relax and chat while enjoying the airshow.

Counting the AIAA members and their friends and family, we attracted about 13 people to this informal event. The EAA members and their friends and family were a much larger group. Richard and Chris pulled their planes out of their hangar to display them and make room for us to sit in the hangar, though we had enough shade to move outside with our seats in the afternoon. A third EAA member put his yellow and blue plane on display at this hangar, too. Chris is building his

New Members

Date joined: June 1, 2007:	2007:	our section)	Scott Bird
Janet Edwards	Alex Stoll	Lee Wible	Wes Kelly
Marvin Leblanc	Lisa Earehart	Ludmila Dmitriev-Odier	Michael Wells
Ada Rivera	Christina Torres	(our new International	Keenan Turner
Mark Sandberg	Alaina Dupont	Space Activities Com-	Samantha Kujala
Luis San Andres	Vickye Presley	mittee Chair)	Jessie Daniel
	Astra Zeno	David Brown	Andrea Ilg
	Robert Gay	Wayne White	
Date joined: July 1, 2007:	David Finkel	Larry Spratlin	New, October 1, 2007:
Juan Salinas	Susan Stachowiak	Don Huynh	Ernest Bell
Ed Rubio	Clifton Knight	Kenneth Lambert	Jason Gabbert
Kent Adams	Carl Lawrence	Jerry Griffin	Aisha Garell
Dan Brockway	John Osborn	Raquel Weilt	
William Carson	Sherry Lynne Julio-	Logan Minning	Transferred in, October
Joel Broome	Thompson	Matthew Cowley	1, 2007:
Richard Taylor	Tom Ong	Nicole Hill	
William Heitzman	James Meyer	Eleuterio De La Garza	
Sagar Bhatt	Gregory Mcclung	Lollie Garay	Jon-Paul Eisenring
David Tucker	Erma Moore	James Forkner	Shawn Gano
Misty Wohl	Michael Johnson	Venkateshwar Vardhi-	Aisha Garell
Michael Stewart	Linda Hyde	neni (our section's new	Keric Hill
Robert Ennis	Bari Funda	Professional Develop-	Scott Jenkins
Terry Wilcutt	Melissa White	ment Chair)	Oren Kornberg
Sampath Atluri	Steven Robson	William Sun	Laurence Mutuel
John Furby	Jeffrey Bye	Stephanie Ojeda	Don Nelson
Jack Montieth	Priscilla Celaya	Stacey Kelley	Michael Belisle
Nykea Christal	Mark Powell	Joy Bryant	Sarah Farrell
Ann Jablonski	Gary Turner	Michael Merriken	Monica Muzny
Munir Kundawala (<i>the</i>	William Decker	Karen Lawley	Don Carter
<i>new chair of our sec-</i>	Ashivni Shekhawat	Jan Grout	
<i>tion's Public Policy</i>		Kelly Sebelius	
<i>committee)</i>		Xavier Rivera	
Anthony Quandt	Date joined: September	Jared Egli	
Baljeet Singh	1, 2007:	Anton Kolomiets	
Tamas Kalmar-Nagy	Janie Ordaz		
Peng Xu	Alexander Craik	Date joined: October 1,	
	Ami Gilliam	2007:	
	Salma Mahzooni	Melissa Smith	
	Lorenn Vega-Martinez,	Lisa Voiles	
	(a new Councilor for	Leif Anderson	

Important notes:

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

Nominate a Colleague for One of AIAA's Top Awards

Do you know of a colleague who has made significant contributions to aeronautics or astronautics or to AIAA? Nominate them for one of AIAA's top awards.

Visit <http://www.aiaa.org>

Update Your Membership Records

Please verify 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).

We do not have current contact information for the following members, which means that either their email or mail addresses are no longer valid. If you know where they are, please either ask them to update their information on www.aiaa.org or send their new information to Lisa Voiles at membership@aiaa-houston.org.

[No names listed this issue]

Dinner Lecture Summary

Becoming an Aquanaut: Using an Underwater Extreme Environment to Train Astronauts for Spaceflight

DOUGLAS YAZELL, AIAA HOUSTON CHAIR

Marc Reagan was our honored guest for our dinner meeting on Monday, October 15, 2007. A few notes from our publicity flyer will introduce this topic:

then he has supported every NEEMO mission, generally in the role of Mission Director. As Mission Director he is responsible for all aspects of the mission operations: planning, timeline development, procedures, priorities, and all real-time ops. Mr. Reagan also serves as the Group Lead of the Station Training Lead group at NASA/JSC. As the STL Group lead, he has responsibility for the team based full simulator crew and flight controller training for the International Space Station (ISS). He also occasionally works as an ISS 'Capcom'."

Mr. Reagan began by explaining that NEEMO (http://www.nasa.gov/mission_pages/NEEMO/) started in response to errors during spacewalks despite extensive astronaut training which included Neutral Buoyancy Labs (NBLs), which resemble an immense swimming pool. The dangerous environment of spacewalks distracted the attention of the astronauts and led to errors. NEEMO's Aquarius is so deep

that a quick ascent to the surface with scuba gear is not possible, so the training is more realistic. Team members spending a week or two in Aquarius cannot choose their team members for the mission, so that is very much like the real space missions, too. Quite a few astronauts were NEEMO graduates before their first missions on our space shuttle and space station programs. This embrace of the program by NASA is testimony to the caliber of the ideas, planning, and work involved.

NASA fact: Aquarius operates 3.5 miles (5.6 kilometers) off Key Largo in the Florida Keys National Marine Sanctuary. It is deployed next to deep coral reefs 62 feet (19 meters) below the surface. http://www.nasa.gov/mission_pages/NEEMO/

NEEMO missions last up to 3 weeks. Space station training instructor Bill Todd commanded the first mission, joined by Mike

(Continued on page 15)



Above: Mr. Marc Reagan of NEEMO, NASA Extreme Environment Mission Operations, photographed at our dinner meeting by D. Yazell

Right: JSC2007-E-42291 (12 Aug. 2007) --- Japan Aerospace Exploration Agency (JAXA) astronaut/aquanaut Satoshi Furukawa operates a rover during an undersea session of extravehicular activity (EVA) for the 13th NASA Extreme Environment Mission Operations (NEEMO) mission. The crew is spending 10 days, Aug. 6-15, on an undersea mission aboard the National Oceanic and Atmospheric Administration's (NOAA) Aquarius Underwater Laboratory, which is operated by the University of North Carolina at Wilmington and located off the coast of Key Largo, Florida.

"Mr. Marc Reagan has been involved with the NASA Extreme Environment Mission Operations (NEEMO) project since its inception. NEEMO uses NOAA's Aquarius habitat, the only operational undersea research habitat in the world, as the base for lunar analog missions. As the Deputy Project Manager, he has helped steer the project through 13 safe and successful missions to date. He trained as a backup to NEEMO 1, and led the Topside Team activities in support of that mission. On NEEMO 2 he served as an aquanaut crewmember for the 9-day mission. Since





(continued from page 14)

Gernhardt, Mike Lopez-Alegria, and Dave Williams. The NEEMO 2 team of May 2002 was Space Station trainer Marc Reagan, Sunita Williams, Dan Tani, and Mike Fincke. A note on the web site says, "Technically, the term aquanaut is limited to those who stay underwater for 24 hours or more."

Members of the NEEMO 3

mission constructed an underwater structure, "waterlab", as an analog for space station assembly missions. Two storms threatened NEEMO 4 in September of 2002, Hurricane Isadore and Tropical Storm Lili. The mission was shortened to five days. The NEEMO 5 mission in August of 2004 was commanded by Peggy Whitson, who is now the commander of the International Space

Station (ISS) Expedition 16, following her launch in a Soyuz capsule from Baikonur on October 10, 2007. The most recent NEEMO mission recorded on the web site is NEEMO 13, with Nicholas Patrick, Richard Arnold, JAXA astronaut Satoshi Furukawa, and Christopher Gerty. They began a 10-day mission on August 6, 2007.

