Horizons

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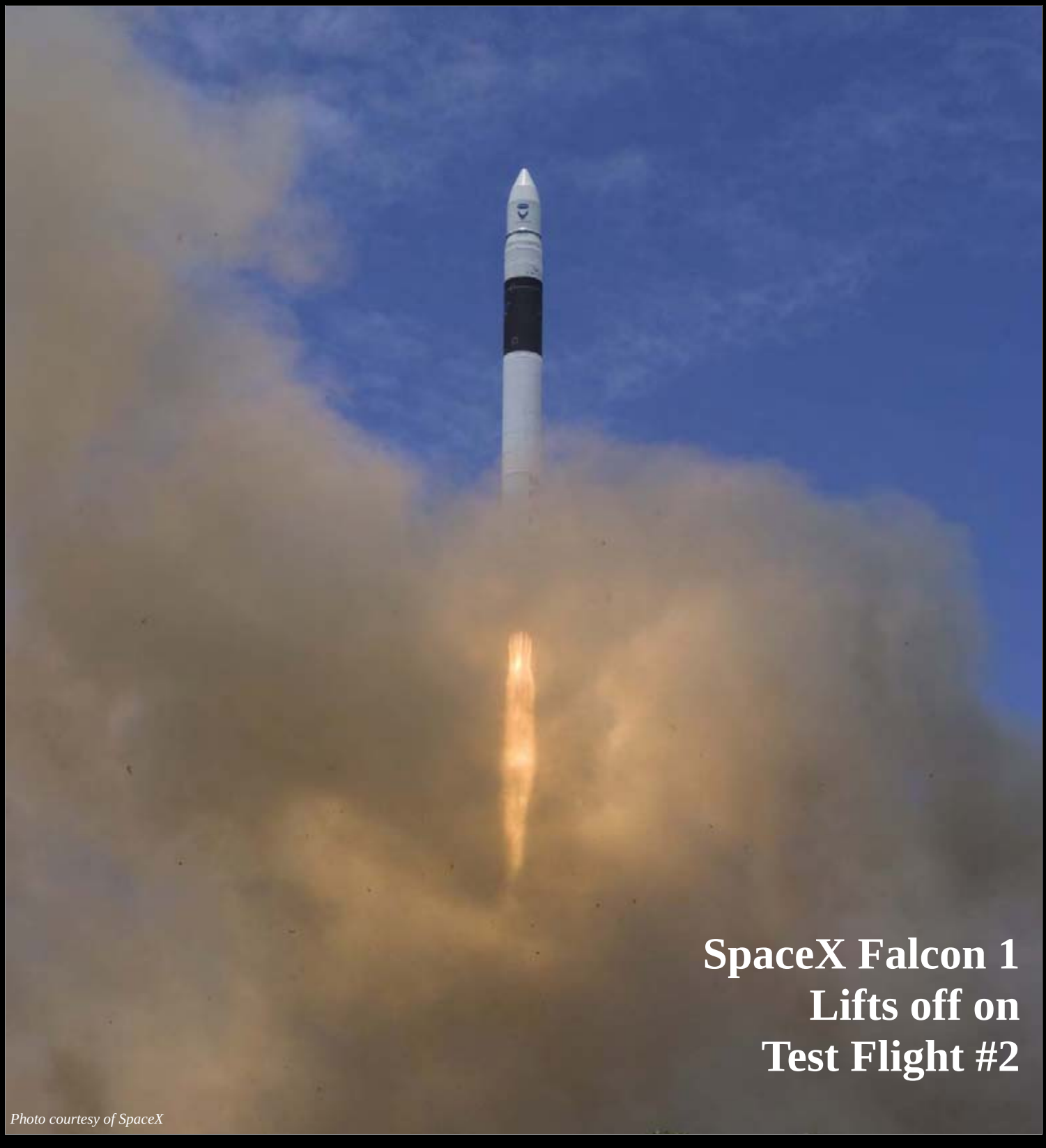


SpaceX Falcon 1 Lifts off on Test Flight #2

Photo courtesy of SpaceX

AIAA HOUSTON

American Institute of Aeronautics and Astronautics

Spring 2007

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

Jon S. Berndt
Editor

TABLE OF CONTENTS

Horizons and AIAA Houston Web Site AIAA National Communications Award Winner

2005 2006

Cover: Falcon 1 lifts off on test flight #2. Photograph courtesy of SpaceX.

From the Editor From Fort Myer to Fort Worth

JON S. BERNDT

According to the Aerospace Industries Association (AIA), 2006 was a very good year for the aerospace industry:

"*The U.S. aerospace industry was highly successful in 2006, with total deliveries projected to surpass $184 billion, up more than 8 percent from last year's $170 billion. While sales increased across the board for nearly all product and customer categories, most notable was a surge in the civil aircraft sector of 21 percent. Once again the aerospace industry was a major contributor to the nation's trade balance, with exports jumping to $82 billion. Combined with relatively flat imports of aerospace products, the net trade surplus for the sector should surpass $52 billion.*"

Library of Congress Photograph

The first solicitation for a "heavier-than-air flying machine" by the U.S. Army Signal Corps (issued in late 1907) specified that a payment of $25,000 would be made for fulfilling the listed requirements. The Wright brothers delivered to the Signal Corps at Fort Myer, Florida, a flying machine that earned a 20% bonus for flying 2 mph over the specified 40 mph nominal speed. The aircraft was accepted on August 2, 1909, becoming the world's first military aircraft. In current-year dollars, the aerospace industry has seen an average growth over the 100-year period since that first military aircraft contract was issued of about 13% annually.

Recently, I toured the F-35 Joint Strike Fighter (JSF) production and simulation facilities at the Lockheed Martin plant in Fort Worth, Texas. The 60+-year-old main facility is probably about 50 feet high, 100-200 feet wide, and over a mile long. The building was used during WWII to produce bombers. It has been used more recently in producing the F-16. F-22 final assembly is done in Marietta, but some F-22 assembly is done in Fort Worth. The facility is being prepared for JSF production, at this time.

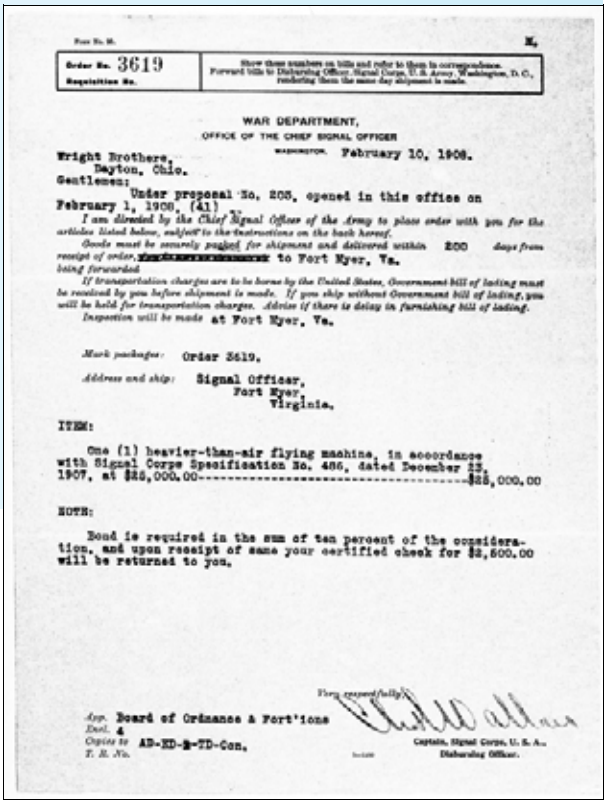
There was a noticeable lack of clutter in the plant. One policy that has been instituted is that no extraneous tools or components should be at a particular assembly station. Inventory is kept at one end of the building. There are only several hours worth of parts on the floor at a time. Everything else is kept out of the way. Items such as gloves are available in "vending machines" on the floor, where they can be checked out. The floor itself looked clean enough to eat off of.

I was quite impressed with the tools that are used in manufacturing the JSF. I saw several [huge!] milling machines. Part of the JSF manufacturing process involves taking a block of titanium and milling it to shape. Shavings are swept into a "sluice pit" where they are gathered, cleaned, and compressed into a large "hockey puck". They are then returned to the supplier for recycling. We were told that 98% of the shavings are recycled.

The JSF wing outer skins are made of composite material (cured in large autoclaves that have been installed at the plant). Composite material is laid up on the forms, cured, and later on perhaps shaved to get the exact dimension needed. A laser is employed to find high spots. For the JSF - given the nature of its stealth design - the exterior dimensions are very important and must not vary. A robotic drill is used to bore a few thousand holes in the wing panels after they are cured.

Once various panels (such as for

(continued on page 4)



Order No. 3619

WAR DEPARTMENT,
OFFICE OF THE CHIEF SIGNAL OFFICER
WASHINGTON. February 10, 1908.

