



Volume 36, Issue was 1

AIAA Houston Section www.aiaa-houston.org

May 2011

Robert McCall, Artist, 1919-2010 A Bright Future for People in Space



Who's who in the 1979 mural at NASA/JSC





AIAA HOUSTON
American Institute of Aeronautics and Astronautics

Horizons is a quarterly publication of the Houston section of the American Institute of Aeronautics and Astronautics.

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May 2011

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AIAA National Communications Award Winner



2005

2006

2007

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Cover: Robert McCall, artist, and his 1979 mural (signed by Robert McCall and Louise McCall) at NASA/JSC Building 2 Teague Auditorium. Credits: NASA

Plans, Recent Successes, and New Opportunities

SARAH SHULL

The 2010-11 year marks the 49th year for the Houston Section of AIAA and as you know we have a busy year underway. The AIAA year started out strong with our executive council retreat in mid-August. At this annual half-day meeting, your Houston Section officers set goals for the coming year and began to plan out a variety of activities for the coming year. As Section Chair my main goal for the year is to help you, our section membership, to realize the value of AIAA membership in these uncertain times. Whatever the coming year may bring, I hope that the Houston Section of AIAA continues to be valuable to the members by offering networking opportunities, interesting speakers, educational lunch-n-learns, technical symposiums and occasions at which members can socialize with others in the aerospace industry.

I hope that everyone who was able to attend our very successful dinner meetings in August and March enjoyed the moving live performances by Grammy Award Winning Artist John Jarvis and Grammy nominated Artist Lydia Salnikova as well as the update on aerospace related happenings on the hill given by Congressman Pete Olson and update on the State of JSC given by Director Coats. The "August is for Aerospace" and "State of the Center" events are an annual tradition within AIAA that the Houston Section enjoys participating in. During the month of October, we hope you were able to join

us at our annual outing to the Wings Over Houston Airshow. This year, as we did last year, we partnered with CollectSPACE and EAA to have a display table at the Airshow on Saturday, October 23rd.

Other events held this fall and winter included the continuation of the Space Center Lecture Series (<http://www.spacecenterlectureseries.com>), our second annual outing to the George Observatory for an evening of star gazing, the annual Yuri's Night celebrations and various Young Professional networking events.

For the remainder of the year we are working hard on planning for our section's Annual Technical Symposium on May 20th, 2011 as well as our awards dinner on June 21, 2011 with Distinguished Lecturer Robert Zimmerman. Keep an eye on your e-mail and the section website for further details about these exciting events; I hope to see you there!

One new initiative our section hopes to implement this year is the pairing of our educator associate members with professional members. The Houston Section presently has over 100 educator associates (K-12 teachers) who are largely disconnected from our professional members. It is our hope to better serve these educators, and by association the students they inspire, by pairing each one with a professional member who can serve as an e-mail mentor/resource to

the teacher they are paired with and once per year visit that educator and his/her students in person. Once we get the logistics of this initiative worked out, expect a call for volunteers via e-mail.

If you are interested in getting more involved with the Houston Section of AIAA, don't hesitate to contact me at chair@aiaa-houston.org. We often have openings on our section executive council that we are looking to fill.

From the Chair



From the Editor

A Newsletter ReBoot

DOUGLAS YAZELL



Welcome to Horizons for April 2011, my first issue as editor, a role I started on Monday, April 11, 2011. With help from quite a few people, we can continue this great newsletter tradition. For about 15 issues ending in late 2007, Jon Berndt served as editor and made Horizons great in surprising ways. I then served as acting editor for three issues, followed by Dr. Steven E. Everett who served as editor for two years and seven issues. Horizons averages about 6,000 hits per issue. Our section has about 1,100 members. AIAA has 90 corporate members over 35,000 members.

We apologize for our tardiness with this quarterly issue. Its publication online was aimed at September 30, 2010, and will more likely be a few days after April 30, 2011. We will aim for our next quarterly issue to be online by June 30, 2011, as in past years. We are returning to our quarterly schedule. If possible, we will change that to a bimonthly schedule.

I helped with two feature articles in this issue. Richard Sessions, a past president of the Houston Chapter of The Experimental Aircraft Association (www.eaa12.org) suggested we start a series of profiles of people active in general and experimental aviation in Houston, profiles of EAA and/or AIAA members. Our first feature article is a treasure, the first in that series, a profile of Mr. Lance

Borden. Lance kindly allowed us to use quite a few images from his collection for the first time, telling a story of aviation in his family since 1929. These images will be used one day in a book he is writing. The other feature article is a tribute to the late space artist Robert McCall. He was prolific and influential. He left an inspiring legacy few can match. We found a Houston connection for this article: who's who in the mural he painted in 1979 at JSC.

Robert Pearlman of CollectSpace.com explains in his public lectures that collecting space memorabilia and artifacts in private collections is very important to our communities around the world, since many such items are owned legally, morally, and ethically, but are not appropriate for museums. I purchased a space souvenir from a coin store on Bay Area Boulevard last year. It's a 1975 medallion celebrating the first American space-walk's 10th anniversary. It was created to raise money for the Ed White Youth Center in Seabrook, here in our Clear Lake community in the Houston area. The artwork shown in this image is impressive (mostly taken from a NASA photograph), using high relief and a bit of artistic license to add the Gemini crew capsule to that picture.

I am enjoying a video presentation of a panel discussion at Rice University's

James A. Baker III Institute for Public Policy. Three or four panelists discuss space shuttle history and making the space shuttle program a commercial venture. The panel's moderator is Mr. George Abbey, a former NASA/JSC Center Director. Robert F. Thompson gets quite a few respectful rounds of laughter during his unorthodox presentation, a lecture that I find educational. The web page address for this video is <http://bakerinstitute.org/events/u.s.-human-spaceflight-continuity-and-stability>.

Our back cover contains a 1964 NASA group portrait of some Space Task Group members in Houston. Our section's web site contains a page for Chester Vaughan's history technical committee. That web page already shows the results of some good work, including documents which will help with our section's celebration of our 50th anniversary in 2012. The photo on this issue's back cover can be a part of that work, helping to match names and faces for some those pioneers who did such historic work on Mercury, Gemini, Apollo, and later space programs. From Harold (Hal) Beck's brief e-mail note of Friday, April 22, 2011, used with his permission:

"The people in the photo are those members of the Mission Analysis Branch of the Space Task Group at

Langley who moved down to Houston in early 1962. The Mission Analysis Branch was originally structured and managed by John Mayer and Carl Huss. The organization grew and later became the Mission Planning and Analysis Division (MPAD) at JSC. The photo was taken in 1964, just before the organization moved from the Houston Petroleum Center (HPC) building on the Gulf Freeway (at South Wayside Drive near Griggs) to the Manned Spacecraft Center (MSC) site in Clear Lake.

“The early history of the Mission Analysis Branch is not very well documented. In the 1959 – 1960 timeframe John Mayer and Carl Huss helped define the basic functional requirements for mission planning and analysis. At that time, there were no text books or guidelines in place that covered all aspects of manned spaceflight. The “text book” of the day was a thick handwritten document simply called “Space Notes” which was written in the 1958 - 1960 timeframe, by “specialists” within the Mission Analysis Branch. The document covered most disciplines of spaceflight, e.g., launch window design, trajectory planning and analysis, abort planning, rendezvous, flight dynamics, orbit determination, deorbit planning, etc. The early work within the Mission Analysis Branch supported the major Space Programs, including: Atlas, Redstone, and Mercury. The early Mission Analysis Branch was a learning experience for all, as was true with in other organizations at Langley. It was an incredible experience that we can appre-

ciate even more today – in light of the decline in the manned spaceflight programs. We were very, very fortunate to have been a small part of that great experience. Such accomplishments will never be repeated!

“For reference, the following is an abbreviated timeline related to the early days of NASA:

“October 1, 1958- NASA became operational, The National Aeronautics and Space Administration (NASA), replaced The National Advisory Committee for Aeronautics (NACA, founded in 1915)]

“November 1958- Space Task Group (STG) formed– 36 people transferred from Langley Research Center to form the new organization

“January 1959- STG organization was defined, Pro-

ject Manager, Robert Gilruth

“August 1959- STG organization further defined

- The first seven NASA astronauts were named on the org charts

- Mission Analysis Branch appears within the Ops Division (Mathews/Kraft) – John Mayer head of the Mission Analysis Branch

“September 1961- Houston named as location for the STG

“November 1961- Space Task Group is designated Manned Spacecraft Center

“Early 1962- most of the members of the Mission Analysis Branch moved to Houston.”

From the Editor

Below: A non-profit group's space souvenir medallion from 1975 celebrating the 10th anniversary of NASA's first (1965) spacewalk..

Credit: Douglas Yazell



From the Assistant Editor

Still A Bright Future in Space

ROBERT BEREMAND

Our cover story for this issue is a tribute to an artist who saw a bright future in space. It occurred to me that some people might view the subtitle, "A Bright Future for People in Space", as a mistake given our current situation. It's no secret that these are tough times for the space community, particularly in Houston. With the end of the Shuttle program, the cancellation of the Constellation program, massive layoffs, and the fear of future budget cuts and government shut-downs, it is easy to understand why it could be difficult for many people to see a bright future in space right now. In fact, space historian John Logsdon was recently quoted in the Houston Chronicle saying, "We are as uncertain about the future of hu-

man space flight today as we were ... 50 years ago. Until our national leadership decides space is truly part of America's future, we will continue celebrating anniversaries of past milestones rather than pioneering the future."

However, not everything has been doom and gloom. There have been exciting milestones in private space flight. SpaceX recently achieved the first ever successful return from orbit for a privately owned space ship. Virgin Galactic has enjoyed successful glide tests of its SpaceShipTwo vehicle. Bigelow Aerospace is continuing to develop its private space station. NASA has continued to award contracts for further advancement of the Commer-

cial Crew Development (CCDev) and Commercial Reusable Suborbital Research (CRuSR) initiatives. The International Space Station (ISS) has been extended and the Orion program from NASA's Constellation program is being continued. Also, though the President's budget does reduce the current support for manned spaceflight, it has increased funding for other areas of NASA. There is no denying that the manned spaceflight community at NASA is facing historic challenges, but I am confident that things will improve. NASA will find a direction forward, and there will still be a bright future in space.

In both images, from left to right: Marianne Dyson, Dr. Albert A. Jackson IV, Hal Beck, Rod Rose, Marty Jenness, Ken Young (blue shirt), John Llewellyn, Glynn Lunney. Dr. Christopher Kraft. (Emil Schiesser was in the next seat and is not shown in these photos.) Credit: Douglas Yazell, from our section's 40th anniversary of Apollo 8 lunch-and-learn.



SpaceShipTwo's First "Feathered" Flight Marks Latest Milestone for Virgin Galactic

Press Release

Early on Wednesday 4th May 2011, in the skies above Mojave Air and Spaceport CA, SpaceShipTwo, the world's first commercial spaceship, demonstrated its unique reentry 'feather' configuration for the first time. This test flight, the third in less than two weeks, marks another major milestone on the path to powered test flights and commercial operations.

SpaceShipTwo (SS2), named VSS Enterprise, has now flown solo seven times since its public roll-out in December 2009 and since the completion of its ground and captive -carry test program.

This latest flight saw a 6:43AM (local) runway take off for VSS Enterprise, attached to its WhiteKnightTwo (WK2) carrier aircraft, VMS Eve. At the controls of the of the spaceship were Scaled Composites'

test pilots Pete Siebold and Clint Nichols whilst Mark Stucky, Brian Maisler and Brandon Inks crewed the purpose built, all composite, twin fuselage WK2.

After a 45 minute climb to the desired altitude of 51,500 feet, SS2 was released cleanly from VMS Eve and established a stable glide profile before deploying, for the first time, its re-entry or "feathered" configuration by rotating the tail section of the vehicle upwards to a 65 degree angle to the fuselage. It remained in this configuration with the vehicle's body at a level pitch for approximately 1 minute and 15 seconds whilst descending, almost vertically, at around 15,500 feet per minute, slowed by the powerful shuttlecock-like drag created by the raised tail section. At around 33,500 feet the pilots reconfigured the spaceship to its normal glide mode and executed a

smooth runway touch down, approximately 11 minutes and 5 seconds after its release from VMS Eve.