Above left: JSC2007-E-41652 (7 Aug. 2007) --- Astronaut/aquanaut Richard R. Arnold II works with an umbilical line during an undersea session of extravehicular activity (EVA) for the 13th NASA Extreme Environment Mission Operations (NEEMO) mission.

Above right: JSC2007-E-41650 (7 Aug. 2007) --- Japan Aerospace Exploration Agency's (JAXA) astronaut/aquanaut Satoshi Furukawa climbs a ladder to simulate tasks on the lunar surface during an undersea session of extravehicular activity (EVA) for the 13th NASA Extreme Environment Mission Operations (NEEMO) mission.

Left: JSC2007-E-41610 (31 July 2007) --- Equipped with SCUBA gear, astronaut/aquanaut Nicholas J. M. Patrick (commander) deploys a cave reel during an undersea training session for the 13th NASA Extreme Environment Mission Operations (NEEMO) mission.



Lunch n Learn Summary

Apollo 13 Trajectory Reconstruction

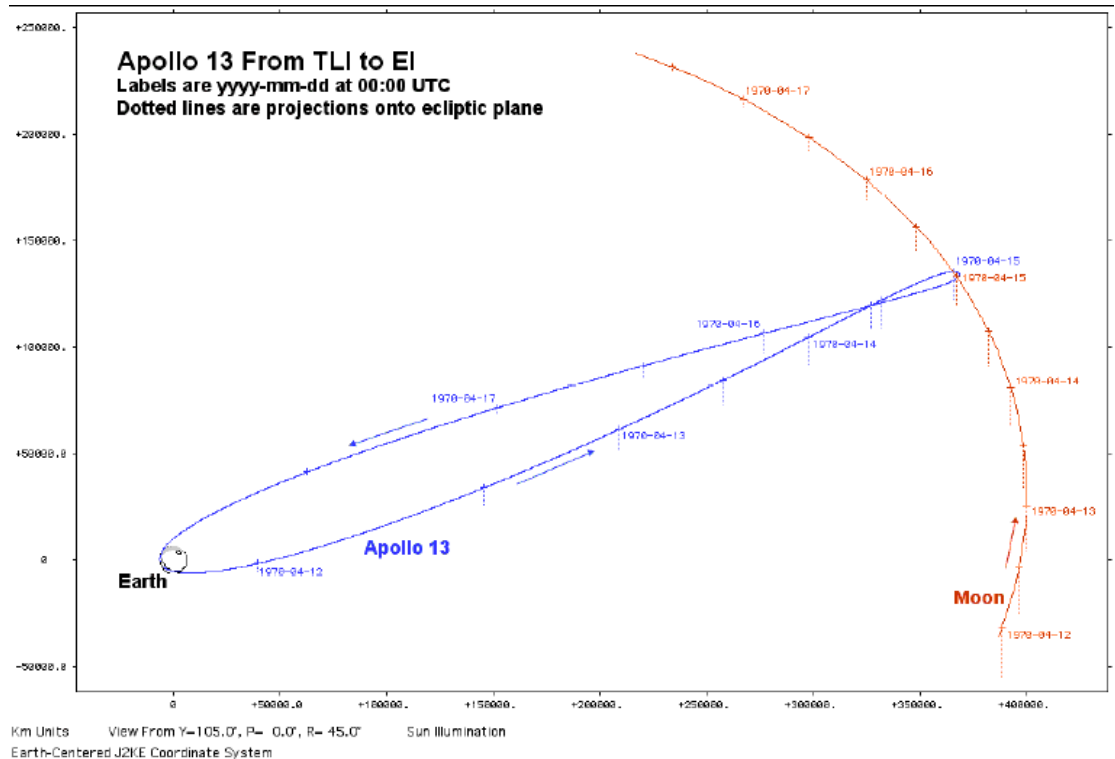
DOUGLAS YAZELL, AIAA HOUSTON CHAIR

About 40 people came to listen to the lunch-and-learn on Friday, November 2, 2007, in the JSC building 30 auditorium. The presentation was,

tion program available via www.shatters.net/celestia/. It provides a means with which educators and their students can visualize even the most

ment from the way it was in April 1970!

Dan Adamo has worked on trajectory aspects of simulation, flight design, and Mis-



"Apollo 13 Trajectory Reconstruction", by Daniel R. Adamo. A related paper AAS 07-330 was presented by Mr. Adamo at the AAS/AIAA Astrodynamics Specialists Conference, August 19-23, 2007, at Mackinac Island, Michigan. If we have Mr. Adamo's permission, we will post his PowerPoint charts on our web site at <http://www.aiaa-houston.org/tc/astrodynamics/>. Here are a few notes from our publicity flyer:

"Celestia" is an open-source freeware space simula-

tion program available via www.shatters.net/celestia/. It provides a means with which educators and their students can visualize even the most exotic trajectories arising in space exploration. A challenge to reconstruct the Apollo 13 as-flown trajectory was issued in 2006 through a Celestia discussion forum. In answering this challenge, methods of accurately reconstructing any as-flown Project Apollo trajectory have been developed using publicly available Internet sources. During the course of verifying these methods, multiple insights regarding Apollo 13's trajectory have been realized. Come share some enlighten-

ment from the way it was in April 1970!

Dan Adamo has worked on trajectory aspects of simulation, flight design, and Mission Control operations since commencing his JSC career in 1979. Beginning in 1990, he supported 57 Space Shuttle missions from the Flight Dynamics Officer console. As a high school and college student, he was an avid follower of Apollo missions to the Moon, including Apollo 13.

From the nine-page presentation, Mr. Adamo of United Space Alliance, LLC, shows a Mission Operations patch and mentions Flight Design and Dynamics Division, Orbit Dynamics Branch.

Seabrook Middle School and NASA Student Launch Initiative

HAROLD LARSON, NASA-HOUSTON ROCKET CLUB

Every Thursday afternoon at Seabrook Middle School, a group of about a dozen students gather to prepare a Preliminary Design Review for a NASA-sponsored Student Launch Initiative project. The goal is to launch a student-built rocket to approximately one mile, and to obtain scientific data during the flight. This PDR was held on November 28, followed by a Critical Design Review, a Flight Readiness Review, a launch at Marshall Space Flight Center in April 2008, and a Post-Launch Review. (See <http://education.msfc.nasa.gov/docs/127.htm> for details)

As the design stands, the rocket will be 61 inches long, 4 inches in diameter, and will have a launch mass of 3.5 kg. Thrust is provided by a J1999 motor, which provides 2,100 Nt. of thrust, for 0.6 seconds. Airframe will consist largely of Fiberglass-reinforced phenolic tubing and Fiberglass reinforced fins, since burnout velocity is expected to be about Mach 1.1. A screen shot of a "Rocksim" simulation appears in Figure 1.

Going from a standing start to Mach 1.1 in 0.6 seconds implies an acceleration of about 70 times gravity, so construction of this rocket will involve materials normally used by the high power rocketry hobby. This G loading also constrains the design of the onboard instrumentation packages.