Wright Brothers,
Dayton, Ohio.
Gentlemen:

Under proposal No. 205, opened in this office on February 1, 1908, (41)

I am directed by the Chief Signal Officer of the Army to place order with you for the articles listed below, subject to the instructions on the back hereof.

Goods must be securely packed for shipment and delivered within 200 days from receipt of order, [redacted] to Fort Myer, Va.

being forwarded.

If transportation charges are to be borne by the United States, Government bill of lading must be received by you before shipment is made. If you ship without Government bill of lading, you will be held for transportation charges. Advise if there is delay in furnishing bill of lading.

Inspection will be made at Fort Myer, Va.

Mark packages: Order 3619.

Address and ship: Signal Officer,
Fort Myer,
Virginia.

ITEM:

One (1) heavier-than-air flying machine, in accordance with Signal Corps Specification No. 486, dated December 23, 1907, at $25,000.00---------- $25,000.00

NOTE:

Bond is required in the sum of ten percent of the consideration, and upon receipt of same your certified check for $2,500.00 will be returned to you.

Very respectfully,

Encl. 4
Copies to AD-ED-B-TD-Con.
T. R. No.

Board of Ordnance & Fort'ions

Captain, Signal Corps, U. S. A.,
Disbursing Officer.

Purchase order from the War Department for a Wright aircraft.
Courtesy of the Library of Congress

Chair's Corner

JAYANT RAMAKRISHNAN, AIAA HOUSTON CHAIR

AIAA Houston has continued to blaze new trails, thanks to the dedication of the officers and volunteers and the support of all of you – our members. Since December 2006, we have set a blistering pace of events that appeal to all facets of our membership.

We began January 2007 with a representation at the AIAA Reno Conference. Our Chair Elect Douglas Yazell and Secretary Tim Propp were at the conference representing our section and facilitating the flow of information. As an offshoot of this effort, Douglas led the nomination of two teams at NASA JSC for National Awards. We supported the Future City Competition and also had a showing of Christa McAuliffe's "Reach for the Stars" Documentary in co-operation with AAS under the aegis of the Young Professionals Program. In February, we had an exciting Engineer's week social at the 1940 Air Terminal Museum at Hobby Airport. On a crisp Saturday morning, our members got to visit the museum and hear a presentation by Capt. A.J. High, a retired pilot before touring the facilities and seeing the inside of a Med-Vac Helicopter.

The Dinner Meeting in February co-sponsored by USALA had Mr. John Connolly from NASA JSC speaking on Lunar Exploration under the topic "Kickin' Up Some Dust". In March 2007, we co-sponsored the Space Settlement Design Competition. From the career development perspective, we decided to invite AIAA Distinguished Speaker Paul Kostek who presented "Positioning for Engineers' at the April Dinner Meeting.

We have continued to have Lunch and Learns and video showings for our membership. As I write this article, we have three major events coming up on the horizon:

1. The Annual Technical Symposium on May 11, 2007 co-sponsored by Jacobs, Lockheed Martin and USA
2. Dinner Meeting featuring Elon Musk, CEO, SpaceX on May 23, 2007
3. Awards Dinner featuring AIAA Distinguished Speaker John McMasters from the Boeing Commercial Aircraft Company

Our Election Ballots for the section will also be coming out in April 2007.

As I get ready to pass the baton over to Douglas Yazell in June 2007, let me once again encourage you to volunteer and see if AIAA-Houston can help you advance your careers. We are always looking for a few good folks to help us in different technical and operational areas. In closing, I will remind you that "The Best is Yet To Be …."

From the Editor (cont'd.)

(Continued from page 3)

the wing) are assembled, they are taken to a set of rooms where coatings are sprayed on. This process is also done automatically (under human control) in an isolated environment, because the paint is corrosive, and applied at a high temperature.

This is all on the cutting edge – among the most advanced aircraft production processes and technologies in use today (with a similar acknowledgement to the Boeing 787 team, I'm sure). But, it's amazing what can be accomplished at the other end of the spectrum, as well: by small business, in a garage, or by students at a university (and increasingly, even at the high school level). For example, using the collective knowledge that has been gained over the century since the Wright brothers improved upon the work of their predecessors and first accomplished powered, controlled flight, and using easily obtainable (off-the-shelf) technology products such as complete, compact flight control computers, one can integrate them with small R/C-size aircraft, and program them to fly autonomously over small and great distances. Seeing the tools, processes, and products at both ends of the spectrum, one can get the impression that there is nothing that cannot be built, given the will to do so. Between the extremes exist growing space trans-

(Continued on page 19)

Right: A JSF wing frame is hoisted at Lockheed Martin's plant in Fort Worth.
Photo courtesy of JSF.mil.

Team America Rocketry Challenge

Feature Article

HAROLD LARSON, VICE-PRESIDENT NHRC

Behind Building 14 at Johnson Space Center, in an area known as the Antenna Farm, an unusual rocketry project has entered its fifth year. This project has nothing to do with Mars rovers, Orion, or the ISS. Rather, it's the Team America Rocketry Challenge, known as TARC to the participants. This nationwide project is jointly run by the Aerospace Industries Association, and the National Association of Rocketry (or NAR, an amateur rocketry association). It involves students enrolled in grades 7-12 in the design, construction, and operation of rocket-propelled vehicles. Nationwide, some 685 schools are involved in the challenge, and locally teams from Clear Lake HS, the Al-Hadi School, St. Thomas, Booker T. Washington, and Seabrook Intermediate are involved.

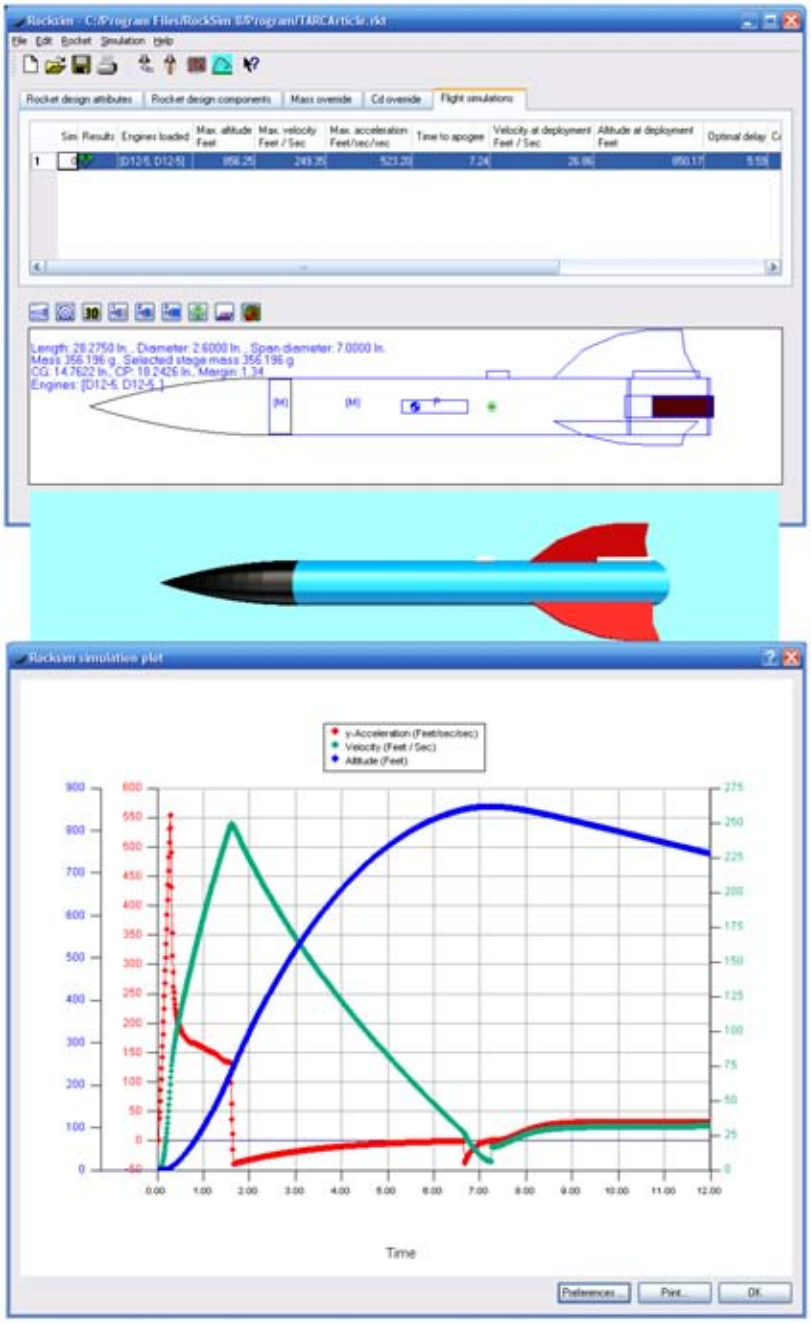
The goal of the challenge is to launch one Grade-A, raw, hen's egg to an altitude of 850 feet using only rocket power, to have the egg's capsule back on the ground precisely 45 seconds after first motion, and to do these without damage to the egg. Time of flight is measured by two observers with stopwatches, while altitude is measured by an onboard barometric pressure sensor. Of the 685 nationwide entrants, the top 100 teams will be invited to the finals, to be held in Virginia on May 19. The top 10 finishers in Virginia share in a $60,000 prize purse, and the top 25 finishers are invited to a NASA-sponsored student launch initiative, involving a sounding rocket flight. In recent years, the first place team has been given a paid trip to the Farnesboro air show. Scoring consists of taking the absolute value of the difference between actual altitude and 850 ft, plus the absolute value of the difference between actual air
time and 45 seconds; low score wins.