All objectives for the flight were met and detailed flight data is now being analyzed by the engineers at Scaled Composites, designers and builders of Virgin Galactic's sub-orbital spacecraft.

George Whitesides, CEO and President of Virgin Galactic, said: "This morning's spectacular flight by VSS Enterprise was its third in 12 days, reinforcing the fast turnaround and frequent flight-rate potential of Virgin Galactic's new vehicles. We have also shown this morning that the unique feathering re-entry mechanism, probably the single most important safety innovation within the

(Continued on page 15)



Left: Virgin Galactic's SpaceShipTwo's first feathered flight, May 4, 2011. Credit: Clay Center Observatory Thanks to Tara Hyland, one of Houston's Virgin Galactic's Accredited Space Agents, for the photograph, caption, and press release.

Robert McCall 1919-2010

A Bright Future for People in Space

DOUGLAS YAZELL, EDITOR

*All image credits for this page:
NASA*

Robert McCall's art has a strong connection to our NASA/Johnson Space Center (JSC) community in Houston, Texas, USA, since his most famous works focus on human space programs. He painted an outstanding mural in 1979 in the lobby of NASA/JSC's Building 2, at the entrance to the Teague Auditorium. At the time, Building 2 was the JSC Visitor Center. Now we have Space Center Houston for visi-

tors, next door to JSC. A smaller version of this mural is displayed in the lobby of the Gilruth Center at JSC. This article identifies people in this breathtaking mural as much as possible.

Bob Mahoney's recent essay in The Space Review (<http://www.thespacereview.com/article/1669/1>) highlighted a very personal and unique

McCall-JSC connection. Former United Space Alliance (USA) rendezvous instructor Mahoney recounts how a particular early 70s painting by McCall of a shuttle-station docking approach inspired him to work in the space program. While here at JSC, Mahoney served on the training team for STS-63, the first mission (as

(Continued on page 9)



Above: The artist, Robert McCall, in front of the lower left corner of the mural.

Below: The entire 1979 mural by artist Robert McCall



(Continued from page 8)

part of the Shuttle-Mir program) to ever execute such a shuttle-station approach. Inspiring indeed!

Houston resident Robert Pearlman's web site, www.collectSPACE.com (and it works without the www, too: collectSPACE.com), contains an excellent obituary and tribute to Robert McCall (<http://collectspace.com/news/news-022810a.html>). Its conclusion

is a quote from Mr. McCall about a bright future for people in space. One memorable story in this article by Mr. Pearlman highlights Mr. McCall's artwork on a space mission patch that will never fly, since the candidate astronaut, Barbara Barrett, was a backup for private ISS astronaut Guy Laliberte, of Cirque du Soleil fame.

Mr. McCall created mission patch artwork for STS-1, STS-3, STS-133 (shown on

page 17 of our last issue), the last planned flight for Space Shuttle Discovery, and other Space Shuttle missions. He also created the Apollo 17 mission patch and the patch for the NASA Mission Operations Directorate (MOD), both of which appear in this mural near the bottom left corner. His space-themed artwork is on quite a few stamps from the United States Postal Service.

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Robert McCall 1919-2010

*All image credits for this page:
NASA*



Left: The astronaut in the mural with his raised arm pointing to our left is Alan Shepard (deceased). From a NASA biography at JSC: Shepard was one of the Mercury astronauts named by NASA in April of 1959. He was the first American to journey into space. He was also a member of the Apollo 14 crew.

On the scaffold, Mr. and Mrs. John Young pose with the artist in 1979. From a NASA biography at JSC: Astronaut John Young is the first person to launch into space six times from Earth, and the first to launch into space seven times counting his lunar liftoff.



Far left: The artist with a portrait of Judith (Judy) Resnik, a 1979 astronaut candidate who later perished in the Challenger accident, mission 51-L. She was also a crew member on the earlier Space Shuttle mission STS-41-D.

Left: The artist and Judith Resnik, who is painted in the center of the mural next to John Young.

Robert McCall 1919-2010

All image credits for this page: NASA

(Continued from page 9)

One of his most famous works is a painting for the 1969 blockbuster movie *2001: A Space Odyssey*. No doubt this art and movie inspired many in our industry, including the creators of a Houston-area engineering firm, Odyssey Space Research.

This article fails to identify some of the real people shown

in this 1979 mural. If you know the identity of anyone shown in this mural (including corrections, additions, suggestions, etc.), please write to us at editor@aiaa-houston.org, or ai-aadyazell@me.com.

With one or two other people, AIAA Houston Section council member Dr. Albert A. Jackson got the ball rolling for the creation of this article. He

later showed a draft of this article to artist Alan Bean, an Apollo astronaut, the fourth person to walk on the Moon. This article includes a photo of Bean adding the astronaut pin design to the mural. He mentioned to Al that he also added the same thing to the McCall mural at the Air and Space Museum in Washington, DC.

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Right: The artist with the portrait of astronaut Gus Grissom. From a JSC biography: Virgil I. Grissom (deceased) was one of the seven Mercury astronauts selected in April of 1959. He piloted the Liberty Bell spacecraft, the second and final suborbital Mercury test flight, on July 21, 1961. He later served as command pilot on the first manned Gemini flight. Grissom was named to serve as command pilot for the AS-204 mission, the first 3-man Apollo flight. Lieutenant Colonel Grissom died on January 27, 1967, in the Apollo spacecraft flash fire during a launch pad test at Kennedy Space Center, Florida.



Far right: Ed Fendell, Integrated Communications Officer (INCO) posing for the artist. We can see Mr. Fendell in the mural even better in the picture below this one.

Far right bottom: Glynn Lunney poses while the artist adds him to the mural.



Right: Dr. Christopher Kraft (JSC Center Director in 1979) and the artist.



Above: Eugene Kranz, former NASA flight controller, and the artist, allowing us to see Mr. Kranz in the mural.



Above: Artist Alan L. Bean is a former astronaut who walked on the Moon as part of the Apollo 12 crew. He is shown here adding an astronaut pin design with the collaboration of Mr. McCall.

Below: George W.S. Abbey and the artist.



(Continued from page 10)

Dr. Jackson also contacted space artist Pat Rawlings (www.patrawlings.com) who gave us permission to include the following quote from his web site. "Bob McCall, one of the founding fathers of space art passed away February 26, 2010. He was 90 years old. In 1979, I was working at Johnson Space Center as a technical illustrator on a Space Shuttle systems manual. Bob was working on the 'Opening the Space Frontier -The Next Giant Step' mural outside the Johnson Space Center's main auditorium. At that time, I was just beginning to consider the possibility of becoming a space artist. Every few days I would go over and watch him paint and exchange a few pleasantries. Eventually, I met with Bob in Building 45 to discuss his work and he drew me a pretty elaborate sketch in a space art book featuring his work. His enthusiasm was contagious and after that meeting, I decided to focus on a career in space art. Over the years, when I have run into Bob at art shows or conferences, he has always

(Continued on page 12)

Robert McCall 1919-2010

All image credits for this page: NASA



Left: Chuck Biggs and the artist.

Robert McCall 1919-2010

*All image credits for
this page: NASA*

(Continued from page 11)

been a perfect gentleman and inquired as to what I was working on and what techniques I employed. He and Louise were very welcoming to an artist that was just beginning to get his 'brushes' wet. The field has lost one of its founding fathers. Bob, now you are getting a close-up view of the heavens that your paintings so beautifully opened to the world."

Marianne Dyson kindly helped with this project to identify people in this mural. She is a Golden Kite and AIP Science Writing award winner and a former NASA flight controller whose web site is www.mdyson.com. She also suggested we add a plaque to this mural at NASA/JSC in order to identify as many people as possible in the mural. That is a worthwhile task for the mural in building 2 at JSC and



Above: An image cropped from the mural. Our guess for this member of the future "NASA Patrol" is astronaut Frederick Gregory, based on a printed copy of a NASA photograph.

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Right: two of fifty artist's concepts for this mural. About 400 images are part of this NASA collection of photographs about this 1979 mural by artist Robert McCall. The NASA intranet web site is <http://io.jsc.nasa.gov/app/browse.cfm?cid=7401&ct=1>



Above: The left third of the mural, cropped from the image shown earlier in this article. This allows us to see the people in the bottom of this part of the mural.

- Mr. George W. S. Abbey, later a JSC Director, in the blue coat & tie at the far left. People near him are shown on the next page.
- Unknown: the lone man on the far side of the consoles, at the end of the row of consoles, near the left end of this image. A larger image of this man is shown on the next page.
- The pair of seated men: Dr. Charles Berry wearing the dark coat, and Dr. Richard S. Johnston (NASA medical doctors)
- The pair of standing flight controllers: left: Dr. Christopher Kraft (author of *Flight: My Life in Mission Control*), right: Dr. Robert Gilruth
- Eugene Kranz, flight controller & author of *Failure is Not an Option*, standing to the right of Dr. Kraft and Dr. Gilruth.
- Ed Fendell, INCO, just behind Mr. Kranz. In the mural Fendell is looking to our left.
- Deke Slayton, astronaut, wearing a white shirt, standing in the lower left corner.
- John Jurgensen, seated (with dark hair, a dark beard, and a blue and white striped shirt) just in front of Deke Slayton

(Continued from page 12)

the smaller copy of the mural at JSC Gilruth Center. We will make the suggestion to NASA/JSC and AIAA Houston Section.

Marianne also put us in touch with our main expert for identifying people in this mural, Mike Gentry at NASA/JSC. The artist Robert McCall spoke with Mr. Gentry in 1979 and showed him who was in the mural, identifying most or all of the recognizable people. Mr. Gentry asked a few colleagues at NASA about this subject and shared his memories as much as possible during the preparation of this article.

If you work at NASA/JSC, you might be able to see a 1979 article about this mural and the artist. It appears on pages 1 and 4 in the March 9 edition of JSC Roundup. The following two paragraphs are from that article.

Specializing in space art, McCall has had his share of memorable experiences. “I had been sketching around for days, in Mission Control, during Apollo 15. And this guy, Ed Fendell, says, ‘Hey, Bob, you want to sit down here and work that camera on the Moon?’ Gosh. You know. For me this was fantastic. So I sat at his console, and looking at that big picture in Mission Control, I punched the buttons and I panned right. I watched that picture pan about 10 seconds. I zoomed in and I zoomed out, tilted up, tilted down, and panned the lunar landscape. I knew that my movements here were moving that camera on the Moon. That was a real thrill.”

The Building 2 mural, the theme of which is “The Space Program: Past, Present, and Future,” is McCall’s third: His work covers walls at Marshall Center and the Smithsonian. “I wanted to do another mural,” he says. He discussed it with Chuck Biggs of JSC’s Public Services, who thought it was a good idea, “and so I pursued it,” says McCall.

It is a pleasure to identify people portrayed in this mural. As we pause to honor the late Robert McCall, we also give a tip of the hat to these excellent representatives of our country’s human spaceflight program.

(End of the main text. Additional images are presented on the next page.)

Robert McCall 1919-2010

Below: one of fifty artist’s concepts for this mural.