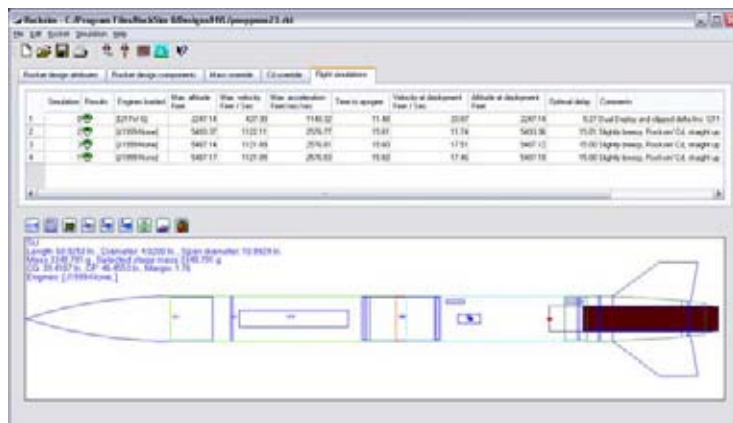
Modeled vehicle performance is summarized in the plot below. Acceleration (in red) peaks at 2,550 ft/sec/sec, and thrust terminates at 0.6 seconds. Velocity (in green) peaks at 1,100 ft/sec at motor burnout, so the rocket will be briefly supersonic. Altitude (in blue) at burnout is just under 400 feet, thus, the majority of the flight will consist of a coast from 400 feet to 5,400 feet, expected to take a total of 17 seconds.

The students' goals are to measure rocket drag coefficient in the transonic-supersonic region by measuring deceleration just after burnout, and to measure stagnation temperature at the nose cone tip. These measurements will require onboard data logging, which will be based on either a Microchip "PIC" microcontroller, or on an "Arduino" C-programmable microcontroller. Both micros run at similar speeds and have onboard A/D inputs, so the final choice will be a matter of preference by the payload specialist.

The Seabrook team will get a single launch attempt at Marshall in April, thus at least one test launch is planned at Johnson Space Center before then. Since a full-power launch will exceed the local rocket club waiver of 2,500 feet, this test launch will use a smaller I211 motor, expected to go to 2,250 feet. The test launch will prove out the rocket's data acquisition systems as well as the parachute deployment systems. Timing for this launch is not yet known, but will likely be during a Saturday launch by the NASA-Houston Rocket Club (see www.nhrc.homestead.com).

Seabrook's participation in the Student Launch Initiative program is due to the results of the "Team America" rocketry challenge (see www.rocketcontest.org). Seabrook came in 18th nationally out of some 700 teams entered, and thus qualified for an invitation to participate in SLI. Original "Team America" members Daniel Kim, Kunal Abichandani, Nick Doyle, and Kayla Esquivel have recruited additional students for this SLI project, and the project roster now includes:

Mrs. Sam Youts, faculty leader
Michael Pontikos, overall lead
Brittni Boettger, proposal lead

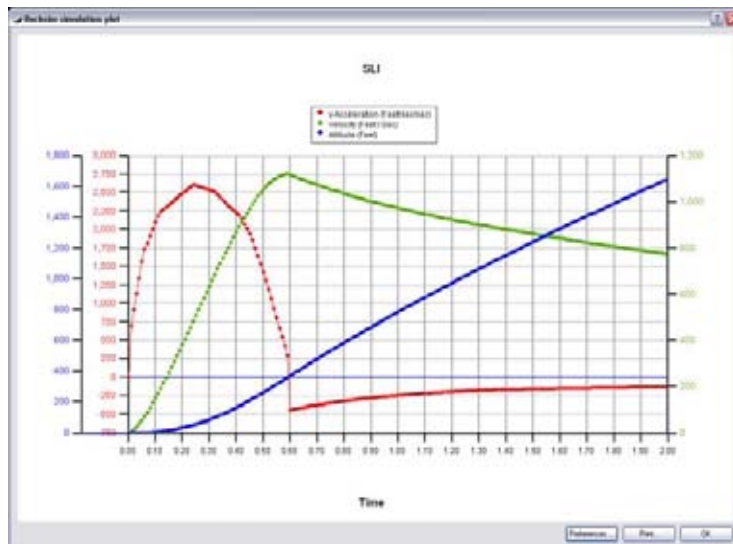


Kayla Esquivel, outreach lead
Daniel Kim, scientific payload lead

Figure 1: Rocksim

Kelden Pehr
Kunal Abichandani
Brian Boettger
Jake Cover
Nick Doyle
Neelay Fruitwala
Jason Klein
Nicholaus Pehr
Austin Sandel

Further details of this project can be found at www.seabrook-sli.com.



Local News **Lockheed Martin Team Opens EDL**

JON BERNDT, EDITOR, HORIZONS

The Lockheed Martin, United Space Alliance, and Honeywell jointly funded Exploration Development Laboratory (EDL) in Webster, Texas, was opened with a celebration on the morning of Wednesday, 12 December. In attendance were representatives from all three companies, NASA, local media, state and local government representatives, and many others (including this Editor).

simulations using flight-like elements.

- System engineering, integration, and test.
- Human factors and interfaces.
- Constellation operations.

Regarding the last item, above, The Lockheed Martin team in the future plans to expand the EDL to support additional Constel-

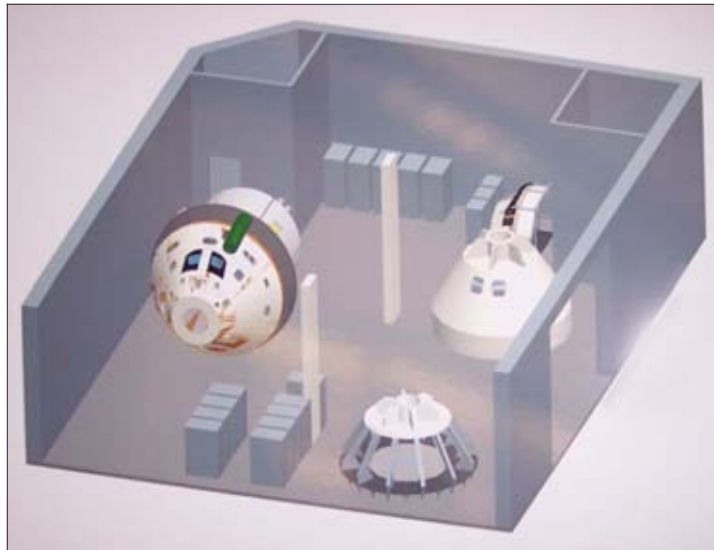
At the EDL opening, a mockup of the Orion Crew Exploration Vehicle (CEV) was open for viewing. The mockup was built during the proposal process, and externally it represents the 504 vehicle. Internally, the mockup has been updated to represent the more recent 606A iteration. There are five seats mounted inside, but a sixth was removed to facilitate entry and exit. According to Lockheed, the mockup will be used by NASA and the Lockheed Martin team to "perform fact-finding activities, such as reach zone, panel displays, internal lighting assessment, seat mockup and development, docking hatch development, crew stowage, hand controller development, and other human interface devices."

Adjacent to the CEV mockup was a pilot-in-the-loop / hardware-in-the-loop CEV simulator. The underlying core simulation is Lockheed's OSIRIS simulation. OSIRIS is built on top of the Johnson Space Center developed Trick simulation framework. Interfaced with the simulation are three Honeywell flight control modules of the type built for the Boeing 787. The FCM units connected to the simulator are not spaceflight qualified, but they nonetheless give an early capability in the simulation. Also inter-

(Continued on page 19)

Image captions: At right, the planned layout in the EDL. An Orion capsule with Service Module is shown as a future addition. The open structure near the front of the lab in the plan image is a boilerplate Pad Abort 1 article. The cockpit mockup is further back, and behind that is a standup simulated crew station.

At bottom right, the editor flies a simple simulated docking approach. The cylindrical device in the background shows the jets firing (red lights).