A typical TARC rocket is propelled by commercially-available solid fuel motors, based on either black powder (Isp~80), or ammonium perchlorate + aluminum (Isp~200). Typical airframes are cardboard tubes, about 2.5" in diameter by 18 inches long, although other shapes that contain the egg completely are acceptable. Typical launch mass is about 600 grams. Given these parameters, 50 Newtons applied for 1 second results in a burnout velocity of 240 ft/sec, and a coast to (hopefully) 850 feet. This impulse is well within the range of commercially-available motors. Aerodynamic drag is a complication, and typically results in flights ~300 feet lower than drag-free flights. Weather conditions, and especially crosswinds, provide additional complications. Return from 850 feet is typically under parachute, with the parachute deployed at apogee by an ejection charge associated with a delay train incorporated in the motor. Since delays are fixed at standard values ranging from 3 to 9 seconds, this must be considered when selecting motors. Naturally, parachute diameter must be chosen to give a return from 850 feet in about 40 seconds, or about 21 ft/second, and an egg capsule must be designed to protect the egg during landing. Fin size and location must be chosen to give stable flight, with fins sized to provide a center of aerodynamic pressure roughly two body diameters behind the vehicle's center of gravity.

The students' task is simplified by one of several available CAD programs. Using a GUI, a rocket can be designed using commercially available parts and motors, and its flight simulated in various weather conditions. Then, it is necessary to construct the flight hardware, which usually comes out a bit heavier than the simulation would have predicted.

The simulation plot, below, shows

(Continued on page 6)



AIAA
American Institute of Aeronautics and Astronautics

Sumet Joshi, of Seabrook Middle School

(Continued from page 5)

a TARC rocket reaching 856 feet on a pair of Estes D12-5 motors, a center of pressure behind the center of gravity, and a peak velocity of 243 ft/sec. Both cutaway and 3D images are possible, although the author has not determined how to duplicate the students' 'flame' paint pattern in the simulation!

Al-Hadi School Girls' Team (from left to right): Sara Pourghaed, Samira Mortazavi, Rana Laham, Maryam Tejani.

Curves of altitude (blue), velocity (green) and acceleration (red) are available within the program. Peak acceleration of 550 ft/sec^2 (17 G) is very brief, and is a feature of Estes motors. This acceleration spike ensures that the rocket is moving rapidly when it clears the 6 foot launch rod, which aids in establishing a stable flight path. This initial G loading also constrains the students' egg and altimeter packaging arrangements.

Investment in a TARC rocket is $90 for the entry fee, $55 for the altimeter, roughly $50 for miscellaneous body tubes, balsa or lite-ply fins, nose cone, and other supplies, and $10-$25 per flight, depending on motor choice. The entry fee goes to provide a discounted CAD package, to provide prize money, and to provide the site for the finals at The Plains, Virginia (on a steeplechase course near Manassas). Students are free to raise funds as they see fit, including corporate sponsorship, and there is no objection to corporate logos appearing on TARC rockets. Locally, Lyondell Chem. Co. has provided support to the three Seabrook Intermediate rocket teams.

Nick Doyle, Seabrook Middle School

High school teachers are usually not familiar with the details, and especially the safety requirements, of amateur rocketry. NAR members who have volunteered as mentors help students who have entered TARC. In particular, the NAR safety code and TARC rules mandate such items as remote electric ignition, nonmetallic external parts, audible countdowns, use of commercial motors, launch site size, misfire procedure, rocket mass limits, and recovery systems. Additionally, FAA part 101 rules generally require ATC notification for launches of rockets > 1 lb.

Over each of the last 5 years, the NASA-Houston Rocket Club (NHRC) has hosted a number of TARC teams, several of which have made it to the finals in Virginia. Club launches normally take place on the first and third Saturday of each month, beginning at 9AM, in the antenna farm behind building 14 at Johnson Space Center. During the month before the TARC deadline of April 10, launches normally occur each Saturday to accommodate last-minute teams or to make up for rainouts on earlier days. Deadline for qualification flights is April 9, and at this writing, one Seabrook team and the Clear Lake High School team have scores that are likely good enough for the finals. The finals are scheduled for May 19 in Virginia.

www.rocketcontest.org	TARC home page
www.nhrc.homestead.com	NASA-Houston Rocket Club site
www.nar.org	National Association of Rocketry site
www.perfectflite.com	TARC '15K' barometric altimeter
www.thrustcurve.org	Thrust curves for amateur rocket motors

Turning Reality into Fiction that Becomes Reality: The Challenges in Crafting an Authentic Space Thriller

Lunch and Learn Summary Report

DOUGLAS YAZELL, CHAIR-ELECT, AND BOB MAHONEY, AUTHOR

Author Bob Mahoney spoke to an audience of about 25 at NASA/JSC building 16, room 113 on Monday, October 23, 2006 at noon. The event was sponsored by our section's Astrodynamics technical committee, chaired by Dr. Albert Jackson, who introduced the speaker. The quotes below are from the publicity flier.

"The Topic: Sure, you've thought about it—taking all the excitement here at JSC and writing THE definitive *realistic* space thriller. How tough can it be? Can you really: Keep the plot exciting if you obey the laws of orbital motion? Spin a can't-put-it-down story without resorting to terrorists hijacking your spacecraft? Get past that darn redundancy…in *every*thing? Finally, can you base characters on your coworkers (*and* supervisors) without them suing you for libel?

"Mr. Mahoney left JSC almost ten years ago to actually try; *Damned to Heaven*, involving an ISS-bound shuttle marooned in orbit by a debris hit and published in 2003, was the result. (He's currently writing a novel set on a lunar base.) He returns to explain how he tackled all these things and more, along with some thoughts on the role fiction can play in the greater story of space exploration itself.

"The Speaker: Bob Mahoney served nearly ten years as a space flight instructor in MOD here at JSC. He taught astronauts, flight controllers, and fellow instructors in the disciplines of orbital mechanics ("That guy with the hula hoops!"), computers, navigation, rendezvous, and proximity operations. His duties included development of simulation scripts for both crew-specific and mission control team training. Missions he supported include STS 35, the first flight of *Spacelab* post-*Challenger*, and STS 71, the first shuttle docking to *Mir*. As Lead Rendezvous Instructor for STS 63, the first shuttle-*Mir*. rendezvous, and STS 80, the first dual free-flyer deploy-and-retrieve, he ensured both crew and flight control team preparedness in rendezvous and proximity operations. The highlight of Bob's time at JSC was serving as Supporting, and then Lead, Tether Dynamics Instructor for STS 46 and 75, respectively, the first missions to operate deployable/retrievable space tethers. In July 1996 *Air & Space/Smithsonian* published his essay describing the disappointment and wonder of watching the broken STS 75 tether fly overhead in the early morning darkness on a Galveston beach.
"Bob's interests include vertebrate paleontology and the history of technology. He gave up his career teaching rendezvous & orbital dynamics to pursue something *much* more challenging: stay-at-home dad (and full-time writer). He lives in Austin, Texas, with his wife, Margie, and their five children."

He primarily addressed three subjects: plot, characters, and suspense. Mr. Mahoney worked to find a viable, unique, and authentic plot. This novel has a hero, a villain (a space station program manager), and conflict. While thinking of plausible ways to get a space shuttle in trouble for this novel, he was aware of various approaches taken in other fiction, but he chose orbital debris breaking the thermal protection system (TPS). The loss of the space shuttle *Columbia* due to launch debris damaging wing TPS occurred later, but the novel was not changed in this regard. Characters are sometimes composites of several people around a set of core qualities. Mr. Mahoney referenced that suspense was once defined by Alfred Hitchcock as something different from surprise. "Two people talking about baseball for five minutes, then a bomb under their table explodes. That's surprise. Show the audience the bomb at the start of those five minutes, then they spend that time on the edge of their seats. That's suspense." Mr. Mahoney concluded that clocks have a lot to do with suspense, and the space business has plenty of them built in: countdowns, orbital mechanics (90 minutes per orbit, 45 minutes per nodal crossing), cabin leaks with a specific time before the air runs out, etc.