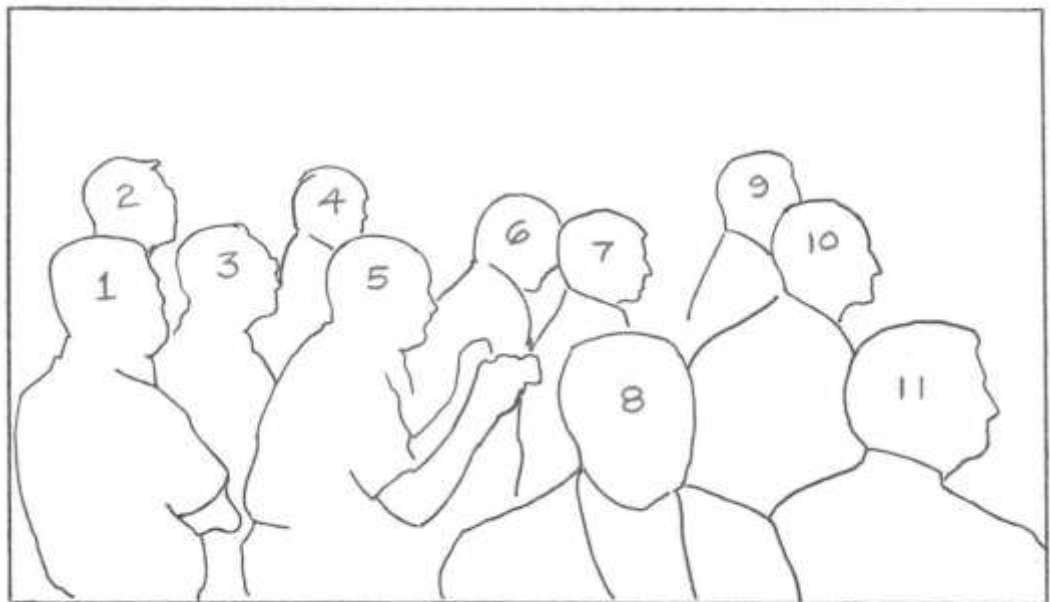
All image credits for this page: NASA



Below: not identified yet, the lone man on the far side of the consoles.



Robert McCall 1919-2010



Above: an image cropped from the photograph on the prior page. Image credit: NASA (silhouettes by Don Kulba)

1. Chuck Biggs, whose photograph with the artist is shown on a prior page (light hair and beard)
2. William (Bill) Der Bing, NASA Protocol Office, the higher of the two men wearing eyeglasses.
3. Bob Gordon, NASA Public Affairs Office, the lower of the two men wearing eyeglasses. Between Mr. Der Bing and Mr. Gordon is a face we have not identified.
4. Unknown
5. Pat Patnesky, NASA photographer, with his cameras
6. Ed Mitchell, Apollo astronaut (dark hair and beard)
7. Joe Allen, astronaut, with light hair, just in front of Ed Mitchell
8. Mr. George W. S. Abbey, later a JSC Director, wearing the blue coat and tie
9. Not identified (face not visible)
10. Ron Evans, Apollo 17 astronaut
11. Glynn Lunney, an Apollo flight director

(Continued from page 7)

whole system, works perfectly. This is yet another important milestone successfully passed for Virgin Galactic, and brings us ever closer to the start of commercial operations. Credit is due to the whole Scaled team, whose meticulous planning and great skill are changing the course of history." Pete Siebold, who along with Clint Nichols piloted the spaceship added: "In all test flight programs, after the training, planning and rehearsing, there comes the moment when you have to go up there and fly it for real. This morning's flight was a test pilot's dream. The spaceship is a joy to fly and the feathered descent portion added a new, unusual but wonderful dynamic to the ride.

The fact that it all went according to plan and that there were no surprises is a great testament to the whole team."

Wing Feathering for Re-Entry

Perhaps the most innovative safety feature employed by SpaceshipOne and now SpaceShipTwo is the unique way it returns into the dense atmosphere from the vacuum of space. This part of space flight has always been considered as one of the most technically challenging and dangerous and Burt Rutan was determined to find a fail-safe solution which remained true to Scaled Composite's philosophy of safety through simplicity. His inspiration for what is known as the feathered re-entry was the humble shuttlecock, which like SpaceShipTwo relies on aero-

dynamic design and laws of physics to control speed and attitude.

Once out of the atmosphere the entire tail structure of the spaceship can be rotated upwards to about 65°. The feathered configuration allows an automatic control of attitude with the fuselage parallel to the horizon. This creates very high drag as the spacecraft descends through the upper regions of the atmosphere. The feather configuration is also highly stable, effectively giving the pilot a hands-free reentry capability, something that has not been possible on spacecraft before, without resorting to computer controlled fly-by-wire systems. The combination of high drag and low weight (due to the very light materials used to construct the vehicle) mean that the skin temperature during re-entry stays very low compared to previous manned spacecraft and thermal protection systems such as heat shields or tiles are not needed. During a full sub-orbital spaceflight, at around 70,000ft following re-entry, the feather lowers to its original configuration and the spaceship becomes a glider for the flight back to the spaceport runway.

About Virgin Galactic

Virgin Galactic is on track to be the world's first commercial spaceline. The new spaceship (VSS Enterprise) and Mothership (VMS Eve) are both being developed for Sir Richard Branson's Virgin Galactic by Mojave-based Scaled Composites. Founded by Burt Rutan, Scaled developed SpaceShipOne, which in 2004 claimed the \$10m

Ansari X Prize as the world's first privately developed manned spacecraft. Virgin Galactic's new vehicles share much of the same basic design but are being built to carry six customers on sub-orbital space flights, allowing an out-of-the-seat zero gravity experience and offering astounding views of the planet from the black sky of space. The VSS Enterprise test flight program will continue through 2011, prior to commercial operations, which will be based at Virgin Galactic's future headquarters at Spaceport America in New Mexico.

Press Release

*Below: First free manned flight of VSS Enterprise, October 10, 2010
Credit: Virgin Galactic*





EAA and EAA Chapter 12 Information

Chapter Mission

The Experimental Aircraft Association's Chapter 12, located at Ellington Field in Houston, is an organization that promotes all forms of recreational aviation. The organization includes interest in homebuilt, experimental, antique and classic, warbirds, aerobatic aircraft, ultra lights, helicopters and commercially manufactured aircraft and the associated technologies.

This organization

brings people together with an interest in recreational aviation, facilitating social interaction and information sharing between aviation enthusiasts. Many of the services that EAA offers provide valuable support resources for those that wish develop and improve various skills related to aircraft construction and restoration, piloting, aviation safety, and aviation education. Every individual and organization with an interest in avia-

tion and aviation technology is encouraged to participate (EAA membership is not required, but encouraged). Meetings are generally from 6:30 PM to 9 PM at Ellington Field in Houston Texas. We welcome everyone. Come as you are and bring a guest; we are an all aviation friendly organization!

Ideas for a meeting? Contact Richard at rtssessions@earthlink.net, Chapter web site:

www.eaa12.org

Experimental Aircraft Association web site: www.eaa.org

Scheduled/Preliminary Chapter 12 Event/Meeting Ideas and Recurring Events:

Monthly Meeting: Chapter 302, 2nd Saturday, 10 AM, Lone Star Builder's Center, Lone Star Executive, Conroe TX

1st Saturday of each month – La Grange TX BBQ Fly-In, Fayette Regional (3T5)

1st Saturday – Waco/Macgregor TX (KPWG), Far East Side of Field, Chap 59, Pancake Breakfast with all the goodies 8-10 AM, Dale Breedlove, jdbvmt@netscape.com

2nd Saturday – Lufkin TX Fajita Fly-In (LFK)

2nd Saturday – New Braunfels TX Pancake Fly-In

3rd Saturday – Wings & Wheels, 1941 Air Terminal Museum, Hobby Airport, Houston TX

3rd Saturday – Jasper TX BBQ Lunch Fly-In (JAS)

3rd Saturday – Tyler TX Breakfast Fly-In, 8-11, Pounds Field (TYR)

4th Saturday – Denton TX Tex-Mex Fly-In

4th Saturday – Leesville LA Lunch Fly-In (L39)

4th Saturday – Shreveport LA Lunch Fly-In (DTN)

Last Saturday – Denton Fly-In 11AM-2 PM (KDTO)

Below: EAA member Lance Borden is profiled starting on the next page. He is shown here with his 1948 Luscombe airplane, which is airworthy. Ironically, flying it takes time away from rebuilding his 1929 Inland Sport airplane.



Profile: Lance Borden

DOUGLAS YAZELL, EDITOR

Editor's note: Welcome to the first in a planned series of profiles of members of EAA Chapter 12, the Houston Chapter of The Experimental Aircraft Association (www.eaa12.org). I asked some questions while recording this interview on August 9, 2010, but the interview is presented as if it was a narrative by Lance Borden.

Mr. Borden purchased one of the approximately seven existing Inland Sport airplanes. The Inland company made only about 46 (one report says 90) of these popular, practical, and record-setting airplanes from 1929 to 1932, in three different models. The only difference in the three models was the size of the motor, two using 5 cylinders with 70 and 90 horsepower and one using 7 cylinders with 110 to 125 horsepower. The company was created to make these airplanes based on the

prototype airplane, which was designed and built by Mr. Borden's maternal grandfather, Lawrence Dewey Bonbrake, a barnstorming pilot who was one of the company leaders.

I was born into an aviation family. My maternal grandfather was Lawrence Dewey Bonbrake. He was born in 1899. He grew up in Woodston, Kansas. In about 1912, when he was just 13, an airplane came to the nearby town of Stockton, Kansas. Here is a web site about that:

<http://earlyaviators.com/elongren.htm>

This site shows a photograph of the flight of Albin K. Longren (1882—1950) at Stockton, Kansas, on September 6, 1912, from the collection of William Burke, Jr. The town of Stockton is near Woodston. It was the next town from

Woodston, and it was larger of the two towns. I am sure that he would have been out there to see the airplane. He had a cousin who had similar interests. These guys were notorious around Woodston for being always into everything, building things, making all kinds of stuff. In high school, he made a sled with a motorcycle engine and a propeller. In the winter-time he rode it to Stockton and back. I have a newspaper article about that feat.

He and his cousin did things like making gliders and jumping off the barn with them.

He wanted to learn to fly. His father was the banker in Woodston. They were fairly well off. I don't know exactly when he learned to fly, but it was in the teens, before 1920. By 1920, he owned a Curtiss JN-4 Jenny, and he was a barn-

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Inland Sport prototype airplane, tail number NX7225, ca. 1927-1928, designed and built by Lance Borden's maternal grandfather, Lawrence Dewey Bonbrake. Image credit: Lance Borden (see also www.dmairfield.com/airplanes_type/inland, Davis-Monthan Aviation Field, First Municipal Aviation Field in the U.S.)

Profile

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stormer. He did that all around Kansas and Missouri.

He met my grandmother in Kansas City at an ice cream store. It was a small shop. My mom says he walked in wearing his aviator's helmet and goggles and swept my grandmother off her feet. So that got married in 1922 and my mom was born in 1923.

He went to Valparaiso University and learned a lot about aircraft maintenance and design. He was a pretty bright guy. When he was about 20 years old he designed an air ambulance, and I have pictures of that. It was a huge airplane for its day. I think it had a 400 hp Liberty engine. The pilot sat outside in an open cockpit. It was a big biplane. It had an inside area for the patient, and for doctors and nurses.

In about 1924, he and a friend, Blaine Tuxhorn, a famous early aviator in the Kansas City area, bought a Bahl Lark monoplane.

By the way, I did not mention it yet, but he was in a crash in the Jenny. Another guy was flying it. My grandfather got injured real bad. The Jenny was totaled. The other guy got killed. Bones in Dewey's face were broken, and he always had a rather nasal voice after that. He had some scars on his face from that accident. He died when I was nine years old. I remember him very well.

The Bahl Lark was a totally unsatisfactory airplane. My grandfather wrote a letter to the editor of Aviation Week magazine. In it he said the airplane was totally unsatisfactory. So he redesigned this airplane. He made it into a satisfactory airplane. It had a 3-cylinder, 50 hp

Wright-Anzani engine. It was a parasol, open cockpit. I think it was a single seater.

That gave him the idea of the Inland Sport, to build an everyman's airplane. It was a high-wing monoplane. It saved the cost of the extra wing of a biplane. A single wing was good enough. It made the airplane simpler and faster. It had side-by-side seating. He could carry his wife with him and sit next to her. It was good for training, too. It had dual cockpit controls so you could train people to fly.