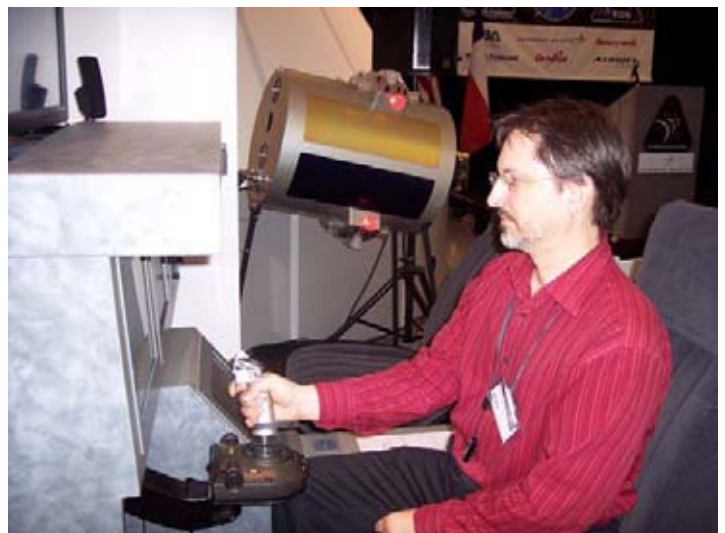
According to Lockheed Martin, the facility's capabilities are being designed "from the ground up as a set of distributed System Integration Labs (SIL), including a 10,000 square foot facility in Houston, TX, to join facilities in Denver, CO, Glendale, AZ, and Arlington, VA."

One of the goals of the facility is to reduce program risk by providing an early opportunity for testing avionics and software exactly as they are to eventually fly. Another goal is to enable increased collaboration between centers distributed throughout the U.S.

The EDL will focus particularly on these tasks:

- Human-rated avionics, software, autonomy, sensors and

lation elements such as the Ares V booster and the lunar lander program (now called "Altair").





(Continued from page 18)

faced with OSIRIS is a propulsion simulation device, which shows visually which reaction control jets are being fired at any time during a maneuver. I had the opportunity to fly a simplified docking with ISS, from a very short range. Translational control was provided through the joystick when a trigger was squeezed, otherwise, the stick acted as a

traditional rotational hand controller.

A CEV boilerplate structure was present in the EDL. The structure is being used as a rig to support testing and development of systems to be used for the Pad Abort 1 (PA-1) flight test next year at White Sands Missile Range in New Mexico.

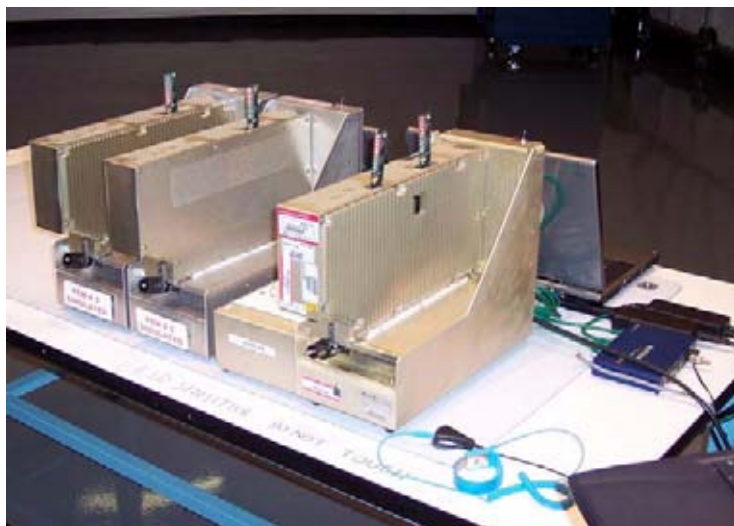


Image captions: Above left, EDL CEV low fidelity cockpit mockup. Above right, Honeywell Flight Control Modules (FCM).

Below left, EDL CEV low fidelity cockpit mockup; crew seats and displays and controls. Below right, Orion displays and controls simulator.



Local News

SPACEHAB SUBSIDIARY WINS FIRST COMPETED CONTRACT UNDER RECENTLY AWARDED VAFB IDIQ

Houston, Texas, August 27, 2007 – SPACEHAB, Incorporated (NASDAQ: SPAB), a leading provider of commercial space services, today announced that its Astrotech Space Operations subsidiary has won the first fully funded task order under the recently awarded Vandenberg Air Force Base (VAFB) indefinite delivery, indefinite quantity (IDIQ) contract for the Ocean Surface Topography Mission (OSTM)/Jason-2.

On June 25, the SPACEHAB subsidiary announced the award of a \$35 million indefinite delivery, indefinite quantity contract for payload processing support on several upcoming NASA spacecraft missions, for which each must be individually competed. OSTM is the first in the series to be awarded.

“The OSTM contract award is an important accomplishment for us as it underscores the confidence our valuable customers have in the capabilities, safety, and customer service associated with the Astrotech name,” said Don M. White Jr., Astrotech General Manager.

OSTM, scheduled to launch from VAFB in mid 2008, is the next-generation ocean altimetry mission to extend the time series of sea surface topography measurements begun by TOPEX/Poseidon (1992-2005) and continued by Jason-1 launched in 2001. A four-partner mission between NASA/JPL, Centre National d’Etudes Spatiales (CNES), the European Organization for the Exploitation of Meteorological Satellites (Eumetsat), and the National Oceanic and Atmospheric Administration (NOAA), OSTM will measure sea surface height to an accuracy of less than 4 cm very ten days. These precise measurements will help scientists better understand ocean circulation and its effect on global climate.

SPACEHAB SUBSIDIARY WINS INTERSTELLAR BOUNDARY EXPLORER MISSION CONTRACT

Houston, Texas, October 4, 2007 – SPACEHAB, Incorporated (NASDAQ: SPAB), a leading provider of commercial space services, today announced that its Astrotech Space Operations subsidiary has won an additional fully funded task order under the recently awarded Vandenberg Air Force Base (VAFB) indefinite delivery, indefinite quantity (IDIQ) contract. The Company will provide facilities and payload processing support for NASA’s Interstellar Boundary Explorer (IBEX) spacecraft, scheduled for launch mid-2008.

IBEX is the second mission competed and won by Astrotech, under a \$35 million IDIQ contract awarded in June 2007, to provide facilities and payload processing support on several future NASA spacecraft missions. The IBEX satellite, whose key mission partners are NASA, Southwest Research Institute, and Orbital Sciences Corporation, will orbit the Earth every eight days to make the first comprehensive map of the boundary between our solar system and interstellar space. Mission managers affirm that measuring this interstellar interaction is important for understanding the Earth’s protection from galactic cosmic rays – energetic particles from beyond the solar system – that could pose health risks to future astronauts exploring deep space.

In other Astrotech news, Astrotech has been contracted by NASA, in the amount of over \$750,000, to add a laminar flow enclosure to one of its Titusville, Florida facilities. While Astrotech’s processing facilities are already certified to a stringent Class 100,000 air cleanliness level, the specialized enclosure will be an additional and effective means of achieving an even higher class of particle free environment for the NASA customer’s critical payload which will require a more highly controlled, contamination free environment.

SPACEHAB SUPPORTING KEY MILESTONES UNDER NASA SPACE ACT AGREEMENT

Company Unveils Initial Details of ARCTUS

Houston, Texas, November 19, 2007 – SPACEHAB, Incorporated (NASDAQ: SPAB), a leading provider of commercial space services, today announced that in accordance with the milestone requirements of the previously announced Space Act Agreement (SAA) with NASA, the Company hosted a formal Systems Requirements Review of its Advanced Research and Conventional Technology Utilization Spacecraft (ARCTUS) on October 25-26 at its Houston Headquarters facility. Attendees included representatives from NASA, the Federal Aviation Administration, United Launch Alliance, Cimarron, Inc., and Lockheed Martin.