His novel incorporates 14 diagrams, and Mr. Mahoney would like to see more books use pictures to help readers along. In editing this first novel, he eventually eliminated the passive voice, not an easy task for a former engineer. He learned about viewpoint control and limiting it to one viewpoint per scene. He found it necessary to read dialog out loud in the voice of each character to see if it worked. Family members found this amusing, of course. He offered some examples of how he sharpened his writing with even simple descriptive verbs… "He burst in…", instead of, "He walked in."…, and "The shuttle sidled up to the space station…", instead of, "The shuttle moved up to the space station…".

Mr. Mahoney closed with a few remarks about the public's perception of our space program, citing a recent editorial in this newsletter, "Tell me why." He described our work (space exploration) as an emotional pursuit and stated that fiction grabs readers emotionally and can play a role in reconnecting the public with near-term space flight. He asserted that our reality at work here is more exciting than any reality TV show.

A signed copy of the book can be from Bob Mahoney for $25 for the book + $3 for shipping.

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Austin, TX 78709-0156
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Field Trip

Social for National Engineers Week at 1940 Air Terminal Museum at Hobby Airport

DOUGLAS YAZELL, CHAIR-ELECT

Approximately 22 people attended an AIAA Houston Section event on Saturday, February 17, 2007 at the Hobby 1940 Air Terminal Museum. The event ran from 10:00 AM to 1:00 PM, starting with a short talk by Captain A. J. High (retired, Continental Airlines), a VIP from the museum (www.1940airterminal.org). At 10:00 AM. Captain High showed a short, professionally-made documentary film about the museum, then spoke for about 30 minutes on the history of Hobby airport post-WW2 and answered questions. Captain High discussed how air traffic into Houston Hobby started with only two airlines in the early 1940s using profits from the busing of ex-GIs, and grew significantly across the next decade. A second floor was added to the air terminal to allow for airport expansion. The 1940 Air Terminal Museum is in the process of being restored to its condition circa 1950. The audience for this talk was roughly 50 people, with all chairs filled and quite a few people standing. The AIAA Houston Section handed out some door prizes, took group pictures, and then enjoyed the museum displays, in addition to an engineer's week social. Among our door prizes was a large photo montage poster of a panoramic view of the moon with an Apollo moon buggy, etc., from www.moonpans.com.

A Wings and Wheels program is presented at the museum every third Saturday. The weather was cool and sunny for this event, allowing those who participated to visit the outdoor aircraft on display. A guided tour was available at 1:00 PM which included going out on the roof and the abandoned control tower, both of which give excellent views of the runways. The museum is adjacent to the runways, so the view from those high points is superb.

The February Wings and Wheels program could be called choppers and choppers, since a group of motorcyclists were invited to bring their shiny bikes and trikes, which were parked out front for viewing, and about five helicopters flew in and were on display out back, where they have limited space available by the runway.

Lunch was included in the museum's low admission price of $10 per adult and $5 for children 12 and under. One of the museum volunteers explained that in about 18 months from now, renovation will be complete on the first two of the five floors. Instead of finishing the remaining floors right away, they will move a hangar there. (The moving operation will be quite a sight, I was told by Captain High.) The hangar will store their aircraft, which can be moved out when large groups want to come for a dinner or similar events. Plans proposed have included bed a breakfast rooms in the museum.

In addition to thanking the many people who made this event possible, thanks go to Laura Slovey, our Young Professionals Chair, and to Dr. Syri Koelfgen, our College and Co-Op Chair, for helping to plan this event. The museum has a bright future and is already an inspiring place to visit. We encourage you to visit their informative web site and the museum. Some corporate jets will be on display on the third Saturday of March 2007 for the next Wings and Wheels program. Look for future AIAA events at this wonderful location.

Many of the group that visited the 1940's Air Museum

Personal Positioning for Engineers

Dinner Lecture

DOUGLAS YAZELL, CHAIR-ELECT

A crowd of about 60 people attended this dinner meeting at the Gilruth Center at NASA/JSC on Tuesday, April 3, to hear Mr. Paul J. Kostek speaking about "personal positioning for engineers". Mr. Kostek is a Senior Systems engineer with the Boeing Company. He is also the Principal of Air Direct Solutions, a systems engineering/project management consulting firm. He works with companies in defining system architecture and design, system requirements, and software development standards. Paul received his BSEE from the University of Massachusetts, Dartmouth, in '79.

Paul is Chair of the AIAA Career Enhancement Committee and Chair of the AIAA Pacific Northwest Section. In 1999, Paul was President of IEEE-USA, and a member of the IEEE Board of Directors. He also has served as President of the IEEE Aerospace & Electronics Systems Society in 2000-2001 and was a director of the Washington Aerospace Alliance (PNAA.net).

Paul started the AIAA Career Workshop held annually (since 1997) at the Aerospace Sciences Meeting and is a distinguished lecturer on career issues for AIAA. Paul has written about career issues for Today's Engineer, Dr. Dobbs, Puget Sound Business Journal, and Wireless Systems Design. Paul is an AIAA Associate Fellow, and Senior Member of IEEE, a member of the International Council on Systems Engineering, SAE, and the Project Management Institute.

From the publicity flier, "In the 21st Century the employment options we have will be expanding and changing. What we do today may not be what we do tomorrow. Globalization, outsourcing, mergers and budget allocations will impact how we work. Success will be determined by our ability to position ourselves to take advantage of opportunity and respond to change. We will look at several different employment and career options for engineers and help you determine which will work for you. Not all of the options will work for each person and the key to succeeding is understanding yourself, how you respond to change and what level of risk you can deal with. Along with discussing the different employment options (direct/contract/consulting/starting a business), each participant will be asked to consider a series of questions on each of these options. We will also look at career options such as moving into management versus staying technical, working for a large company versus a small company, and private versus government agencies. At the end of this presentation, you will have learned more about employment opportunities for engineers and how these would work for you."

We are fortunate to have his PowerPoint charts on our web site, www.aiaa-houston.org. The presentation has many questions to help engineers think about where they are in their career, what their responsibilities are and what career step makes sense. Paul started with these questions:

- Where am I in my career?
- Is this where I want to be?
- Where am I going?
- Is it where I want to be; if not, how do I change direction?
- Do I have the skills I need?
- To stay current with my present employer, or remain in the same industry
- To pursue a new direction

At the close of the presentation he left us with these questions:

- What have I learned about myself?
- Am I a risk taker?
- Am I conservative?
- How open to change am I?
- How would I react to a sudden change?
- Do I know the current market conditions?
- Do I have a network in place?

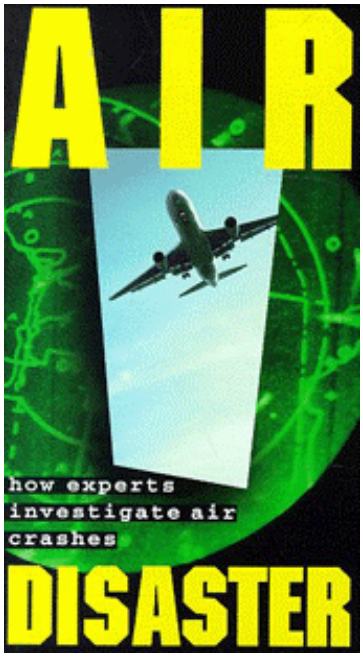
Paul mentioned that he is more comfortable with uncertain and fluctuating finances at home than his wife. My wife later told me that she was glad to hear Paul's related advice and that those roles are reversed in our marriage. I appreciated Paul's teaching, especially about networking, something AIAA encourages. At our table, Chang Keem joined Ellen Gillespie, our section's Vice Chair for our technical branch, me, and my wife. I have been trying to persuade Chang to join the AIAA Houston Section Astrodynamics technical committee, since she works on ISS and she used to study with Victor Szebehely. We just missed the chance to introduce her to the committee's chair, Dr. Albert Jackson, though you could say we were networking and having some success. But I recall Paul telling the crowd that in a situation like this, i.e. a Section meeting, we tend to sit with people we know. He challenged us to take advantage of Section meetings to "work the room" introducing ourselves to strangers, etc. He reminded us that there will be times in our careers when we will need a good professional network to help us. And you want to have the network in place before you need it, since we are all more likely to help someone we know.

Note that AIAA has an excellent brochure about aerospace career planning. I value my copy, and I know just where to find it. I have worked a long time with one company, but I need to act on Paul's advice as much as anyone. Paul is a gifted speaker and could easily write a popular book on this subject. His trip to Houston to talk with us was very much appreciated.

Video Review

Video: Air Disaster

DOUGLAS YAZELL, CHAIR-ELECT



Five people attended the video lunch-and-learn on Thursday, April 5, 2007, at United Space Alliance (USA), 600 Gemini, Civic Room. No badges are required to visit this USA conference room. The attendees were Douglas Yazell (AIAA Houston Section Chair Elect), Ellen Gillespie (AIAA Houston Section Vice Chair-Technical), Nelson and Jeri Brown (retired), and Radha Venkat, who has about 10 years of experience working in the Clear Lake area with Dynacs and Boeing.