In those days, most airplanes were tandem two-seaters, front and back. To train somebody to fly, you had to yell. The student was usually sitting in the front and the instructor in the back.

Aviation was really booming after Lindberg flew the Atlantic

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Mr. Lance Stafford Borden in his own 1929 Inland Sport airplane, tail number NC252N, in his hangar at Ellington Field in Houston. Using that tail number in an internet search leads to some nice web pages about this airplane and the Inland Company. Image credit: Douglas Yazell



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in 1927. People thought that within a few years, everybody would have an airplane. They thought it would be common.

The years 1928 and 1929 had some of the fastest growth for airplane companies. It was tremendous. You can picture the graph, it was continually climbing up. After 1927, it just went up like a skyrocket.

My grandfather built a prototype of the Inland Sport in 1927-28. It had all those good features designed by my grandfather. It was made of 4130 chrome-moly steel tubing, which was beginning to be used at that time, rather than all wood. This metal is still in use today for building airplanes, bicycles, and motorcycles. This prototype airplane had a unique trim system for the horizontal stabilizer, using a jackscrew, and it had a trim wheel in the front. As I said, it was an open cockpit, which was common. It had side-by-side seating.

It was very fast. It won altitude and speed records in 1929 and 1930. In the 1930 National Air Races in Chicago, it won a number of the races. I have listings. It won a lot of those races in that event that year in its class. In some of the races, it won in bigger classes, winning

against bigger and more powerful airplanes.

One thing Inland did early on was to promote women flying. There were several women that were famous in their day. One was named Mae Haizlip. Her real name was Mary. She was married to Jimmy Haizlip, who was a very famous aviation racer in the late 1920's and through the 1930's. Another was Vera Dawn Walker. She was also a very successful air racer. Another was Martie Bowman. Her real name was Marguerite. She went by Martie. She also flew the Inland Sport.

As a matter of fact, Mary "Mae" Haizlip and Martie

Bowman, I have proof that they have flown my airplane. Martie Bowman flew my airplane in 1931 from San Diego to Cleveland, in what was to become later, The Powderpuff Derby. It was The National Air Classic Derby. I think they are now calling it that again, The National Air Classic Derby. She won third place in my airplane. My airplane has some good history.

The Inland Sport prototype, was built by my grandfather and a young apprentice, in a metal building in Kansas City, Missouri. That was in 1927 and 1928. They built it with pretty much their own money. I am sure he got money from his

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Profile



Left: The motor and the 89-inch propeller, part of Mr. Lance Borden's 1929 Inland Sport airplane. Only about 46 of these popular, practical, and record-setting airplanes were built (one report says 90 of them were built). The company started in September of 1929, and the infamous stock market crash of 1929 took place in October. The Inland company lasted until 1932 before declaring bankruptcy. Image credits: Douglas Yazell



Profile

Right: Inland S300E. Image credit: aerofiles.com



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father, too. His father was pretty well off. In 1929, the stock market crashed, and wiped out my great grandfather. Those two men built the prototype, and they put a Wright-Anzani 3-cylinder engine on it. It was a 40 or 50-horsepower Wright-Anzani engine. It flew very well.

The 1928 National Air Races, was one of the first such event and it was in Los Angeles, California. One of my grandfather's pilot friends flew with another guy to Los Angeles from Kansas City to Los Angeles to the National Air Races in the Inland Sport prototype airplane. The man's name was Arthur Hardgrave. The pilot was Gene Gabbart. Gene Gabbart was a very close friend

of my grandfather. There are records of Gene and Arthur landing at Davis Monthan Airport in Tucson during that trip. We have those records. They went to those races, and Mr. Hardgrave was very impressed with that prototype airplane. He was a venture capitalist. He had a lot of connections into money. He was the president of The Kansas City Ice Company. He was also president of The Kansas City Chamber of Commerce. He got financial backing and they opened up shop at Fairfax Airport in Kansas City, Kansas, which was a brand new airport at that time, in 1928 or 1929. They started manufacturing Inland Sports.

The first production Inland Sport had a 60 hp LeBlonde engine, a 5-cylinder radial engine. It performed much better

than it did with a 3-cylinder engine. Later in 1929, they put a Warner-Scarab 110 hp engine 7-cylinder on an Inland Sport. That's the one that won the altitude and speed records. I have those figures. It was remarkable that this airplane could do that. This 1929 record for altitude was over 18,000 feet. Its circuit air speed record was over 125 miles an hour. That was remarkable for an airplane in its category at that time.

The first production airplane was called an Inland Sport. It was the "Sport". It had the smaller engine. Its model number was S300. The next one they made... They actually built the Super Sport first. It had the 110 hp 7-cylinder engine. That was called the W500

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Lawrence Dewey Bonbrake in 1929 with an Inland Sport airplane, the Sport S-300-E model. Mr. Bonbrake was Lance Borden's maternal grandfather. Mr. Bonbrake designed and built the Inland Sport prototype airplane. Image credit: Lance Borden (see also www.dmairfield.com/airplanes_type/inland, Davis-Monthan Aviation Field, First Municipal Aviation Field in the U.S.)



Profile



Left: Lance's Inland Sport NC252N in 1949. Image credit: Lance Borden

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model, with W meaning Warner, and they called it the "Super Sport". In early 1930, Warner came out with a 5-cylinder, 90 hp engine, a kind of an economy engine, and Inland put one of those on the airplane and they called that the R400 Sportster model. The R400 Sportster was very successful, because of the combination of fairly good power, good economy, and good handling.

The first production Inland went on the market and was announced, in the September, 1929 issues of several aviation magazines. The stock market crashed in October of 1929. They managed to stay in business until early 1932, when they went bankrupt. They just could not sell enough airplanes. It devastated my grandfather. My mom and my grandmother always said he was never really the same after that. It really crushed him.

But he did go on to do great things after that. He did design work on many airplanes. Many of them we know today. I could list a number of them. B-24, B-

36, C-130, Fairchild F-27, Super Constellation to name a few... He worked for Lockheed for a long time. He worked for a number of other different manufacturers also.

In 1944, he was a chief engineer on the Manhattan Project in Los Alamos, New Mexico, for seven months in 1944. He was working on the atomic bomb, not aviation. He was a chief engineer for seven months. He had crippling nosebleeds living at that altitude. They ended up leaving because of that. He went back to Los Angeles. He was working for Consolidated. He worked for a number of such companies, Consolidated, Vultee, Lockheed, I can't remember them all now.

He died in 1955 of a stroke. It may have had something to do with his accident. He was 56 years old. He died in his sleep, it may have been from those head injuries when he was younger. He probably had high blood pressure, too. It runs in the family. He died young, unfortunately.

Any of those models from The Inland Sport Airplane Company can be called Inland Sports. The three airplane models, were all exactly the same, except for the engine. There was one that had a Cirrus engine. That was one of a kind. The Inland also made an all metal biplane. It was a prototype Army trainer. It crashed during testing. About that time, they were probably about to fold up, anyway. I have never seen a picture of that airplane. It crashed and killed the pilot. It got into a spin, and he did not get out of the airplane in time. He was a friend of my grandfather.

If you look in Juptner's Aero Files, it says they built about 46 Inland Sports. However, I have a letter from Arthur Hardgrave, who was the President of Inland Aviation, that was a letter of recommendation for my grandfather, probably when he was looking for a job during the Depression. It says that they built over 90 of them. I don't know. He might have been exaggerating. Maybe they built over 90 and we just have not

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Profile

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found the records of them. There are records about building 46 of them.

The Inland Sport I have now is the biggest. It's a Super Sport. If 46 Inland Sports were produced, about half were Super Sports, and about a quarter were Sports, and about a quarter were Sportsters. That is a rough guess. Mine started out as a Sport, an S-300. It was converted to a W-500 at the factory before it was sold.

I worked with Bell Helicopter in Iran for five years during the 1970s. During that time we took some vacations in Europe. One was really good. We rented a VW Kombi camper in Amsterdam, and drove all over Europe, including a lot of time in France and Germany. We did that in 1976.

My Dad was in The Air Force, and granddad a pioneer aviator, so we heard this growing up. Granddad had model

airplanes on the mantle. We kids built and "flew" model airplanes like crazy. Decals, pieces, glue, etc. ... we loved aviation. Father was an aviation cadet in the Army Air Force. He went into the Army Air Force in 1942. He was an aviation cadet but washed out in second part, though he learned to fly in a Stearman PT-19. He said it was the instructor that caused his failure, which it may have been. He was flying the more advanced BT-13 airplanes when he washed out. So he wound up next in Air Force intelligence. His career was mostly in the OSI (Office of Special Investigation), which was affiliated with the CIA, The Central Intelligence Agency. During WWII, he participated in the third day of the Normandy invasion. Then he was part of a P-47 outfit in Belgium. He was the intelligence officer in that area.

We lived on Air Force bases and saw airplanes a lot. All of us kids had model airplanes.

Aviation careers were a natural thing for us. My older brother went in the Air Force and he was a crew chief on B-47s. I went into the Air Force then in 1965. A twist: I was interested in electronics and radio. That was also thanks to my grandfather. He used to build crystal sets in the 1920s, for all the neighbors when radios were just beginning.

He bought a crystal set for my brother and me in about 1953. We were totally fascinated with it. It was magic to me. After that I just wanted radio kits. Those and model airplanes, all at the same time. I stayed very active in electronics starting when I was a little kid. I bought my first tube radio when I was about 8 years old. It was a kit. Of course, I had help.

I got a ham radio license when I was 15. Electronics, as well as aviation, was a passion for me. I still have an electronics shop at home, and a ham

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Right: A photograph from about 1950 showing the family who owned the airplane which Mr. Lance Borden now owns. credit: Lance Borden (see also www.dmairfield.com/airplanes_type/inland, Davis-Monthan Aviation Field, First Municipal Aviation Field in the U.S.)



Profile



other people in. Then towards the end of the day they locked the doors and pulled down the blinds and called us over there. They said, "Give us every copy of your orders." Then the guy said, "Well, here's your new orders..." They gave us orders to Detachment One of the 56th Air Commando Wing. We were both B-52 electronics guys. He was from a different base. We were thinking, "This can't be right. We are not air commandos." The guy said, "Just a minute, Sgt. Dennis will come over and pick you up." We saw this guy come over in a jeep. He was wearing an Aussie hat and bloused fatigues. He looked just like he was ready to jump out of an airplane. He came over and picked us up. Both of

Left: Inland logo. Image credit: Lance Borden

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radio station.

I got my pilot's license in 1972. In the Air Force I got a lot of air time, passenger time. I was an aircraft maintenance guy. Avionics technician was my specialty.

I did not get into college soon enough to keep from getting drafted in 1965. I lived in Columbus, Ohio. I intended to go to Ohio State University. Rather than going into the Army, I joined the Air Force. I went into two fields that I liked. One was aviation, being in the Air Force. The other was electronics.

I was an honor graduate of the electronics school at Keesler Air Force Base in Mississippi. I then went to work on B-52s and KC-135s at Carswell Air Force Base in Fort Worth. I did that for a couple of years. Then I got orders to go to an F-4 outfit in Thailand. On the way there, I had to stop in Hamilton Air Force Base in California for two weeks of combat training. I did not realize it at the time, but that was an unusual thing. When I got to Udorn Royal

Thai Air Force Base in Thailand, and got into the central base processing office, another guy and I waited there most of the day and they did not process us in. They were processing



Left: Lawrence Dewey Bonbrake, Lance Borden's maternal grandfather, designer of the 1929 Inland Sport prototype airplane. This photograph shows scars on Mr. Bonbrake's nose and lower lip, and (probably not visible in this reproduction) his upper lip. Those scars were from his accident in his barnstorming airplane, a Curtiss JN-4 Jenny. Image credit: Lance Borden (see also www.dmairfield.com/airplanes_type/inland, Davis-Monthan Aviation Field, First Municipal Aviation Field in the U.S.)