The unfunded SAA, signed in June 2007, facilitates the Company’s development of a commercial transportation system capable of ferrying cargo between Earth and Low Earth Orbit. SPACEHAB has engaged key suppliers to support major elements of the ARCTUS program including launch services provider, United Launch Alliance, spacecraft bus component supplier, Lockheed Martin Space Systems, Cimarron, tasked with mission control center development and integration, and Odyssey Space Research, LLC, providing trajectory analysis and integration services.

“Our ARCTUS solution is a low cost, low risk design solution that seamlessly integrates flight proven components and does not require the development of a new launch vehicle,” said Rick Fitts, ARCTUS Program Manager. “With the arrival of the ARCTUS pressure shell mockup into our Houston facilities in July, we received the first hardware component of this innovative program,” said Fitts. SPACEHAB engineers are currently using the 500 pound mockup for internal

(Continued on page 21)

(Continued from page 20)

pressurized cargo accommodation designs.

Capable of delivering and returning pressurized cargo to and from Low Earth Orbit, ARCTUS will supply a critical 'means to an end' for two distinct, yet complementary, space transport needs. First, ARCTUS supports NASA's requirement to fill the International Space Station (ISS) cargo transport gap between the space shuttle's planned 2010 retirement and when its replacement Constellation program becomes operational in 2015. Second, ARCTUS provides SPACEHAB with an additional means of space access in support of the Company's previously announced microgravity processing initiatives, many of which are destined for production and processing on the ISS.

Consistent with the terms of the SAA, SPACEHAB conducted its Program Management Plan review in June 2007. In addition, a spacecraft Concept Review, including representatives from all ARCTUS spacecraft systems providers, was held on November 8, 2007 at Lockheed Martin's facilities in Denver, Colorado. The ARCTUS team continues to develop the spacecraft vehicle and ground systems design and is focused on the next major milestone, the Preliminary Design Review scheduled for early 2008.

SPACEHAB RESPONDS TO NASA RFP SEEKING COMMERCIAL ISS RESUPPLY MEANS

Company and Renowned Affiliate Team Propose ARCTUS as Most Viable Transport Solution

Houston, Texas, November 29, 2007 – SPACEHAB, Incorporated (NASDAQ: SPAB), a leading provider of commercial space services, today announced that the Company has submitted a formal proposal response to NASA's Commercial Orbital Transportation Services (COTS) Phase 1 Demonstrations Request for Proposal (RFP) based on the Advanced Research and Conven-

tional Technology Utilization Spacecraft

(ARCTUS) design. SPACEHAB, together with its aerospace affiliates Lockheed Martin, United Launch Alliance, Cimarron and Odyssey Space Research, is developing a commercial cargo transportation capability to serve both NASA's needs for cargo services to the International Space Station (ISS) as well as other commercial needs, including SPACEHAB's recently announced Microgravity Processing activities.

NASA released the COTS Phase 1 RFP in October 2007 seeking one or more funded Space Act Agreements (SAAs) with private industry. The effort calls for the development and demonstration of the vehicles, systems, and operations needed to resupply, return cargo from, and transport crew to and from low Earth orbit after 2010, helping fill the gap between the space shuttle's scheduled retirement and 2015 when the planned replacement Constellation Program becomes operational.

SPACEHAB's COTS solution draws heavily from existing components and infrastructure providing a reliable, low-cost, and low-risk solution. The ARCTUS design philosophy has been to utilize flight proven systems, hardware and assets to the greatest extent possible. This approach ensures availability, reduces flight risks, and minimizes cost while meeting all NASA requirements for this much needed service.

Spacecraft structural and avionics components will be obtained from Lockheed Martin and are derived from the Centaur and XSS-11 programs. Launch services will be procured through United Launch Alliance utilizing the successful Evolved Expendable Launch Vehicles (EELV) Atlas V or Delta IV. Cimarron will provide mission control center development and integration while Odyssey Space Research will perform trajectory analysis and provide associated integration services.

SPACEHAB is currently working to develop ARCTUS under an unfunded SAA with NASA. The COTS I award, expected in early 2008, will provide NASA investment to the winning solution(s) through a funded SAA. NASA has announced that up to \$174 million is available under this pending COTS I award.

"The tremendous flexibility afforded by the ARCTUS design translates to the most cost effective cargo service for our NASA customer," said Rick Fitts, SPACEHAB Vice President and ARCTUS Program Manager. "We are confident that our approach will allow us to meet NASA's projected need for reliable, affordable cargo services to the ISS, thereby ensuring continued domestic access to the station after the planned shuttle retirement. This capability is not only important to NASA, but will also provide us with assured access to the station to support our planned commercial utilization of the ISS National Laboratory," he said.

SPACEHAB REALIGNS CORPORATION

Company Positioned to Capture NASA COTS Business

Houston, Texas, December 10, 2007 – SPACEHAB, Incorporated (NASDAQ: SPABD), a leading provider of commercial space services, today announced an initiative to align the corporate structure and personnel toward its strategic direction of winning the NASA Commercial Orbital Transportation Services (COTS) funded Space Act Agreement, due to be awarded February 2008, and to process and manufacture products in microgravity on the International Space Station (ISS).

"We have determined that the ability to provide cost effective, reliable cargo services to space is critical to the overall success of the ISS National Laboratory and to SPACEHAB's microgravity processing business plan," said SPACEHAB Chief Executive Officer, Thomas B.

(Continued on page 27)

Local News (cont'd)

CALNDAR

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

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

January

- 11 Lunch & Learn: Space and Astronomy, Decade by Decade
(Sponsored by the Astrodynamics Technical Committee)
Location: Gilruth (Room is TBD: see the web site for more information)
Time: 1200—1300
Speaker: Marianne Dyson, author and former NASA flight controller (www.mdyson.com)
- 25 Michael Coats, Director, NASA Johnson Space Center, Gilruth Center Alamo Ballroom, "State of the Center"

March

- 11 John Frassanito & Associates: NASA/JSC Gilruth Center

Cranium Cruncher

BILL MILLER, SENIOR MEMBER

Last issue's puzzle dealt with a fictional shaft bored from pole to pole on the Moon. The question was, for a nonrotating, uniform density Moon and a perfect vacuum in the shaft, what is the resultant motion for an object dropped into the shaft?

Answer:

The acceleration of the object is solely due to gravitational attraction of the spherical portion of the Moon whose radius is measured from the centroid to the package at any moment. The gravitational attraction of the spherical shell portion of the Moon "above" the object cancels out and has no effect.

So, at any time the mass M of the partial Moon sphere "below" the object is:

$$(1) M = (4/3) \pi r^3 \rho$$

Where r = distance from centroid to object at given time

ρ = density of Moon

The gravitational acceleration a caused by this mass is:

$$(2) a = (G M) / r^2$$

Where G = gravitational constant

If we substitute (1) into (2) we get:

$$(3) a = (G (4/3) \pi r \rho)$$

Since everything in the equation is constant except r this means that the acceleration is proportional to the displacement. Call the acceleration at the Moon's surface g_M and the full radius of the Moon r_M , then the acceleration at any r will be proportional:

$$(4) a = r g_M / r_M$$

This lets us see that the resultant motion will be a harmonic oscillator. Since for this type of motion

$$(5) a = \omega^2 r$$

Where ω = the frequency of oscillation

We can substitute (4) into (5) and solve for ω . The "r"s cancel and the frequency comes out to be

$$(6) \omega = \sqrt{g_M / r_M}$$

Using simplistic values of lunar surface acceleration of 1.6 m/s^2 and lunar radius of 1740 kilometers, the frequency comes out to be $9.6 \times 10^{-4} \text{ rad/sec}$ and the period to be about 109 minutes.

Thus, the object will accelerate down the shaft, reaching a maximum velocity at the center of the Moon. It will then decelerate on the other half of the trip and come to rest just as it reaches the other pole of the Moon about 54 minutes from release, then accelerate back down the shaft and continue this forever.