Those assembled found time to enjoy about 30 minutes of the art of conversation over pizza before the movie. This was timely, as our most recent AIAA dinner speaker, Mr. Paul Kostek, discussed the need for networking in his presentation "Personal Positioning for Engineers" (see www.aiaa-houston.org for his PowerPoint charts).

The 1995 VHS video "Air Disaster" was informative and educational. "Air Disaster" shows actual footage of fiery air catastrophes, and then goes behind the scenes for a firsthand look at the technology and methods investigators are using to determine the cause of air crashes. The proximity of airplane wreckage tells investigators about which part(s) may have failed, or whether an explosion occurred onboard. Review of connecting aircraft panels tells investigators if moving control surfaces took matching damage, as expected by functioning pieces. Review of the "black box" data tells investigators about the trajectory of the plane and provides pilot comments and valuable background noise from the cockpit prior to the crash.

"Air Disaster" visits the USAF Aircraft Investigation Lab in California where students train to become crash investigators, and the Transportation Safety Board's lab in Canada where experts perform detailed analysis of wreckage. Here, painstaking work leads to clues the flight industry can use to ensure increased safety in the future.

"The result of these intrinsic differences between the two launcher types leads to a tradeoff between the lower development costs of expendable rockets and the lower recurring costs of reusable launchers. In making that tradeoff, one must take into account a number of other realistic factors that favor expendable launchers. For example, although one can amortize reusable vehicle construction costs over many flights, they are far more expensive to build than expendable rockets."

Andrew J. Butrica
Critical Issues in the History of Spaceflight (Chapter 10)

Staying Informed

COMPILED BY THE EDITOR

The Wilbur and Orville Wright Papers at the Library of Congress
http://memory.loc.gov/ammem/wrighthtml

Photographs Taken by the Wright Brothers of Aviation Experiments, Home, and Family
http://www.loc.gov/rr/print/coll/236_wright.html

Joint Strike Fighter
http://www.globalsecurity.org/military/systems/aircraft/f-35.htm

Boeing Current Market Outlook 2006
http://www.boeing.com/commercial/cmo/index.html

Airbus Global Market Forecast 2004-2023
http://www.airbus.com/store/mm_repository/pdf/att00003033/media_object_file_GMF2004_full_issue.pdf

Atlas V for Commercial Passenger Transportation
http://www.lockheedmartin.com/data/assets/13344.pdf

Team America Rocketry Challenge
http://www.aia-aerospace.org/aianews/features/team_america/

History Publications at Dryden Flight Research Center
http://www.nasa.gov/centers/dryden/history/Publications/index.html

Critical Issues in the History of Spaceflight
http://history.nasa.gov/SP-2006-4702/frontmatter.pdf

Kickin' Up Some Dust

Dinner Lecture

JON BERNDT, HORIZONS EDITOR & DOUGLAS YAZELL, CHAIR-ELECT

On Thursday, February 22, 2007, Mr. John Connolly (NASA-JSC), Lead Vehicle Engineer for the Lunar Surface Access Module (LSAM) Project Office, delivered a dinner speech to a packed ballroom at the NASA/JSC Gilruth Center. About 200 people from the AIAA Houston Section and United Space Alliance Leadership Association attended the event.

We've all heard the comments that Orion looks a lot like Apollo. Hopefully, by now, we're all aware that the similarities are mostly in appearance only. With the Lunar Lander, there is not even a similarity in appearance. Even though the actual design of the new lunar lander is still under development (and even then only in the early stages), the requirements laid out for the vehicle will preclude any resemblance to the Apollo Lunar Module.

Among the requirements that Mr. Connolly discussed for the new lunar lander are:

- Four crew will be transported to and from the lunar surface, for stays as long as seven days.
- Any location on the lunar surface must be accessible.
- Return to Earth at any time must be supported.
- The capability to deliver 20 metric tons (about 44,000 pounds) to the lunar surface is required.
- The ability to fly autonomously in cargo-only mode.
- There will be an airlock for surface activities.
- The descent stage will use LOX/LH2.

The version of the LSAM that we have seen in NASA concept art up to now is a notional design. Several months ago, a study was done in which each of the major NASA centers provided a design or designs for a lander that met a list of requirements. In Phase 1, innovative design concepts were explored. 30 concepts were fielded. Some of the characteristics were common to several concepts:

- Minimally sized ascent stage design.
- Staged descent flight profile.
- Descent stage connectivity with other descent stages to facilitate outpost buildup.
- Consideration given for unloading cargo on the lunar surface.
- Consideration given for packaging the lunar lander in the launch vehicle.

Also discussed was the question of whether short sorties should be undertaken, or whether longer missions should be undertaken first. The conclusion reached was that an outpost should be built as early as possible, because it results in the best environment for meeting the goals. The goals include development of an In Situ Resource Utilization (ISRU) capability. Also, it is thought that science objectives can best be met that way.

With that much figured out, candidate base sites on the lunar surface were considered. Polar sites offer a lot of benefits, including a steady temperature and high availability of solar power. Among the most alluring polar sites is one on the rim of Shackleton crater. There is a belief by some that water ice may exist there in permanently shaded zones.

The results of the study led to a more firm idea of possible requirements for a new lunar lander. Among the potential requirements are:

- Minimize the ascent stage size.
- Minimize the size of the descent stage.
- Maximize the cargo module.

Definition of the Lunar Lander continues in cooperation with the Lunar Architecture Team (LAT). The Lunar Lander Project Office is constantly in search of innovative concepts and configurations. As a member of the Constellation Program Office at JSC, John Connolly is part of the NASA team that is defining the future systems that will return crews to the moon and transport them to Mars.

Concept art of Orion docking with a Lunar Lander.
Image courtesy of NASA

John Connolly returned to JSC in 2005 almost 2 years at NASA HQ's Exploration Systems Mission Directorate. At NASA HQ, he served as the Deputy of the Exploration Systems Analysis Study (ESAS) Team, where he led the definition of the lunar architecture that became the basis for NASA's exploration planning. Prior to his Headquarters assignment, Connolly's duties included Special Assistant to JSC's Astronaut Office and senior systems engineer in JSC's Exploration Office. He holds engineering degrees from Penn State University and the University of Colorado, and is a registered Professional Engineer in Texas.

SpaceX is the third company founded by Mr. Musk. Prior to SpaceX, he co-founded PayPal, the world's leading electronic payment system, and served as the company's chairman and CEO. PayPal has over twenty million customers in 38 countries, processes several billion dollars per year and went public on the NASDAQ under PYPL in early 2002. Mr. Musk was the largest shareholder of PayPal until the company was acquired by eBay for $1.5 billion in October 2002.

Before PayPal, Mr. Musk co-founded Zip2 Corporation in 1995, a leading provider of enterprise software and services to the media industry, with investments from The New York Times Company, Knight-Ridder, MDV, Softbank and the Hearst Corporation. He served as Chairman, CEO and Chief Technology Officer and in March 1999 sold Zip2 to Compaq for $307 million in an all cash transaction.

DINNER MEETING

5:30	**Social (Cash Bar)**
6:00	**Dinner/ Door Prize**
7:00	**Presentation**

Entrées: Mediterranean Chicken Breast, or Eggplant Parmesan

MEMBERS & THEIR GUEST	**$10.00**
NON-MEMBERS	**$15.00**
STUDENTS	**$7.00**

NASA JSC Gilruth Center – Alamo Ballroom

(Use gate 5 on Space Center Blvd - no badging required and no charge for parking)

ALL ARE WELCOME

MAKE DINNER RESERVATIONS ONLINE AT http://www.aiaa-houston.org
OR CONTACT JJ JOHNSON AT 281-280-3696 OR *events@aiaa-houston.com*

PLEASE SPECIFY ANY SPECIAL MENU NEEDS.
NOTE: RESERVATION DEADLINE IS *Wednesday, May 16th, 2007, AT 1:00 PM*.
ANY CANCELLATIONS ARE REQUIRED PRIOR TO DEADLINE. NO-SHOWS WILL BE BILLED.
DINNER RESERVATIONS ARE NOT REQUIRED FOR ATTENDING THE PROGRAM ONLY.