Profile

Right: Inland Sport color ad. Image credit: Lance Borden

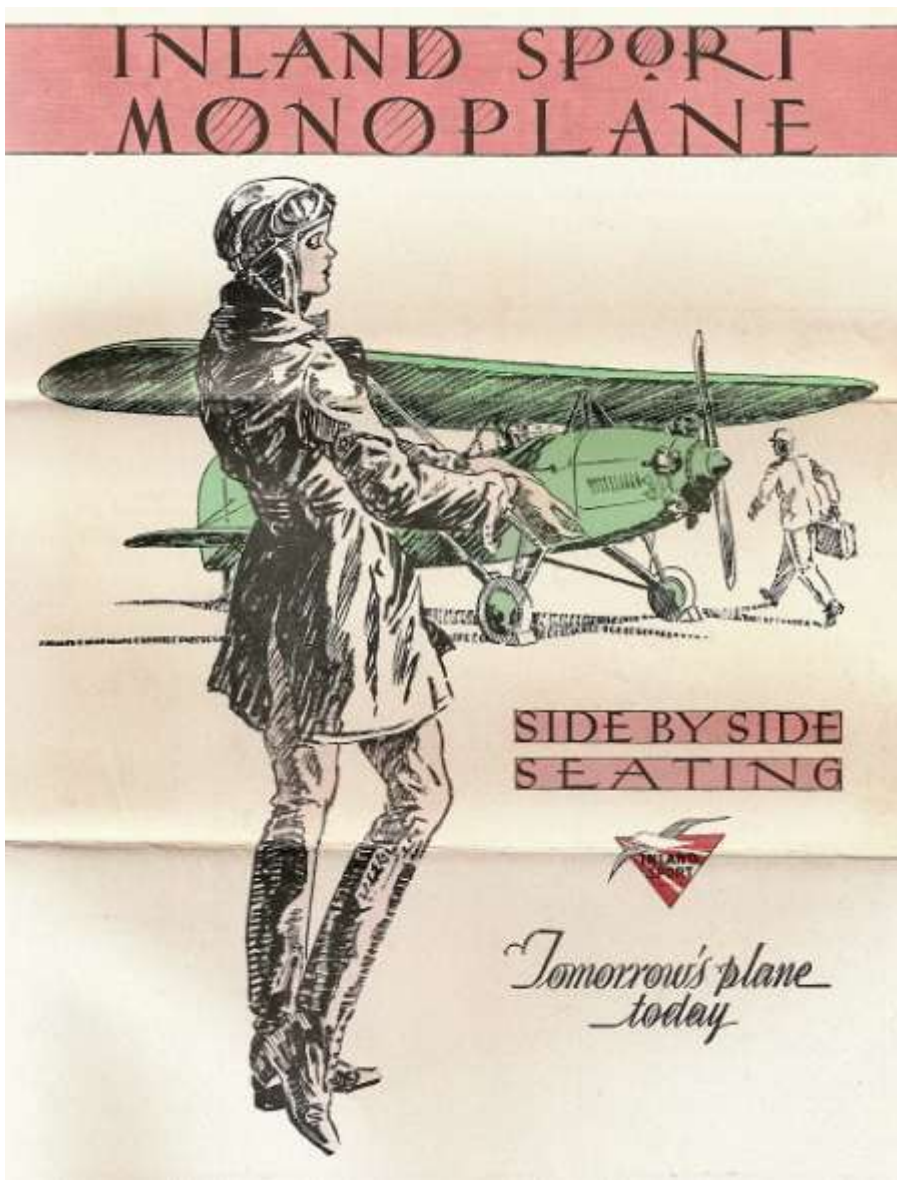
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us were scared to death. He told us what it was all about.

He said we were going to be in a secret operation. For many years we could not talk about it.

It was a T-28 fighter bomber outfit. They also had the Raven forward air controllers, which flew O-1 bird dogs and Cessna 185s (U-17s) and the Helio Courier aircraft. They did a lot of flying with Air America and

the fact that I picked up a skin fungus there I have never gotten rid of. I keep it under control. I was also exposed to Agent Orange. I do have problems because of that.



I loved the aircraft. Every time I got a chance I flew in the back seat of the O-1 bird dogs. Combat operations. I flew in the back seats of the T-28 fighter bombers. The missions were bombing and strafing and so forth. We were small groups of 15 Americans or so supporting Lao-tian Air Force people and pilots. Some of the pilots were Thai pilots. We shared work. I was an electronics guy, but when I had time, I helped fuse bombs, pump gas, etc. We pumped gas by hand in some of the places. We flew into some remote areas. Changing tires, replacing brakes, working on the engines, not just electron-

I can talk about it now. It was declassified in 1986. They got people in there by sending them with orders to other outfits, then at arrival, as they did for us, they changed the orders. That's how they got the people they needed to do the work.

the whole operation was in Laos. So I spent 18 months in and out of Laos, mostly in Laos. I got a lot of back seat time in forward air controllers in combat operations. I drew combat pay for 18 months. I never got wounded, shot or injured in any way other than

ics.

I still stay in touch with some of those people. I make a lot of those reunions about once a year at Randolph Air Force Base in San Antonio.

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When I got out of the Air Force, I really wanted to go to medical school. I never made it. When I was in high school, since 9th grade... Even as a kid, I had been down to the Ohio State medical school to talk to them. But I had a great career. I took college biology in high school. If not for the Vietnam War, I might have been a doctor and I would not have known all this other stuff.

My specialty became avionics, aviation and electronics. Early 1960s, I flew model airplanes, single channel, rudder only, and control line models. I never would have expected that I would work in the Space Program someday.

I am now retired from Boeing. My first day of retirement was Oct. 1, 2008. I had 29 years with Boeing. Since then, starting on Jan. 1, 2009, I have worked for Barrios Technology, part time, working for man who replaced me. When I retired, I was the Space Shuttle RF NAVAIDS subsystem manager. Now I work for that manager.

I was the Space Shuttle RF NAVAIDS subsystem manager from 2002 until the end of 2008. I always wanted to work the rest of the Space Shuttle missions, since I worked all of them, so I am doing that now.

I worked Apollo 17. When I got out of the Air Force, I came to Houston where I had a lot of relatives. I worked for Associated Radio at Hobby Airport as an avionics technician. I worked there a couple of years, then I went to work on the NASA airplanes at Ellington Field. I worked on (probably) these same T-38s in 1972 and 1973. I was an avionics techni-

cian. I then opened an avionics shop at Hobby Airport called Airtronics.

I had a couple of financial backers. It was on the south side of the field. We could do everything. I had it certified with the FAA. Then Bell Helicopter made me a great offer and I went to Iran as a Senior Avionics Technician. I held that title for three years, then I went into armament engineering... I started engineering with Bell Helicopter... as an armament electronics engineer. I had lots of experience with armament systems.

When I left Iran, I was the Chief Armament Engineer. I was 32 years old. I had a lot of responsibility. It was a great job. Unfortunately, the revolution came along and we had to leave.

I came back here on January 4, 1979. I have worked at Johnson Space Center ever since then. I left a few days before the Shah.

I worked

Apollo 17 at Ellington Field. I was here when Apollo 17 astronauts came back. I was out there, standing there talking, right there in front of the stand. I did that but I have never done that for the Space Shuttle crews.

I spent 14 years in SAIL at JSC. SAIL is the Space Shuttle Avionics Integration Laboratory. Most of the time in SAIL I was a communication and tracking systems engineer. There I really learned the systems. It is the best training place for learning Shuttle systems if you ask me. When Shut-

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Left: Newspaper clipping from September 5, 1928. Image credit: Lance Borden



Left: Warner Scarab engine logo. Image credit: Lance Borden

Profile

Right: Inland Sport W-500 in 1929. Image credit: public domain



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 tle goes away, SAIL will go away. People were building a CAIL for Constellation (vehicles in work the past several years for the Moon, Mars and Beyond vision). I think work on that has stopped now. SAIL was a great place. I loved working there. I met lots of neat

people there.

I have a younger brother who got into Ohio State. He could not keep his grades up so he went into the Navy (avionics, Airedale). He spent two cruises on the Roosevelt aircraft carrier. He has lots of interesting stories about work-

ing on the flight deck. He is two years younger than me. He worked in avionics shops after the Navy. He went to college part time. He has been an engineer for a long time. He just got laid off by Raytheon in Tucson. He was working on the missile systems there.

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Right: Curtis JN-4 "Jenny" about 1920. Image credit: Lance Borden



Profile

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He worked for TRW for many years. He worked at the TDRSS ground station in Las Cruces. Then he worked for TRW in CA and actually built the satellites. Some have family names written inside of them in pencil. Being 61 years old and laid off is not a good thing.

I have a sister, three years younger than me. She is the only one who had nothing to do with aviation. She got married and had kids. She has always been very interested in what us guys are doing.

I have done a lot of research on Inland Sports. I am planning on writing a book. I located seven of them that are still registered with the FAA. I think they are the only seven that are still registered with the FAA. I have seen five of them.

A friend in Manhattan, Kansas, has two of them. He has the only surviving S-300 Sport and

the only surviving R-400 Sportster. I was just up there in July. I also visited him there in June. I went to Oskosh (the famous air show) in a motor home with some other guys, and we all sat in his Inland Sports and drooled over them.

I have also visited a man named Harry Stenger in Bartow, Florida, at Bartow Airport, which used to be an Air Force base. He has two Inland Sports. He owns an aircraft maintenance company. They do restorations of antique airplanes. I know a lot about his Inland Sports, where they came from, etc.

He has two Super Sports. Two W-500 Super Sports. Both of them need a lot of work. One of them is mostly just parts, but it is still registered with the FAA. The other one could actually fly, but it is a little rough. It could use recovering and a lot of other work, but is basically airworthy. I know the back-

grounds of those airplanes pretty far back.

The one in better shape originally had a canopy on it. It was a canopy that was added over the open cockpit. The airplane lived in Minnesota. I guess they wanted a canopy on it because it was so cold up there. Somewhere along the line the canopy was removed, but the holes are still in the airplane where the canopy was mounted. It's the only one of these airplanes that was like that, so it is very unique. So I have seen those two airplanes. I went to the Cape to see a launch, and while I was there, I looked this guy up and asked for his permission to come down and see his airplanes.

He was glad to meet me, and vice versa. There are two Inland Sports that I have not seen. I located them. They are at a little airport in Pennsylvania, just north of Wilmington, Delaware.

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Left: Lawrence Dewey Bonbrake about 1924 with Bahl Lark monoplane. Image credit: Lance Borden

Profile

Right: Inland R-400. Image credit: Frank Rezich



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One is registered to a company in Wilmington, and one to a company in Pennsylvania. I am not sure why they are registered to companies. I think they are owned by a couple of different people, but are in the name of the companies for tax purposes or whatever. I have seen pictures of one of them, and I believe it is the one that actually was flown to get the altitude and speed records. I am pretty sure it was that very airplane.

There is another interesting thing about Inland Sports. The man who was their test pilot at that time was a guy named Wilfred Moore. They called him Bill Moore. He was a pilot in Europe in WW I. I don't know if he was an ace or not, but he flew those Spads and the Neuports and so forth.

He was the Chief Test Pilot for Inland. After Inland cratered, he went on and wrote books and scripts for movies,

and radio shows. These were about flying adventures. He is the co-creator of Captain Midnight. That was a real, real famous radio show. And then when I was a kid in the early 50's, it was a TV show, also. It was also a comic book. It is not well known now, but in those days, it was very well known.

Of these seven Inland Sports, the two in Pennsylvania are airworthy. I have pictures.

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Right: Lawrence Dewey Bonbrake about 1925 with Bahl Lark monoplane.



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The one in Bartow, FL, is air-worthy. As for the ones in Kansas, one was recently restored. It is absolutely gorgeous and totally airworthy. They just recently flew it. The other one there is basically airworthy but a little rough. When I saw it four years ago, it was a beautiful airplane. He has taken some things out of it since then, but it is very close to being airworthy,

the S-300. He is going to take that one to Junction, Kansas and have it fully restored. The man in Kansas is Chuck Hall. He was a professor at Kansas State University. He also owns a Cessna 195.