For the second part of the problem, the initial acceleration is just reduced by the cosine of the shaft angle (the rest becomes normal force), but still drops to zero as the object passes the midpoint. Since the length of the shaft is reduced by the same factor and everything stays proportional, the time of flight comes out to be exactly the same.

Correct solutions were received from Joe Frisbee and Gary Turner.

References: A Google search will turn up many. There is a good discussion for the same problem, (except for the Earth), at <http://www.physicsforums.com/showthread.php?t=9625>

Odds and Ends

SPECIAL EVENTS, PICTORIALS, ETC.



Above: [Editor: One of my favorite aircraft is the B-17G. This image, in particular, is one of the best I've seen. The photograph is reproduced here with the permission of the photographer, Christophe Haentjens, Crazy Horse Aviation Photography (<http://www.crazyhorseap.be>), via www.airliners.net.] Writes Christophe: The picture was taken at the 2006 Duxford (Cambridge, UK) "Flying Legends" airshow. This was held on July 8th & 9th. B-17 "Sally B" from B-17 Preservation in the UK & B-17 "Pink Lady" from Association Fortresse Toujours Volant en France were flying together for the massed crowds.



Left: The NASA Mars Exploration Rovers just keep going and going. From <http://marsrovers.jpl.nasa.gov>: "The deck of NASA's Mars Exploration Rover Spirit is so dusty that the rover almost blends into the dusty background in this image assembled from frames taken by the panoramic camera (Pancam) during the period from Spirit's Sol 1,355 through Sol 1,358 (Oct. 26-29, 2007). Dust on the solar panels reduces the amount of electrical power the rover can generate from sunlight each sol. Earlier self-portraits by Spirit, such as one taken on Sol 586, offer a comparison view of cleaner solar panels. The vertical projection used here produces the best view of the rover deck, though it distorts the ground and antennas somewhat." Approximate true color image.



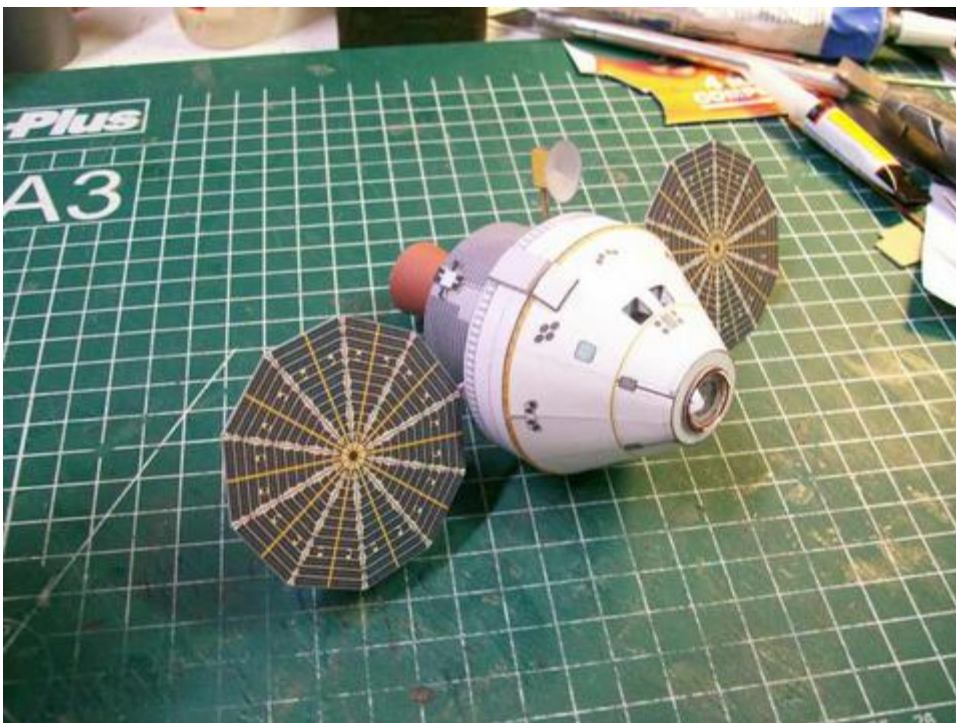
You can search YouTube with the phrase “747 St. Maartens” and get some really nice videos of planes landing in a picturesque setting. One of them, in particular, stands out. This approach is about as low as you can get without being a submarine:

<http://www.youtube.com/watch?v=zAfQwDizpRo>



See what happens when a **LARGE** Star Wars X-wing fighter model is launched:

http://www.youtube.com/watch?v=F_9C-ffxDOW



We’ve mentioned paper models here before, but that was some time ago, and there are new models to be seen. Among them are a more recent version of the Lockheed Martin Orion CEV. The Ares-1 needs to be updated, but it still looks like it could be some fun over the holidays. See many models here:

http://jleslie48.com/gallery_models_real.html



Conference Presentations/Articles by Houston Section Members

COMPILED BY THE EDITOR FROM AIAA AGENDAS, SUBMISSIONS, ETC.

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

7 - 10 Jan 2008

46th AIAA Aerospace Sciences Meeting and Exhibit
Grand Sierra Resort Hotel (Formerly Reno Hilton)
Reno, Nevada

Application of active flow control technology in an unmanned aerial vehicle

G. Agarwal and O. Rediniotis, Texas A&M University, College Station, TX; I. Ekoto, Sandia National Laboratories, Livermore, CA

Laminar Flow Control on a Swept Wing with Distributed Roughness

W. Saric, A. Carpenter and H. Reed, Texas A and M University, College Station, TX

International Space Station Research—Accomplishments and Pathways for Exploration and Fundamental Research

J. Robinson, NASA Johnson Space Center, Houston, TX

Aerodynamic Evaluation and Optimization of the Houck Joined Wing Aircraft

B. Oligney and M. Frash, U.S. Air Force Academy, Katy, TX

Ares- I- X Preliminary Range Safety Malfunction Turn Analysis

J. Beaty and B. Starr, NASA - Langley Research Center, Hampton, VA;

J. Gowan, NASA - Johnson Space Center, Houston, TX

Current Technology Developments in Exploration Life Support Systems

D. Barta, NASA Johnson Space Center, Houston, TX

Oral Presentation

Uncertainty Propagation with the Fokker- Planck Equation (Graduate Award)

M. Kumar, Texas A&M University, College Station, TX

Structural Transitions of MR Fluids in Microgravity

E. Furst, University of Delaware, Newark, DE; J. Agui, NASA Glenn Research Center, Cleveland, OH; J. Williams, NASA Johnson Space Center, Houston, TX; P. Vasquez, University of Delaware, Newark, DE

VASIMR VX- 100 Engine: Next Step to High Power Electric Propulsion

E. Bering and B. Longmier, University of Houston, Houston, TX; F. Chang-Diaz, J. Squire and V. Jacobson, Ad Astra Rocket Company, Houston, TX; M. Brukardt, University of Houston, Houston, TX

Protuberance Boundary Layer Transition Test of CEV Entry Vehicle at Mach 6

T. Horvath, B. Hollis, K. Berger and S. Berry, NASA Langley Research Center, Hampton, VA; A. Amar, NASA Johnson Space Center, Houston, TX

An Experimental and Computational Study of High Enthalpy Convective Heating on the NASA CEV

J. Olejniczak, NASA Ames Research Center, Moffett Field, CA; A. Amar, K. Dries, B. Kirk and R. Lillard, NASA Johnson Space Center, Houston, TX; S. Laurence, California Institute of Technology, Pasadena, CA

dena, CA

An Hemodynamic Application on a Distributed Computing Environment

B. Hadri, H. Ltaief and M. Garbey, University of Houston, Houston, TX

Roughness-Induced Transition and Transient Growth: Experiences Applying the Triad (Invited)