New Members

ALBERT MEZA, MEMBERSHIP CHAIR

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

January
Mr Benjamin P Briles
Mr Timothy Budzik
Isaac Ekoto
Mr Kevin D Foley
Mr James S Greathouse
Mr Richard A Hermling
Prof Alex Ignatiev
Mr Randolph P Lillard
Mr Miguel J Maes
Mr Philip E Robinson
Mr Tuan H Truong
Mr Robert J Zehentner
Thomas C Barnett
Steven A Bone
Brad E Burgess
Will Carter
Cameron L Crisp
William N Cunningham
Nallely E Davila
Daniel M Decino
Richard A Deresz
Matthew P Fritz
Daniel W Greisser
Luke D Gudgel
Danny G Gueho
Reese A Heller
John P Hidore
Jan Randell M Labio
James C Lancaster
Jehon S Leonce
Chad E Martinez
Patrick W Mason
Nicole R Mendoza
Ivan C Morin
Tetsu Nakamura
Van T Nguyen
Bert Olah
Francis R Phillips
Charles Puryear
Jeremiah J Snell
Cadet Samuel D Stephens
Billy D Stovall
Bradley W Toellner
Jennifer E Wells
Matthew D Whitaker
Mrs Nicola J Clemmer
Mrs Susan E Dickinson
Mrs Theodora Healey
N Lewis
Mr Christopher Rafalik

February
Mr David J Forrest
Mr Thomas K Gederberg
Mr Joel RHenry
Mr Michael G Jacox
Ms Kandy S Jarvis
Mr Robert L Kelley
Mr Vinod Kumar
Mr Ricardo A Machin
Mr Nicholas Pantazis
Mr Michael D Roberts
Dr Rattaya C Yalamanchili
Richard S Brown
Mr Carter C Crouch
Mr Frans H Ebersohn
Mr Zachary B Itkoe
Mr Aaron M Kirk
Miss Natalie Rizvi

March
Mr Danny R Ball
Robert W Brown
Mr Jeffery A Cardenas
Mr Chris N Grant
Mr Madhurya S Gupta
Arthur Hinson
Mr Stuart M Monteleone
Prof Satish Nagarajaiah
Eric K Riekenberg
Dr Taher M Schobeiri
Cody Dennis

Important notes:

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

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 albert.f.meza@nasa.gov

Sarah L Bibeau
James Boyd
CAPT Frank L Culbertson
Yuanyuan Ding
Joshua Newhouse
Ryan Sager
Frieda Y Wiley

CALENDAR

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.

May

23 Dinner Lecture: Elon Musk, SpaceX, at Gilruth

June

4 Next AIAA Executive Council meeting
7 Dinner and Awards Meeting, Speaker: John McMasters, "Perspectives on Airplane Design – Past, Present and Future"

Cranium Cruncher

NORM CHAFFEE & JON BERNDT

Here are the Crunchers from last month:

Puzzle #1

Frank Anderson is participating with a team of colleagues in a survival course in the far north of Alaska in the winter. The team's requirement is for Frank to be able to make a six day trek from Base Camp to Remote Camp across the ice and snow. Only Frank needs to arrive at Remote Camp, but other members of his team can participate in the endeavor, but all participants must be able to reach safety back at Base Camp. One person can carry only enough food and water for four days. As you can see, therefore, Frank cannot go alone - his supplies would run out. How many team members, including Frank, need to participate in this trek, in order for Frank to safely arrive at Remote Camp and any other team member to also reach safety at Base Camp?

What is the successful strategy to accomplish this task?

Answer: Three team members are required, including Frank.

Puzzle #2

InTelCo Engineering has had a budget cut and is required to reduce staffing. The Director of Human Resources decides to use a logic test to identify the staff he will retain. He calls in each candidate for retention and offers the individual three envelopes, and gives the following instructions: Here are three envelopes. One envelope has an employment contract. The other two envelopes have dismissal "pink slips". Each envelope has a statement written on it, but only one of the written statements is true.

Envelope A says "This envelope has a pink slip"
Envelope B says "This envelope has a contract"
Envelope C says "Envelope B has a pink slip"

Which envelope do you select in order to be retained?

Answer: Envelope A contains the contract.

The following individuals had the correct answer to both puzzles:

Andrew Palfreyman (Cisco Systems)
Ronny Newman (JSC - DX12)
Wes Dafler (Boeing)

Current Issue Puzzle

With this puzzle, you get the answers right away. See the box at right.

Below are four questions and a bonus question. You have to answer them instantly.

1) You are participating in a race. You overtake the second person. What position are you in?
2) If you overtake the last person, then you are...?
3) [Note: This must be done in your head only. Do NOT use paper and pencil or a calculator.] Take 1000 and add 40 to it. Now add another 1000 . Now add 30. Add another 1000. Now add 20. Now add another 1000 Now add 10. What is the total?
4) Mary's father has five daughters: 1. Nana, 2. Nene, 3. Nini, 4. Nono. What is the name of the fifth daughter?
Bonus: A mute person goes into a shop and wants to buy a toothbrush. By imitating the action of brushing his teeth he successfully expresses himself to the shopkeeper and the purchase is done. Next, a blind man comes into the shop who wants to buy a pair of sunglasses; how does HE indicate what he wants?

Answers:
1) If you answered that you are first, then you are absolutely wrong! If you overtake the second person and you take his place, you are second.
2) If you answered that you are second to last, then you are wrong again. Tell me, how can you overtake the LAST Person?
3) Did you get 5000? The correct answer is actually 4100.
4) Did you Answer Nunu? No. Of course it isn't. Her name is Mary. Read the question again!
Bonus) He asks.

Odds and Ends

SPECIAL EVENTS, PICTORIALS, ETC.

Boeing Home

The Boeing Company, established by William Boeing, was the most successful company to get its start during the World War I era. Boeing, the son of a well-off Detroit family, moved to Seattle, Washington, in 1903 and launched a successful lumber business. He met and became friends with Navy Lieutenant Conrad Westervelt. Neither man had ever flown before but both had become interested in aviation after watching the 1910 air races at Belmont Park, New York. On July 4, 1914, the two took their first plane ride with a barnstorming pilot. From then on, they were hooked. Boeing was convinced he could build a better plane and decided to learn to fly and begin manufacturing aircraft. The next October, Boeing enrolled in Glenn Martin's flying school and bought a Martin plane of his own to fly.

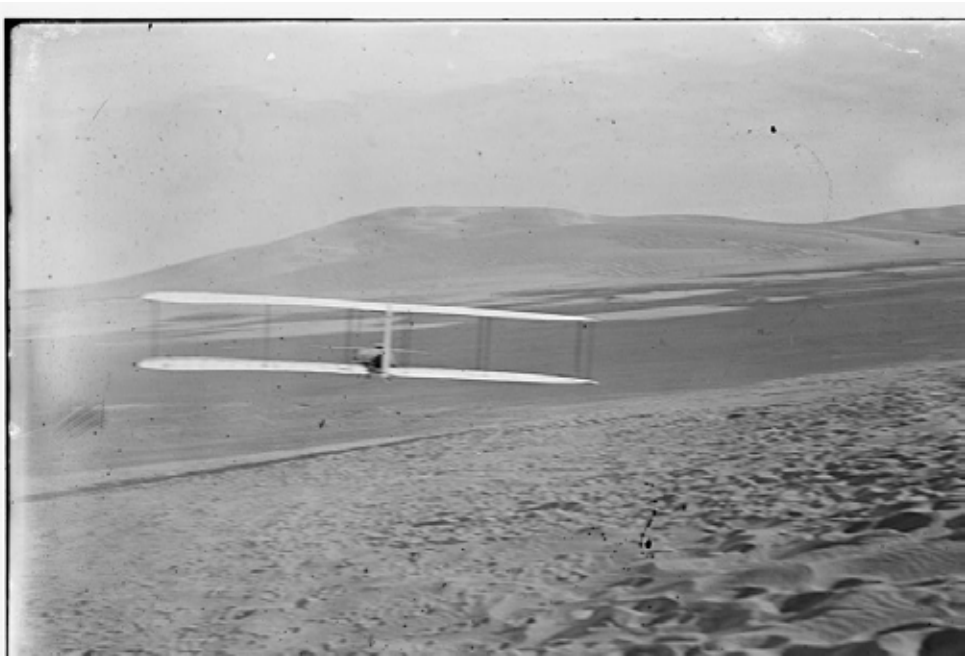
Text and image courtesy of Boeing and www.centennialofflight.gov

Wright brothers home

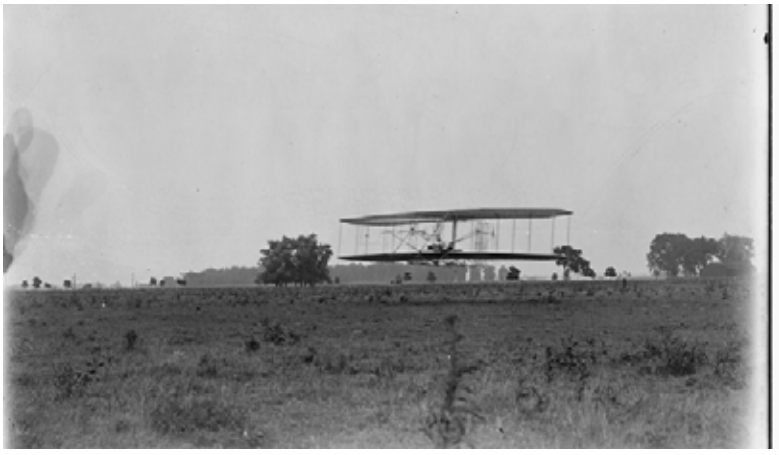
Here is the Wright Company Airplane Factory. The Wright Company was incorporated on November 22, 1909. The aircraft factory was completed in November 1910 and a duplicate building was erected in 1911. The buildings continued in use until the Wright Company was sold, October 15, 1915.