My Inland Sport is about one third restored. I have not worked on it much in a while. I got it in July of 2007. When I first got it, I did quite a bit of

work on it. The fuselage is almost ready to cover with fabric, which I can do. I am an A&P mechanic, I have an FAA A&P license, Airframe and Power plant. So I am licensed to work on it. I will continue when it cools off a little bit. I am doing as little as I can get by with now. When it cools of a little bit I think I am going to cover the fuselage with fabric. The engine has got about 69 hours on it since major overhaul, but it has not run since 1955.

Basically, I am licensed to overhaul that engine, but I haven't done anything with it. It is a 1933 Warner-Scarab. My engine is a 7-cylinder 125 horsepower engine with an 89-inch Hamilton Standard metal propeller. I have located an outfit in Northern California that can rebuild my engine. It is just a matter of obtaining the funds to do it.

He said he can make the engine brand new for me, with magnetos, the exhaust system, and everything. I am very tempted. I really want to get that done. I am working on figuring out ways to get some funding. I may apply for a grant. I am retired. We live OK. I have another airplane that I fly. It's hard for me to come with funds, such as \$18,000 to rebuild the engine. I have a lot of rebuilding to do on the wings. I have them hanging on the wall of the hangar. It might take me a year to do those wings, once I get started on them.

My other airplane is a 1948 Luscombe 8F. It is in pretty much perfect condition.

We were talking about a Cessna 120, and about flying

Left: Lawrence Dewey Bonbrake, the barnstormer with his Curtiss JN-4 Jenny. Image credit: Lance Borden (see also www.dmairfield.com/airplanes_type/inland, Davis-Monthan Aviation Field, First Municipal Aviation Field in the U.S.)



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Profile

Right: Inland Sport S-300 in Kansas 2007. Image credit: public domain

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old airplanes, and comparing its safety to driving old cars. The Cessna 120 is a taildragger. My friend Jim Gardner owns a Cessna 120. I am doing the annual inspection on it right now. I worked on it Saturday and Sunday. We fly that, too, and these are 1940s airplanes. As long as they are properly maintained, they are safe to fly, and they are fun to fly.

That was my grandson in a picture on a web site with me and my Inland Sport airplane. He was probably about 8 years old at that time. I have pictures of my son sitting in Chuck's [Inland Sport] airplane up in



Kansas.

My older son Jason is an engineer working for SAIC. He is a Space Shuttle safety engineer.

I will mention one interesting thing about the Luscombe, my other antique airplane. When I got it, I then had an airplane that flew, so that took some of my attention away from the Inland. As much as I love the Inland, I could go fly the Luscombe.

I was at Hobby Airport, and in that 1940 Air Terminal Museum (in that same building) in about 1970 to 1972. I was working at Hobby on that same side of the field. I was a little farther north where The Associated Radio was. At that time, that terminal build-

ing, that [control] tower, was closed to the public. They were not using it as a tower, and there was another control tower on the field. The city rented parts of that terminal building to the different companies at Hobby for storage. We kept a lot of our radio stuff, spools of wire, just junk, in there. That was about 1970, 1971, and 1972.

When I was a young man I loved aviation and I loved vintage aviation. I remember seeing that building, the one they now call the 1940 Air Terminal Museum at Hobby Airport, out there near one of the runways. I remember the inlays and the art deco design of the building. I was thinking, "Wow! They really ought to do something with this building other than using it to store junk." It was just full of junk at that time.

I have been there a few times recently. I am spreading myself too thin. My wife and I noted that it is starting to catch up with me. I also have a radio business, which is not associated with any of this other stuff. It started out as a hobby business. About 12 years ago I was writing magazine articles for an

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Right: Lawrence Dewey Bonbrake in 1914, age 15, working on his powered sled. Image credit: Lance Borden.



Profile

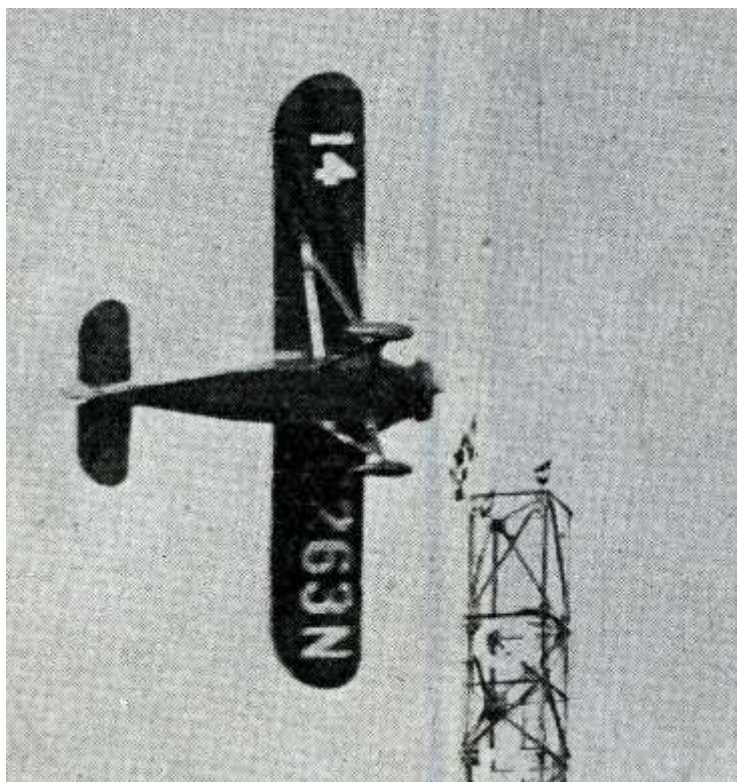
(Continued from page 30)

electronic magazine. They were about building construction projects like I used to build when I was a kid. Some of the readers were interested getting kits for the projects. So I started making kits. Now I have had this business for a few years. I make these radio kits with my designs and sell them on my web site and on eBay. It absolutely keeps me busy as heck. If I was doing just that, it would be good, but then I do that and I work on airplanes and I do my Space Shuttle job... I still work part time on the Space Shuttle for Barrios.

[Editor: I asked about his initials (LB) and the initials of his maternal grandfather, Lawrence Dewey Bonbrake (LDB). I was curious to know if they had the same initials, LDB.]

My initials are LSB. I was not named after him. My middle initial came from my paternal grandfather's name. My middle initial is Stafford. This probably is not worth of mentioning in this article, but paternal side of the family has an interesting history. My great great grandfather was one of the early settlers who came to Texas with Stephen F. Austin in 1824. His brother was the guy who started The Borden Milk Company. Both of those guys, they surveyed Galveston, and they surveyed Houston. They were early residents of Texas. It's funny, I wasn't born in Texas and I never lived in Texas until I was an adult, but I would come visit, because I had relatives here. Unfortunately, we have none of that money. [Laughter] This is not EAA or AIAA related, so it's probably not of interest for your readers.

I grew up all over. I was



Left: Inland Sport at 1930 National Air Races. Image credit: public domain

born at Hawaii at Hickam Air Force Base. My younger brother was born there, also. My older brother was born at Ran-

high school, I had gone to 22 schools. I spent four years at a single high school. I went to 21 schools before I got to high



Left: Image credit: Lance Borden

dolph Air Force Base in San Antonio. My sister was born at Warner Robbins Air Force Base in Georgia. I lived in lots of states, I don't know how many, California, New Mexico, Texas, Mississippi, Georgia, Virginia, Ohio, New York, Missouri... By the time I graduated from

school. We moved often because my dad was in the Air Force, and then my parents were divorced when I was nine years old. My mom was married a couple of times after that. Actually, it was more than a couple of times. I think she was

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Profile

Right: Lawrence Dewey Bonbrake's Air Ambulance, about 1923. Image credit: Lance Borden

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married three times after my dad. Because of that, we just moved all over everywhere.

Virginia. When my mom divorced my dad, we ended up moving back to Georgia. From there we moved to Missouri. We lived there for a while, then

and we moved to Albuquerque. From there we moved to Ohio, where he was from.

I say that I have roots in



Below: Lawrence Dewey Bonbrake's Air Ambulance, about 1923. Image credit: Lance Borden

When we moved to Georgia, my dad was in Korea. My grandfather, the aviation guy, was working for Lockheed in Marietta. We lived with him during the Korean War. When my dad came back, we moved to Langley Air Force Base in

we moved to New Mexico. We lived in New Mexico twice when I was a kid, once when my dad was stationed in Albuquerque, at Kirtland Air Force Base, and the second time when my mom married another guy

Texas. When Inland failed, my grandfather ended up moving to Houston. I think it was because he was looking for work. His father, a wealthy man, was totally wiped out in the Great Depression. I remember my mom, who is still alive, she is



Profile

87 years old, and she is still real sharp... she remembers all of this stuff really well. She remembers Inland! She remembers riding in an Inland! She remembers she had a little helmet. She remembers an Inland Sport on display with ropes around it in a big display place, a model showroom.

I am always looking for more material for the book I am writing about the Inland Sport Airplane Company. When I was at Oshkosh, the famous annual air show, I got to meet a guy named Chet Peak. He writes airplane books. He has written a number of them, mostly about barnstorming airplanes. He just

wrote a book on the Standard biplane. I got to meet and talk to him. I told him who I was, and I told him about my connection to Inland. He knew all about Inland. He told me, "By all means, write the book!" He said, "Hurry up and do it." He wants to read it. That made me feel good.

Editor: Many thanks to Mr. Lance Borden for this interview. He is an inspiring storyteller. Restoring his Inland Sport airplane is a big job. We intend to include brief updates on his progress in future issues of Horizons.



Left: "Printed upside-down in error, the Curtiss JN-4 appears on a famous stamp, known as the "Inverted Jenny". It is one of the most well-known stamps in philately." Image credit: public domain

Museum

The 1940 Air Terminal Museum at Hobby Airport An AIAA Historic Aerospace Site

DOUGLAS YAZELL, EDITOR

A Scientific Look at the Disappearance of Amelia Earhart



Above: The museum in August of 2010.

Image credit: Douglas Yazell

Last issue we presented the museum's press release about Museum Administrator Megan Lickliter-Mundon's work on a scientific investigation of the disappearance of Amelia Earhart. Megan

recently traveled with a team to the South Pacific, as described in the August 11 issue of the newspaper, The Citizen, and its companion publication, The Greater Houston Weekly.

I recently enjoyed a repeat broadcast of a 2009 PBS TV episode of The History Detectives. The first segment focused on something new related to Earhart's airplane, the one being



Right: Amelia Earhart (ca. 1935). Image credit: public domain

"After Charles Lindbergh, Amelia Earhart was the second person to cross the Atlantic solo."

Elyse Luray, PBS Television, History Detectives

flown when she disappeared. Narrator and investigator Elyse Luray explained that John Ott of San Jose, California, has a piece of this airplane.

About three months before Earhart's disappearance, she was making her first of two attempts at her tragic around-

the-world flight. (Editor: The planned second leg of this first attempt was from Hawaii to Howland Island in the South Pacific.) On March 20, 1937, the landing gear on her Lockheed Electra L-10E collapsed during the attempted takeoff. She acted quickly to stop the engines and avoid a fire with the fuel-filled airplane. She and her two navigators were unharmed. Mr. Ott's grandfather, Dan W. Stringer, was a young airman and one of the first on the scene. He kept a small piece of metal, part of the landing gear covering that was torn off in the crash, and he documented his souvenir well. Now it can be used to compare to artifacts from others who believe they found pieces of Earhart's missing airplane in the South Pacific.

When she started over in the same, newly repaired airplane a couple of months later on this around-the-world trip, she went the other way, in an easterly direction. The change in direction was due to seasonal bad weather predictions for the Caribbean and Africa. A 2,500-mile trip to tiny Howland island from New Guinea was now the second from the last leg of the trip. She and her navigator, Fred Noonan, never arrived at Howland Island. (Editor: It is possible she and Noonan crashed and survived for a while on nearby Gardner Island, now known as Nikumaroro.) On July 2, 1937, Ame-

lia Earhart's airplane disappeared. She was 39 years old.