E. White, Texas A&M University, College Station, TX

Time Marching Kernel Approximated Euler Equations Using Complex Variables for Meshfree CFD

A. Garza and N. Butuk, Prairie View A&M University, Cypress, TX

Estimation of the Unsteady Aerodynamic Load on Space Shuttle External Tank Protuberances from a Component Wind Tunnel Test

J. Panda, NASA Glenn Research Center, Brookpark, OH; F. Martin, NASA Johnson Space Center, Houston, TX; D. Sutcliff, NASA Glenn Research Center, Brookpark, OH

Laboratory Experiences in a Mechanical and Aerospace Engineering Department (Invited)

E. White, Texas A&M University, College Station, TX

Effects of Three- Dimensionality in Turbulent Compression Ramp Shock- Boundary Layer Interaction Computations

A. Oliver and A. Lyrantzis, Purdue University, West Lafayette, IN; R. Lillard, NASA/JSC, Houston, TX; G. Blaisdell, Purdue University, West Lafayette, IN

Flow Loop Experiments using PAO Nanofluids

I. Nelson and D. Banerjee, Texas A&M University, College Station, TX; R. Ponnappan, Asian Office of Aerospace Research and Development (AOARD), Tokyo, Japan

Effects of Free Molecular Heating on the Space Shuttle Active Thermal Control System

P. McCloud and C. Wobick, Boeing, Houston, TX

Separation Control on NACA 0015 using Pulsed Air Blowing

G. Agarwal and O. Rediniotis, Texas A&M University, College Station, TX; L. Traub, Embry-Riddle Aeronautical University, Prescott, AZ

Experimental Investigation of the Leading- Edge Flow of a Dynamically Pitching Airfoil

D. Sahoo and R. Bowersox, Texas A&M University, College Station, TX; and L. Goss, ISSI, Dayton, OH

Rotational/vibrational Raman line- imaging measurements in supersonic flows

B. Cohen, A. Bayeh and A. Karpetis, Texas A&M University, College Station, TX

U.S. Air Force T & E Days

(Continued on page 27)

(Continued from page 26)

5 - 7 Feb 2008

**Sheraton Gateway Hotel Los Angeles Airport
Los Angeles, California**

Development of a Test & Verification Approach for the Constellation Program

E. Strong, NASA Johnson Space Center, Houston, TX

Swept-Wing Laminar Flow Control Studies Using Cessna O-2A Test Aircraft

R. Martin, Northrop Grumman Corporation, Palmdale, CA; and A. Carpenter, Texas A&M University, Bryan, TX

(Continued from page 21)

Pickens III. "The COTS program represents a big step in the development of a viable business that will ultimately attract both capital and customers."

Leveraging the Company's 23-year heritage of supporting NASA's space cargo needs, SPACEHAB is realigning its current business structure to better serve NASA's future logistics needs. "We believe SPACEHAB is the most credible company that can deliver payloads to the ISS by 2010 as is called for under NASA's COTS requirements," continued Pickens. "In response to our commitment, we determined that the Company needed to reposition its personnel and business units to be focused on our COTS business plan including developing the Advanced Research and Conventional Technology Utilization Spacecraft (ARCTUS) and processing microgravity products on the ISS," he added. SPACEHAB formed the following four new subsidiaries to advance these initiatives:

Introducing SPACEHAB Orbital Transportation, Inc.

The SPACEHAB Orbital Transportation (SOT) business is intensely focused on the design, manufacturing and launch of the ARCTUS vehicle. ARCTUS is being developed primarily from off-the-shelf, proven hardware and utilizes existing reliable launch vehicles to provide the least-cost, least-risk solution for NASA. Additionally, with the planned increase in crew size expanding from the current three astronauts to a crew of six, cou-

pled with the planned shuttle retirement in 2010, SOT expects to be a primary revenue source for the Company through the delivery of complex cargo and research to the ISS.

Introducing SPACEHAB Microgravity Sciences, Inc.

In April 2007, the Company announced that it had completed its analysis of the over 2,000 experiments sent to microgravity and as a result, has selected various life science products to begin producing on the ISS, now designated as a U.S. National Laboratory. In response to NASA's Announcement of Opportunity for ISS utilization issued in August 2007, SPACEHAB responded with an achievable proposal and awaits the Agency's response, expected in early 2008. In parallel to this initiative, SPACEHAB created a new subsidiary, SPACEHAB Microgravity Sciences (SMS), to focus on the processing of microgravity products.

SMS flew its first commercial microgravity processing samples on space shuttle flight STS-116 where they were transferred to the ISS for processing. The finished products were returned to Earth on the STS-118 mission in November and early analysis has determined a successful mission. Based on existing and newly established relationships with the pharmaceutical and academia sectors, results from these and other microgravity products are expected to form the foundation of this new revenue-generating business.

Introducing SPACETECH, Inc.

With the formation of SPACETECH, the Company has designed a technology transfer, product development, and sales-focused business approach to transform space-based technologies and products into commercial applications, useful products, intellectual property (IP), and possible spin-off businesses. The Company has established a development and sales process expressly for the commercialization of microgravity products and products using space-related IP.

Introducing SPACEHAB Engineering Services

SPACEHAB Engineering Services (SES) is a business hybrid of the former SPACEHAB Government Services and SPACEHAB Flight Services and is continuing to operate in support of current government and commercial customers providing specialized design, development and fabrication of flight hardware, ground systems, and mockups, as well as large scale program data management.

Additionally, Astrotech Space Operations continues profitable operations at its Florida and California facilities processing both government and commercial satellites before launch. The Astrotech business is also currently expanding its menu of services to support the COTS integration, ground communication and launch support requirements.

With these business realignments, significant efficiencies have been achieved resulting in staff reductions of 21 positions

(Continued on page 28)

Local News (cont'd)

Sister Section Relationship with AAAF Toulouse Reaffirmed

DOUGLAS YAZELL, CHAIR

The proclamation declaring our sister section relationship with AAAF Toulouse – Midi-Pyrenees branch was signed on October 23, 2007. It was signed by Douglas Yazell in Houston and by Alain Chevalier and Garrett Smith in Toulouse. It specifies a three-year term, and our plans are to vote again in three years to keep it going for another three or five years at a time. We have some ideas about making this come alive. Thirty AAAF members could travel to Houston, Orlando, and DC in late October and early November of 2008. Thirty AIAA members could travel to Toulouse, Pau, and Bordeaux in 2009. Our proclamation encourages the exchange of technical information within limits set by our employers and national governments, so a conference might take place, and if so, it will be discussed soon so that we can have a three-year planning horizon. The proclamation reads as follows:

Proclamation

Whereas

The American Institute of Aeronautics and Astronautics (AIAA) and the "Association Aeronautique et Astronautique de France" (AAAF) signed a strategic alliance protocol at the Paris Air Show on June 21, 2007, announcing their desire to develop trans-Atlantic cooperation between the two professional societies, and

Whereas

AIAA Houston Section and AAAF Toulouse – Midi-Pyrenees branch share many common interests in space tourism, human space programs, and the professions of aeronautics and astronautics, and

Whereas

France and the United States of America celebrate their centuries-long friendship and their more recent work as teammates on the Space Shuttle program, the International Space Station program, and many more aerospace projects,

Therefore

We hereby initiate the sister section relationship between AIAA Houston Section and AAAF Toulouse – Midi-Pyrenees branch.

Commitments and obligations are specified in this document, which was approved by AIAA Houston Section on Monday, September 10, 2007, and approved by AAAF Toulouse – Midi-Pyrenees branch on Tuesday, September 18, 2007. AIAA Houston Section shall seek re-approval of this document every three years. Note that July 1 is the start of the new year for AIAA Houston Section. AAAF Toulouse – Midi-Pyrenees branch shall seek re-approval of this document every three years. Note that September 1 is the start of the new year for AAAF Toulouse – Midi-Pyrenees branch.