Courtesy of the Library of Congress.

At right: Orville Wright makes a right turn at Kitty Hawk in a glider in 1902. The wing warping control is visible. This photo was taken by Wilbur Wright. Wing warping consists of the twisting motion of the wings of an aircraft to produce lateral control. The entire wing structure twists slightly in a helical motion in the desired direction. The Wright brothers first thought of this concept in 1899 when Wilbur, looking for a way to control the roll of an aircraft, twisted a long, narrow box and believed he could apply the motion to an aircraft's wings. The brothers first used this method of control successfully in a kite that they built that year. On the kite, they used ropes that they pulled on from the ground. When they implemented the method in a glider and later in their powered aircraft, they used cables that the pilot pulled on to twist the wings. *(image courtesy of the Library of Congress, text from www.centennialofflight.gov.*



Below: The pilot and passenger seats in a Wright aircraft, ca. 1911. Photo taken by Orville or Wilbur Wright. *(image courtesy of the Library of Congress).*

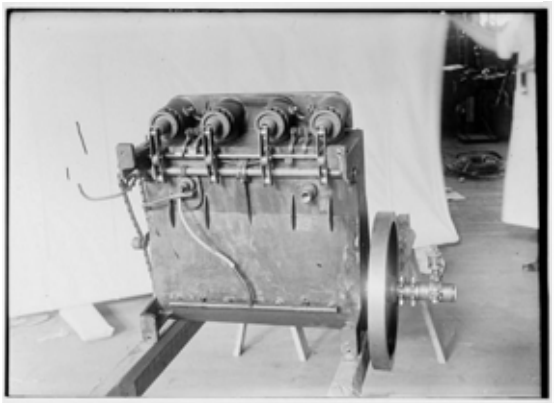


At right: The first powered, controlled, flight by the Wright brothers lifts off its launch rail at Kitty Hawk.

At right, above: Wilbur Wright flies close to the ground in 1904 in Dayton, Ohio.

Below: The engine used on the first Wright flyer.

(images courtesy of the Library of Congress)



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.

AIAA *Infotech@Aerospace* 2007 Conference and Exhibit
7 - 10 May 2007
Doubletree Hotel Sonoma Wine Country
Rohnert Park, California

Reinforcement Learning of Morphing Airfoils with Aerodynamic and Structural Effects
A. Lampton, A. Niksch and J. Valasek, Texas A&M University, College Station, TX

Developing and Executing Goal- Based, Adjustably Autonomous Procedures
D. Kortenkamp, NASA Johnson Space Center, Houston, TX

A Customer View of Goal- Based Operations for the Vision for Space Exploration
M. Lupisella and D. Mandl, NASA Goddard Space Flight Center, Greenbelt, MD; A. Mishkin and M. Barry, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA; W. Clancey, NASA Ames Research Center, Mountain View, CA; R. Proud and J. Hart, NASA Johnson Space Center, Houston, TX

Reinforcement Learning for Characterization of Hysteresis Behavior in Shape Memory Alloys
K. Kirkpatrick and J. Valasek, Texas A&M University, College Station, TX

Making Technology Ready: Integrated Systems Health Management
J. Malin, NASA Johnson Space Center, Houston, TX; and P. Oliver, Lockheed Martin Corporation, Houston, TX

Weapons Bay Flow and Tone Classification by Sequential Function Approximation
J. Kugler, Rice University, Houston, TX

Prototyping Levels of Automation for Crew Exploration Vehicle Rendezvous Tasks
J. Hart, NASA Johnson Space Center, Houston, TX; J. Valasek, Texas A&M University, College Station, TX

Pilot Rating Classification of the HH- 60H Seahawk Helicopter
A. Srivastava and A. Meade, Rice University, Houston, TX; and J. Needham, Massachusetts Institute of Technology, Cambridge, MA

Genetic Algorithm for Multi- Agent Space Exploration
G. Giardini, Politecnico di Milano, Milano, Italy; and T. Kalmar-Nagy, Texas A&M University, College Station, TX

19th AIAA Aerodynamic Decelerator Systems Technology Conference and Seminar
AIAA Balloon Systems Conference
21 - 24 May 2007
Williamsburg Lodge
Williamsburg, VA

Film Strain Measurement Through Hyperspectral Polarimetry
T. Ragucci and A. Cisar, Lynntech Inc., College Station, TX; M. Huebschman and H. Garner, University of Texas Southwestern Medical Center, Dallas, TX

CEV Airbag Landing System Modeling and Simulation
J. Welch, ILC Dover LP, Frederica, DE; J. McKinney, The Boeing Company, Houston, TX; J. Wang, NASA Langley Research Center, Hampton, VA

CEV Airbag Landing System Design
T. Smith, C. Sandy, D. Wilson and C. Willey, ILC Dover LP, Frederica, DE; J. McKinney, The Boeing Company, Houston, TX

Developing the Parachute System for NASA's Orion: An Early Status Report
A. Taylor, Irvin Aerospace Inc, Santa Ana, CA; R. Machin, NASA Johnson Space Center, Houston, TX; P. Royall, Jacobs Sverdrup, Houston, TX; and R. Sinclair, Irvin Aerospace, Inc., Santa Ana, CA

37th AIAA Fluid Dynamics Conference and Exhibit
18th AIAA Computational Fluid Dynamics Conference
25th AIAA Applied Aerodynamics Conference
38th AIAA Plasmadynamics and Lasers Conference
In conjunction with the
16th International Conference on MHD Energy Conversion
39th AIAA Thermophysics Conference
25 - 28 Jun 2007
Hyatt Regency Miami
Miami, FL

Using Higher Order Implicit Runge- Kutta Schemes in Transient Incompressible Flow Simulation – Staggered Grid
M. Ijaz and N. Anand, Texas A&M University, College Station, TX

High- Speed Rough Wall Boundary Layers and Modeling: Invited Presentation
R. Bowersox, Texas A&M University, College Station, TX

Unsteady Wake and Vortex Effects on Gas Turbine Blade Platform Film Cooling
Z. Gao, D. Narzary, S. Mhetras and J. Han, Texas A&M University, College Station, TX

Supersonic Turbulent Boundary Layers with Mechanical Non- Equilibrium
I. Ekoto and R. Bowersox, Texas A&M University, College Station, TX; L. Goss, Innovative Scientific Solutions Inc., Dayton, OH; T. Beutner, Defense Advanced Research Projects Agency, Arlington, VA

5th International Energy Conversion Engineering Conference and Exhibit (IECEC)
25 - 27 Jun 2007
Hilton St. Louis at the Ballpark
St. Louis, Missouri

An Overview of Aerospace Power Systems for NASA Missions
V. Lyons, NASA Glenn Research Center, Cleveland, OH; J. Scott, NASA

(Continued on page 20)

("From Fort Myer to Fort Worth", Continued from page 4)
portation companies that are building on solid, proven, technologies and expertise developed over the past decades, and from that foundation hope to be able to provide launch services for as little as ten percent of the current customary prices.