From my interview with Megan starting Sunday, September 19, 2010:

Have you learned some things about Earhart's life, career, etc., that you find interesting and that our readers wouldn't know?

"Here's something interesting that I didn't know—Earhart, with the help of her husband George Putnam, was an absolute PR machine. She was already in the eyes, hearts, and minds of the public at the time because she was so much in the press. They created her whole persona, and they worked very hard to maintain her image. She had a fashion line, a luggage set, did book signings and talks, etc."

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Below: Studio portrait of Amelia Earhart (ca. 1932). Image credit: public domain



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Are we now waiting for results of DNA tests? To what will they be compared?

"We [The International Group for Historic Aircraft Recovery (TIGHAR)] sent a total of 11 objects to a Canadian DNA identification Lab. TIGHAR obtained a DNA sample from a direct descendant of Amelia some time ago and that sample resides at the lab. Items will be tested for mitochondrial DNA (mtDNA, which is DNA from the female line) and then, if present, that mtDNA will be compared to the sample. The results will

then be duplicated at another laboratory here in the US, with another known sample.

"The main point we take is that mtDNA is at best circumstantial. It's not a complete match kind of deal- we can only ever say that someone with Earhart's similar DNA traits was there, if the results come back positive. Here is a quote from Ric Gillespie: "The best case would be an mtDNA match with an Earhart and/or Noonan reference sample which, when taken in context with all of our other circumstantial evidence, would tip the scales

further in support of our hypothesis."

Is there a TIGHAR web site for the public, for their Earhart project, and for their other projects?

"Yes- www.tighar.org is the main website, which highlights all of TIGHAR's activities and research. The search for Earhart is linked at that web site in various places, and there literally is a wealth of info hiding in those pages."

Your presentation at the museum is probably taking place at the September Wings

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Museum

www.1940airterminal.org



Above: The Niku VI team. Back row: R/V Nai'a, Jesse Rodocker, Bill Carter, Leonid Sagalovsky, Tom Roberts, Walt Holm, Gerald, Tom King, Jon Overholt, Andrew McKenna, Gary Quigg, Art Carty, Graham Berwind, Megan Lickliter-Mundon, Mark Smith. Front row: Taylor Keen, Lonnie Schorer, Ric Gillespie, John Clauss, Dan Lann, Janis Carty, Karl Kern, Curtis Webster. Image credit: TIGHAR

Museum

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& Wheels (W&W). That is the monthly lunch-hour-centered program at the museum every third Saturday. For \$10 and less money for kids, the museum is open for visiting, aircraft are on display out back by the runway, and usually car clubs display cars in front of the museum. Food and drink are included. Is that a firm date yet? What are the themes for that W&W?

“It's more likely going to be mid-to-late October at this point, probably a separate evening event and unlikely during W&W. W&W's for October is Bi-Planes Day!”

What aspects of your TIGHAR expedition should

our readers know about? Do you have some cool not-seen-elsewhere photos to share? Or, what already published photos should be shown to our readers?

“Here is a link to all the photos I'm allowed to share, plus some better description and walkthrough of the results.

<http://tighar.org/Projects/Earhart/NikuVI/Niku6results.html>

“I can say it was hot, hard work, but that we all got along really well and there was a good sense of team. We played jokes on one another and sang some nights with a guitar, marveled at how beautiful the island was and generally tried to enjoy ourselves!”

Right: Team Physician Dr. Jon Overholt helps Collections Manager Megan Lickliter-Mundon prepare to collect an artifact using sterile protocols. TIGHAR photo by Ric Gillespie.



Museum volunteer Michael Bludworth made a presentation in August of 2010 about the museum's history as part of the monthly Wings & Wheels program, which is a lunch-hour program taking place on the third Saturday of each month. The 1940 air terminal was too big for Houston's needs when it was opened on September 28, 1940, but Lyndon Baines Johnson and other legislators were influential enough to find and spend that money on this project. Aviation was changing fast all around the world. By 1946, the terminal was too small for Houston's needs!

Horizons assistant editor Don Kulba contributed the following notes from Michael's presentation:

The terminal was built as part of the War Powers Act (WPA), under which money was spent by the US Government during the Great Depression to provide much-needed employment.

The overall style of the building is art deco. The front of the building has aviation allegorical theme reliefs near the roof. Standing lettering "HOUSTON MUNICIPAL AIRPORT" above the entrance is made of aluminum, and there are thin fluted aluminum columns on the sides of the doors. The wall construction is of hollow, thin-wall clay brick block covered with sanded plaster. Much of the interior has a type of sandstone with naturally embedded seashells on the lower walls up to about three foot height.

The air terminal was only used for four years, after which another terminal was constructed at Hobby, and the 1940 terminal was used for cargo flights. Mr. Bludworth said there is an issue with building airports where air carriers require a particular level of construction (e.g., runway capacity) before they agree to use the airport, but it is difficult to justify building an airport until carriers agree to use it.

When the air terminal was used for passenger flights, flying was a special occasion, and passengers dressed their best (including white gloves for the ladies). Mr. Bludworth showed slides of the types of propeller airplanes that operated at the air terminal. Many of the flights were international, making this the first international airport operating from Houston in 1940.

Accidents Happen!

STEVEN EVERETT, ASSISTANT EDITOR

The last dinner meeting of the year was held on June 24 before a group of about 30 local chapter members and guests. The main presentation, "Accidents Happen! Behind the Headlines," began after door prizes were awarded and consisted of a discussion by speaker John Purvis of what really happens during an aircraft accident investigation. Mr. Purvis is an internationally recognized expert in large aircraft accident investigation who directed the airplane accident investigative team at Boeing Commercial Airplanes for 17 of his 43 years of employment there, and who has gone on to form an aviation safety consulting business with partner Kevin Darcy. His talk was punctuated with anecdotes and pictures from the multitude of accident investigations he has been involved with.

Mr. Purvis began by reminding the audience of the accidents that have been associated with aviation from the beginning of its history. Otto Lilienthal, who developed the hang glider in the 1890's, was himself killed in a gliding demonstration. Samuel P. Langley's airplane suffered structural failures twice during a demonstration in 1903, and Lt. Thomas E. Selfridge became the first man to die in an aircraft accident when the propeller blade on his Wright flyer broke.

The organizations currently involved in aircraft accident investigations were

then described. The International Civil Aviation Organization (ICAO) is a United Nations-affiliated group which oversees the international rules. A subgroup, Annex 13, publishes an "investigators manual" which is basically a "how-to" manual on accident investigations. The United States version of the ICAO is the National Transportation and Safety Board (NTSB). It was formed by the Air Commerce Act in 1927 and became an independent organization in 1974. It reports directly to the President and Congress and is in charge of accidents for which crash sites are in the US. The NTSB operates on a party system, in which teams of around 420 individuals from

various fields, such as aviation, highway, rail, shipping, pipelines, etc., are invited to participate.

Mr. Purvis stated that the current system is quite safe and that accidents are at an all-time low. Interestingly, there is no longer a common cause for accidents in the US, although worldwide common contributors are crew training and infrastructure. When asked where the safest place to sit on an airplane in the event of a crash, he jokingly said that if you expect there will be a crash, you shouldn't go. However, he said that in the center over the wing or next to the lavatory are statistically the safest – not in first

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Dinner Meeting

Below: Aircraft accident investigator John Purvis speaking at the June dinner meeting



Dinner Meeting

Below: Sean Carter receives recognition from the Houston section for his service as treasurer.



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class, which he said are just the first at the scene of an accident. According to the FAA, there is an accident rate of 0.035 per million departures. In other words, it would take 43000 years for there to be a 50/50 chance of an accident on any given aircraft – statistically, flying is 50 times safer than the highway travel. Eighty percent of accidents are caused by human error, where 60 percent are due to the crew. The worst year for airline accidents was in 1974, in which

there were 460 killed in the US, as compared to the US highway where over 40000 are killed every year. The total number of fatalities since the beginning of commercial aviation is less than 10000. The gradual decrease in accidents can be attributed to the following technology developments: stall warnings and pressurization, which allowed aircraft to fly above the weather, introduced in the 1940s; Instrument Landing Systems (ILS) in the 1940s and '50s; Distance Measuring Equipment (DME) in the 1960s; and jet airplanes in the 1950s and '60s. Improvements in reliability in jet engines, improved training, and better simulators have also contributed greatly.

Pictures of several accidents were shown as Mr. Purvis began describing the process of an investigation. He stated he had been in 80 countries, investigating sites in remote areas, on mountaintops, and in the water. After the initial event itself, the initial one to two day phase involves notifying affected parties and assembling the investigation team and required logistics support. The next is a field phase in which meetings are held and subgroups formed, along with a recorder readout phase in which the black box, which is now typically solid state rather than tape drive, is cut open and copied for study. After other phases in the field and a weeks-long follow-on phase for gathering more evidence and doing tests and simulations, long term phases that can take years follow. It is during this time that additional testing and reporting happens, as well as when

public hearings take place.

Mr. Purvis then addressed several questions posed by the audience. Among the most interesting was a question of whether the team is ever stumped by a problem. He stated that this does not often happen, although they rarely completely understand the problem or that they must draw conclusions with less proof than what would be desired.

The dinner meeting concluded with end-of-the-year awards for local chapter members. A Sustained Service Chapter Citation Award was given to Shirley Brandt for her years of involvement with AIAA and the aerospace industry. Chapter citation awards were also given to Dan Nobles and Irene Chan for organizing the student paper competition and to Steve Everett for the chapter newsletter "Horizons." A Best Section trophy was awarded to Al Jackson for his interesting Lunch-and-Learns. Houston Section awards were also given to Chad Brinkley, Sarah Shull, Douglas Yazell, Gary Cowan, Sean Carter, Norman Chaffee, Zafar Taqvi, Melissa Gordon, Svetlana Hanson, and Ben Longmier for their various contributions to the chapter this year. New council members were introduced, and AIAA fellow nominations for Larry Bell, Chet Vaughan, and Norman Parker were announced.

Pete Olson on Washington's Support for NASA Dinner Meeting

ALAN SIMON, ASSISTANT EDITOR

During the one year since Congressman Pete Olson last addressed the AIAA Houston Chapter at Johnson Space Center's Gilruth Center, space workers, bay area businesses, and local residents had endured more debate on NASA policies than over the past several decades. For his return visit to the Gilruth, Mr. Wayne Rast, Region IV Vice President of Public Policy for AIAA, had the privilege of introducing the honorable Congressman from the 22nd District, which includes the Johnson Space Center (JSC). Having been in office for nearly two years, Congressman Olson demonstrated that he had been around Washington D.C. long enough to understand the beltway environment. Having grown up in the Clear Lake area, he clearly understands the needs of his NASA-JSC constituents. In contrast to his predecessors who served during the 1980's and 1990's when the future of the International Space Station Program was, at times, in jeopardy, no previous freshman Congressman has ever inherited such confused and chaotic times as the current within NASA today.

So, when Congressman Olson took to the podium during the September 1, 2010, AIAA Houston chapter meeting, he did not mince words on the current affairs of space policy. He had no idea that one year into office he would be a party to a debate as to whether this country should have a space program. Would he have ever guessed that President Obama would consider cancelling a major element of the

space program like Constellation? "No way!" he told the crowd of about 100 members and guests. Olson opined that, since this past February, the White House had been willing to hand off the future of US human space exploration to private entities. Olson offered that, although the private sector may be an excellent NASA partner, the current set of private sector accomplishments have not yet demonstrated a readiness level that would support a complete handover of exploration responsibility.