Each sister section shall encourage professional contacts and friendship among the two sister sections. Each sister section shall encourage, welcome, and enhance visits between members, including friends and family who travel with them. Exchange of technical information shall be encouraged while respecting the requirements of our employers and national governments.

Signed on Tuesday, October 23, 2007:

AIAA Houston Section: Douglas Yazell

Signed on Tuesday, October 23, 2007:

AAAF Toulouse – Midi-Pyrenees branch: Garrett Smith and Alain Chevalier

While our Russian sister section is only an idea, we have made progress. Ludmila Dmitriev-Odier is our new chair of the International Space Activities Committee (ISAC). With some help for travel expenses from AIAA, she traveled to Moscow and Baikonur to see her son-in-law launched as commander of a three-person crew in a Soyuz capsule. She worked to make her ideas for our Russian sister section come alive, and this journey is an excellent beginning.

Local News

(Cont'd.)

(Continued from page 27)

and major reductions in corporate general and administrative expenses estimating an annual cost savings of \$2.5 million, while costing approximately \$81,000 to implement.

"We believe the realignment and efficiency measures announced today will enable SPACEHAB to make significant strides in our newly identified business divisions," said Pickens. "Through providing these entrepreneurially-unique capabilities to both an established customer base and new client sectors, SPACEHAB is committed to leading our customers, employees and shareholders in a clear and profitable direction," he said.

SPACEHAB UNVEILS ARCTUS WEBSITE

www.arctus-spacecraft.com Now Live as Official Gateway for Program Information

Houston, Texas, December 10, 2007 – SPACEHAB, Incorporated (NASDAQ: SPAB), a leading provider of commercial space services, today announced the release of a dedicated website for its Advanced Research and Conventional Technology Utilization Spacecraft (ARCTUS) Program at **www.arctus-spacecraft.com**. As previously

announced, the Company is on track to meeting its strategic goal of developing a commercial transportation system capable of ferrying cargo between Earth and Low Earth Orbit. Significant program milestone achievements thus far include the successful completion of a Program Management Plan, the Systems Requirements Review, a Vehicle Concept Review, and the fabrication of a full-scale internal and external mockup.

The website provides detailed technical resources to SPACEHAB partners, investors, and potential customers describing the spacecraft, system architecture and key supplier roles and contributions. Additionally, visitors can access a comprehensive archive of press releases, photos and graphics, as well as ARCTUS literature and contact information.

The ARCTUS Program will support NASA's requirement to fill the International Space Station (ISS) cargo supply gap between the space shuttle's planned 2010 retirement and its replacement Constellation program scheduled to be operational in 2015. ARCTUS will also provide SPACEHAB with an additional means of space access in support of the Company's previously announced SPACEHAB Microgravity Sciences initiatives, many of which are destined for production and processing on the ISS.

AIAA Houston Section News

AIAA Foundation 2008-2009 Scholarship and Graduate Awards

Along with our own Houston Section "Spirit of Apollo" Scholarship, there are more scholarship award opportunities through the AIAA Foundation. Every year the AIAA Foundation funds 30 scholarships of \$2000 - \$2500 for college sophomores, juniors, and seniors, and 14 separate graduate student awards worth \$5000 and \$10,000. Deadline for applications for the 2008-2009 Academic Year is January 2008. The goal of AIAA Foundation is to attract top science and engineering students to aerospace fields ... to provide high-visibility recognition of these students and their work ... to furnish financial assistance to aerospace students in need ... and to assure the availability of talented professionals that the aerospace industry will require in the years ahead. Detailed information and on-line applications for the AIAA Foundation Scholarships can be found on the AIAA National website, under the *Students and Educators/Scholarships* page at: <http://www.aiaa.org/content.cfm?pageid=211>. Please share this AIAA Foundation Scholarships information with the deserving students you know!

Houston Section Presents Award to Fredericksburg Teacher

You may recall an article in an issue of Horizons from a couple of years ago about the rocket program at Fredericksburg High School in Texas. Instructor Brett Williams started that program, which has grown. The award is a special service citation, "In Recognition of Exemplary Educational Leadership by Instituting a Rocket Building Program at the High School Level and Motivating Students in Science and Technology". It is signed by AIAA President Paul Nielsen, and VP of member services Catherine Downen.



(L to R): Lorenn Vega-Martinez, Councilor, Svetlana Hanson, Pre-College, Sarah Shull, Secretary, Carson Dickie, non-profit group with Brett Williams, teacher, non-profit group (awardee), BeBe Kelly-Serrato, Space Operations & Support, Robert Beremand, GN&C, Douglas Yazell, Chair, Michael Lembeck, Space Commercialization, Gabe Garrett, Communications

AIAA Houston Section Wins AIAA National Awards

Reston, VA, 19 September 2007 - The American Institute of Aeronautics and Astronautics (AIAA) is proud to announce the 2006/2007 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 **Outstanding Section Award** is presented to sections judged on

their overall activities and contributions throughout the year. The basis for this award is the Section Annual Report. The winners are:

Very Large Category

1st Place Houston Jayant Ramakrishnan, Section Chair
2nd Place Los Angeles L. Jane Hansen, Section Chair
3rd Place National Capital Michael Wooster, Section Chair
Honorable Mention Pacific Northwest Paul Kostek, Section Chair

The **Career Enhancement Award** is presented for section activities that are beneficial to career development. The winners are:

Very Large Category

1st Place Los Angeles M. Richard Denison, Career Officer
2nd Place Hampton Roads Christopher Rumsey, Career Officer
3rd Place Houston Elizabeth Zapata, Career Officer

The **Communications Award** is presented to sections that have developed and implemented an outstanding communication outreach program during the section year. The winners are:

Very Large Category

1st Place Houston Jon Berndt, Section Newsletter Editor
2nd Place Dayton/Cincinnati Richard Snyder, Section Newsletter Editor
3rd Place New England Ray Erikson, Section Newsletter Editor
Honorable Mention Los Angeles Eliza Sheppard, Section Newsletter Editor and Gina Pieri, Section Webmaster
Honorable Mention National Capital Michael Wooster, Section Chair

The **Membership Award** is presented for increasing the sections' membership by planning and implementing effective new member recruitment and retention campaigns. The winners are:

Very Large Category

1st Place Dayton/Cincinnati Jason Slagle, Membership Chair
2nd Place Hampton Roads LaTunia Pack Melton, Membership Officer
3rd Place Houston Albert Meza, Membership Officer

The **Public Policy Award** is presented to sections for stimulating public awareness of the needs and benefits of aerospace research and development, particularly on the part of government representatives, and for educating its members in the value of public policy activities. The winners are:

Very Large Category

1st Place Los Angeles Ashok Mathur, Public Policy Officer
2nd Place Houston Lynn Nicole Smith, Public Policy Officer
2nd Place Hampton Roads Lee Rich, Public Policy Officer
2nd Place Alabama/Mississippi Teri Abel, Public Policy Officer

The **Young Professional Activity Award** is presented to sections that demonstrate excellence in planning and executing successful events that encourage the participation of young members in the AIAA and provide opportunities for leadership at the sectional, regional, and national levels. The winners are:

Very Large Category

1st Place Houston Laura Slovey, Young Professional Officer
2nd Dayton/Cincinnati Julie Saladin, Young Professional Officer
3rd Place Los Angeles Stephanie Herczog, Young Professional Officer



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

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AIAA Mission & Vision Statement

The shaping, dynamic force in aerospace - THE forum for innovation, excellence and global leadership. AIAA advances the state of aerospace science, engineering, and technological leadership. Core missions include communications and advocacy, products and programs, membership value, and market and workforce development.

The World's Forum for Aerospace Leadership

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.