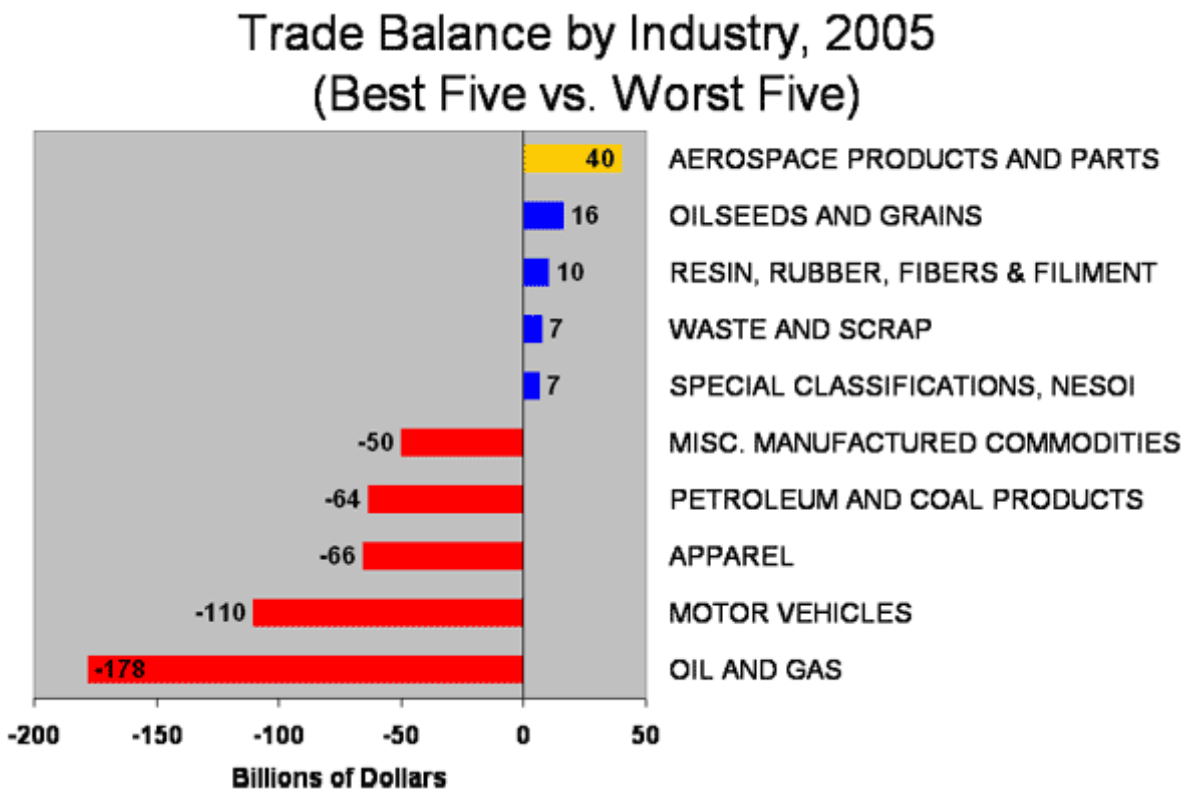
Of course, in any industry, advanced production capability and fancy technologies do not guarantee success. Comparing the Boeing 787 and Airbus A380 programs highlights important differences in these large programs—including in such areas as market research and forecasting. The Boeing 787 – of which the first aircraft has not yet been completely assembled – is now touted as the most successful commercial aircraft program in aviation history, with current sales approaching 600 aircraft. The A380 – while in many respects a fine accomplishment – has faced a growing number of technical problems. But, the biggest problem for Airbus may turn out to be an overestimation of the market for the aircraft – only about 160 have been sold. The break-even point for the aircraft was recently raised from 250 to 420 aircraft, as production delays and technical problems have led to order cancellations and other financial strains.

Similarly, there has been much debate on whether or not the "build-it-and-they-will-come" market philosophy will lead to new and cheaper space launch services. These days, one of the most hotly debated topics in space forums addresses the question: can *existing* launch vehicles (meaning Atlas V and Delta IV) be adapted and certified to launch the Orion Crew Exploration Vehicle much more quickly and cheaply than the cost and time it will take to develop Ares-1? Potentially (it is argued), the use of these launchers would free space agency resources to develop the Ares-V heavy lift launch vehicle that much sooner, and to restore funding to important programs that have been cut. Debate proponents express hope that a synergy would be formed that simultaneously results in both the most "bang for the buck" spent in our nation's space program, and greater opportunities for both new and existing commercial space products and services. The COTS program (Commercial Orbital Transportation Services) is a step in that direction.

Keeping America's place as the global leader in the aerospace industry will be an effort played out in an increasingly competitive world arena, requiring innovation in existing products, an insightful understanding of the current market, and by resolute initiative in "owning" new markets. Regarding the last, two of the most interesting story lines to follow in the aerospace world these days are about owning new markets: Bigelow Aerospace plans to work with Atlas V maker Lockheed Martin for providing crewed launch services to a Bigelow inflatable orbital habitat, and SpaceX is working towards fielding successful, inexpensive orbital launch vehicles, Falcon 1 and the larger Falcon 9. There is little doubt that these products can be *built* successfully, but can the market sustain the products?

Considering history we might ask this question: would we be at a different place today had the U.S. Signal Corps opted to develop and build its own aircraft instead of purchasing one built by the Wright brothers to Signal Corps specifications? Considering where we are today – and where we want to go – we might ask: are there teaming arrangements beyond COTS that can benefit both NASA and commercial space, to result in maximum growth?

-JSB



Graphic courtesy of the Aerospace Industries Association (www.aia-aerospace.org)

AIAA Annual Technical Symposium
Friday May 11, 2007 at the Gilruth Center at NASA JSC

Kickoff Speaker
USA/Anne Martt
Constellation: The Journey Ahead

Luncheon Speaker
Lockheed Martin/Blaine Brown
Space Exploration Initiative

Registration all day at the Gilruth Center 0745-1630
- $5 for presenters
- $10 for attendees
- Pay at the door (cash or check)
- No advance signup is required to attend
- Advance reservations are required for those selecting the optional lunch buffet (see deadlines)
- Presenters: see deadline for abstract submission

AIAA membership and JSC badging not required

Presentations limited to 30 minutes
Laptop computers and computer projectors provided

No paper required
Only abstracts will be published. Presenters to submit presentation on CD at the registration desk

Complimentary coffee, beverages, and snacks

La Vincita Lunch buffet available
Reserve online in advance

Buffet includes vegetarian option

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

(Upcoming Conference Presentations, Continued from page 18)
Johnson Space Center, Houston, TX

43rd AIAA/ASME/SAE/ASEE Joint Propulsion Conference & Exhibit
8 - 11 Jul 2007
Cincinnati Duke Energy Convention Center
Cincinnati, OH

Ab Initio Evaluation of Reaction Rate Constants for Elementary Al Combustion Reactions - Part I: Potential Energy Surface Computation
N. Butuk and R. Berry, Prairie View A & M University, Prairie View, TX; T. Miller, Applied Research Laboratory Penn State, State College, PA

Space Shuttle Strategic Planning Status
E. Henderson, NASA/JSC, Houston, TX

Fredericksburg High School: Suborbital Aeroscience Studies - Nozzle and Fuel Grain Material Study
B. Williams, K. Harvey, R. Sosland, J. Geistweidt, B. Itz and E. Rode, Fredericksburg High School, Fredericksburg, TX

Flight of the Redbirds
B. Williams, D. Crenwelge, C. Moretti, S. Pyka, C. Rosales and M. Walton, Fredericksburg High School, Fredericksburg, TX

A Perspective on Russian Human Rated Propulsion Systems
T. Bulk, NASA Johnson Space Center, Houston, TX; M. Holguin, Lockheed Martin Space Systems, Denver, CO; R. Hagger, Pratt & Whitney Rocketdyne, West Palm Beach, FL; F. Chelkis, NPO Energomash, Khimky, Russia

International Space Station Propellant Management and Operation of Propulsion Systems
S. Russell, NASA, Houston, TX; K. Metrocavage, United Space Alliance, Houston, TX; U. Kamath, Boeing, Houston, TX; D. Sargent, FAA, Fairfax, VA; E. Duncan, Boeing, Houston, TX; R. Hampton, Ares, Houston, TX

Surge Pressure Management in HTV Propulsion System
S. Russell, NASA, Houston, TX; T. Imada, JAXA, Tsukuba, Ibaragi, Japan; S. Nakai and Y. Mio, IHI, Tomioka-Shi, Gunma-Ken, Japan; S. Matsuo, MHI, Komaki, Aichi, Japan; U. Kamath, Boeing, Houston, TX

Start- up Response of Fluid Film Lubricated Cryogenic Turbo- Pumps
L. San Andres, Texas A&M University, College Station, TX

Issues on Instability and Force Nonlinearity in Gas Foil Bearing Supported Rotors
L. San Andres, Texas A&M University, College Station, TX

Fredericksburg High School Aeroscience Program
B. Williams, J. Valentine, J. Bergman, M. Morgan, J. Klein and J. Pinera, Fredericksburg High School, Fredericksburg, TX

Flow Field Studies of Diamond Shaped Fuel Injector in a Supersonic Flow
K. Kobayashi, Japan Aerospace Exploration Agency, Kakuda, Miyagi, Japan; R. Bowersox and R. Srinivasan, Texas A&M University, College Station, TX; C. Carter, U.S. Air Force Research Laboratory, Wright-Patterson Air Force Base, OH; K. Hsu, Innovative Scientific Solutions Inc., Dayton, OH

AIAA Section News

AIAA Monthly Meetings are Open

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

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

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

Seeking Volunteers

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

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

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

Contact chair@aiaa-houston.org

2007-2008 "Spirit of Apollo" College Scholarship Announcement

The Houston Section is once again accepting applications for the "Spirit of Apollo" Scholarship of $1000 for the 2007-2008 academic year. The "Spirit of Apollo" Scholarship honors the historic and unprecedented accomplishments of the Apollo Space Program by encouraging outstanding students at Texas Colleges to continue their studies in engineering, math or science. Qualified students must have completed their freshman academic year with a GPA of at least 3.0 on a 4.0 scale. The qualified applicants must provide an essay, three letters of recommendation, college transcripts, along with a description of extracurricular activities and work experience.

Last year there were four very competitive students from several Texas Colleges that applied for our Spirit of Apollo Scholarship. Please encourage the deserving college students -- especially AIAA student chapter members -- that you know to apply for the 2007-2008 academic year scholarship award! The deadline for application packages is June 1st, 2007. Additional details and the application form for our annual scholarship can be found on the AIAA Houston Section webpage (http://www.aiaa-houston.org/scholarship/).

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

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AIAA Mission

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

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.