Congressional Leadership

In October 2009, Congressman Olson and the Texas Delegation sent a letter to President Obama, requesting the redirection to NASA of \$3 billion in available American Recovery and Reinvestment Act (ARRA) stimulus funding in order to ensure America's global role in the aerospace industry and human space flight, and to help retain thousands of existing jobs within the aerospace industry—a key goal of the stimulus funding. According to Olson, although about \$78M of stimulus funding is still available today, no monies have been redirected. In fact, this letter that was co-signed by two US senators and 26 House representatives has gone unanswered.

Representative Olson explained that the Obama Administration's proposed FY2011 budget allocates about \$2.5 billion for terminating existing Constellation Program contracts. Olson has continued to argue that there is no taxpayer

incentive or benefit for ending Constellation. Doing so would merely shift budgets, thereby subsidizing private entities that currently lack solid expertise and a track record that demonstrates the private sector can put humans into space and return them safely. Olson said that cancelling Constellation, therefore, would essentially end US human spaceflight, at a cost of about \$9 billion that has already

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Bottom: Congressman Olson addresses AIAA members (Credit: Ellen Gillespie)



Dinner Meeting

Right: Programs Chair Angela Beck presents lapel pins to Congressman Olson for a speaker's gift (Credit: Ellen Gillespie)



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been expended, and another \$2.5 billion needed for contract terminations. More importantly, ending the Program would shift the US leadership in space exploration to China, India, and Russia, while at the same time, it would send millions of tax dollars to Russia. For the foreseeable future, Russian spacecraft would become our only means of transportation to and from the International Space Station.

Over the previous several months, Congressman Olson had worked with his colleagues on a bi-partisan NASA authorization bill that would support the Constellation Program and continued development of the Orion capsule, the development of a heavy-lift vehicle, and an additional Shuttle Program flight (STS-135). Although

legislation was on hold until Congress returned from their August recess, Olson suggested that the NASA bill could be passed in the short-term, as it carried bi-partisan support in both Houses. Constituents could see passage by their respective congressional representatives as a substantive accomplishment during a period leading up to the November elections when very little legislation was likely to be passed or even debated. Olson suggested that the White House endorse the Senate version of this legislation.

Earlier in the year, Congressman Olson and six of his colleagues from Texas, Virginia, Utah, and Florida, appealed to NASA Administrator Charlie Bolden, to urge the establishment of a clear plan for the future of human space flight. The-

se legislators reasoned that, "America's leadership in human space exploration is a national priority that cannot be diminished. Our technological advances, national security, and ability to inspire students to pursue the math, science and engineering careers, are dependent upon the U.S. remaining the global leader in human space flight."

Additionally, Olson has asked the US Department of Labor for the same type of financial assistance to NASA workers in Texas who may lose jobs and may need training and the acquisition of additional skills in order to find jobs outside of the aerospace industry. Similar funding was provided to displaced aerospace workers in Florida.

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Bring a Space Shuttle Home to Houston

When asked what measures were being taken to secure Houston as a home for one of the retiring Space Shuttles, Olson enumerated the many reasons why Houston would be an appropriate location for this stewardship. He suggested that the Mission Control Center, that has supported all of the Shuttle missions, is in Houston. Of course, Houston is where the astronauts complete most of their space flight training. He even cited a historical reason, that "Houston" was the first word uttered from the surface of the moon. But, perhaps the most practical reason for bringing a space shuttle home to Houston is that JSC and Space Center Houston are very close to Ellington Field, so transportation to the nearby airport is easily accomplished—shuttles have landed at Ellington many times. And, the trek from Ellington to JSC has few barriers that would prevent a winged

spacecraft from rolling over to an exhibit site. Although, Olson admitted that his colleagues have called him off-scale biased on this issue, the Texas Delegation has come together in a bipartisan way, and it does solidly support the Houston location.

Getting Past Today's Space Exploration Controversies

Some of the AIAA members at the meeting expressed concerns about the ability to develop and sustain widespread interest in NASA and human space exploration during the current economic climate. How do parents sell math and science to their children when some of these parents are directly affected by workforce reductions and project cancellations? Congressman Olson acknowledged that NASA does not always communicate its successes very well. Rather, NASA relies on the successes themselves to garner public relations. Borrowing a recent quote from the most famous astronaut, Neil

Armstrong, Olson reminded the audience that, "If one of the goals of government is to motivate its citizenry to 'be the best that they can be', few government agencies will surpass NASA in that function."

Olson encouraged meeting participants to inspire kids at an early age, just as he was inspired watching the early Apollo missions. He discussed his visit to a 3rd grade Sugarland elementary school class where he tried to inspire students during the pre-launch and launch of a recent Shuttle mission. While the countdown continued in the background, Olson explained to the class how former astronaut Bruce McCandless made the first untethered free-flight on each of the two manned maneuvering units (MMU's) that were carried on-board STS-41B. Those untethered ventures took McCandless farther away from a spacecraft than any other astronaut has been, and the 320 foot separation is captured in incredible

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Dinner Meeting



Left: Region IV Director of Public Policy Wayne Rast listens to the presentation by Congressman Olson (Credit: Douglas Yazell)

Dinner Meeting

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photography. Olson suggested that, often, small efforts and stories can go a long way to capture the minds and interests of our youth.

As for garnering general support for NASA, Congressman Olson quipped that a video advertisement showing several

astronauts in advanced technology suits, planting a flag on the surface of the moon might get people's attention, particularly if the flag this time is Russian or Chinese. That image could easily stir support among most Americans.

Representative Olson attended the AIAA meeting with his

Deputy District Director, Robert Quarles, and his Legislative Director J.T. Jezierski. He stayed after the meeting was adjourned to speak with meeting participants one-on-one and take additional questions.

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Right: Section Chair Sarah Shull, Public Policy Chair Melissa Gilbert, and Programs Chair Angela Beck (Credit: Ellen Gillespie)



Right: Mr. and Mrs. David Hanson with Congressman Olson. Svetlana Hanson is the Section's Pre-College Chair. (Credit: Ellen Gillespie)



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Personal Background and Experience

Representative Olson was born into a military family in the early 1960's. Like many kids, he stayed up late one summer night back in 1969 to watch Neil Armstrong step out onto the lunar surface for the first time. Born in Ft. Lewis, Washington, his family moved to Seabrook in 1972. Nine years later he graduated from Clear Lake High School, and began his undergraduate studies at Rice University. In 1985, Olson received a BA in Computer Science, and left home to

attend law school at the University of Texas at Austin. The same day in 1988 that he passed the Texas Bar Exam, Olson joined the U.S. Navy. He earned his Naval Aviator wings three years later, and flew missions in the Persian Gulf, Indian Ocean, and the Pacific, flying P-3 Orion aircraft. Olson spent the last several years of his nine-year military service as a naval liaison to the U.S. Senate, and accompanied Texas Senator Phil Gramm on several overseas trips. Following his Navy retirement in 1998, Olson went to work for Sen. Gramm. Later, he served as Chief of Staff for Texas Senator John Cornyn,

until elected into the U.S. Congress, in 2008.

Today, Congressman Olson is the ranking member of the Space and Aeronautics Subcommittee. He serves on the Committee on Homeland Security where he is the deputy ranking member of the Transportation Security and Infrastructure Protection Subcommittee. He also holds posts on three subcommittees under the Transportation and Infrastructure Committee.

Dinner Meeting

Below: Congressman Olson addresses AIAA Houston Section members (Credit: Douglas Yazell)



History

Apollo Lunar Module Testing

CAPTAIN ANDREW HOBOKAN, NASA RETIRED

About October 1968 we had a real problem. A Lunar Module (LM) window shattered during the test of the cabin of the LM-4 ascent stage. The window was made by Corning and was a tempered glass, which at the time was called CHEMCOR. The glass was processed to first, be able to bend rather than remain rigid during the changes in differential pressures, and second, break without any sharp shards which could puncture the spacesuits of the crew. The basic requirement for internal pressure in the LM was 5 psid during a fight to the Moon, landing, stay, and lift-off to the Command Module, which remained in orbit around the Moon. However the window which shattered was subjected to 4.6 psid.

This was a major problem. If the window was to shatter while in Earth orbit, on the way to the

Moon or during a landing, stay, or lift-off, it could be catastrophic. Grumman immediately assembled a team of their engineers, NASA engineers and the contractor engineers to investigate the problem. The Resident Apollo Spacecraft Program Office (RASPO) engineering team, under Lew Fisher, was directed to participate in the investigation. I called Dr. William R. Downs at JSC, Structures and Mechanics Division, our contamination expert, to ensure that the clean-up was complete after the incident.

Unfortunately, the shattered window fragments were so small as to be useless in determining the place of origin or the cause of the problem. After several weeks of the investigation, no progress had been made in finding the cause of the problem, and interest by NASA JSC and Grumman kind of withered on the vine, under the

concept that one of the workman must have grazed it with a sharp tool or his ring. Grumman engineering and Quality Assurance (QA) listed it as an unresolved problem, but probably not a serious one, and wanted to close the problem report. I was not so sure and directed Harry Briggs, the RASPO QA Manager, to tell the government inspectors not sign off on that disposition. To me, this was a serious failure and I wanted better information before I'd let the RASPO people close it, even if I had nothing for further review. "One-in-a-row", the cheer of Linden High School pupils at our football games, does not define anything. When our "bonecrushers" made a touchdown, which was very rare, it was never followed by another. But this seemed different, and I did want to see if it was followed by another. And it was.

It was some weeks later when LM-6 was going through a cabin leak test that the window shattered at a pressure below 5.0 psid. Now this was the second one, and it sure got us all upset, and we opened both failures and combined our effort to determine the cause. Again, there was not enough of the glass in large enough pieces to find the origin or the cause. I again called Dr. Downs, and we all, including the manufacturer and other experts, reviewed the history of both windows from manufacturer to installation without coming to any conclusions. The panes did go on a safari to be equipped with anti-fog coatings, electric heaters, etc., but a rigorous inspection

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Right:
"Spider" Over the Ocean

View of the Apollo 9 Lunar Module (LM) Spider, "in a lunar landing configuration, as photographed from the Command/Service Module on the fifth day of the Apollo 9 earth-orbital mission. The landing gear on the LM has been deployed. Note LM's upper hatch and docking tunnel. The EVA foot restraints known as the Golden Slippers are visible on the porch of the LM. They allowed LM pilot Russell Rusty Schweickart to securely stand on the porch during his EVA thus allowing him free use of his hands. Image credit: NASA (photographer David Scott)



History

(Continued from page 44)

was conducted upon arrival at Grumman and it appeared that any damage must have occurred after that.

I then called in Harry Briggs and Joe Kingfield, Grumman's chief of Quality Assurance, and asked him to implement a requirement that detailed inspection of every window take place before and after every operation done on any window, regardless of how extensive the operation was. Joe thought about it and said he'd get back to me after he checked with Grumman management. The next day he came back and said he couldn't implement it because of the cost and schedule impact. We argued about it for some time and I sent him back to talk it over with his management again. He came back again and said that Grumman would not do it, then he said, "Why don't you do it, you have as many inspectors as I have and if it caused a schedule delay, it wouldn't be a Grumman-caused cost, we'd just blame you for it." In desperation, I said I'd implement that suggestion. I talked with Mr. Briggs and Mr. Kingfield, outlined what I wanted done, and I said that if anything, no matter how insignificant it appeared, differed from the previous inspection, I wanted to be informed personally. Harry implemented the plan and the window processing went on.

Several weeks later my secretary, Ms. Mary Totter, said I had a phone call from an inspector and he'd said it was urgent. I took the call and was told that the inspector had seen something in a post operation inspection that he had not seen in the pre-operation inspection. I asked him to hang up a stop work order tag, a red, white,

and blue government tag that said, "It is a felony to further process this item while this tag is attached.", or something to that same effect. I immediately went to his location in the plant and he showed me where to look, but I couldn't see anything out of the ordinary. Then he handed me his loupe and pointed to show me more specifically where to look and then I saw it, a very small group of facets which looked like a diamond in the glass. Holy moly, there it was, a real stress riser, a place where the glass had already been cracked and would crack further given even the smallest chance. I told him to leave the stop work tag attached and asked another inspector to call the cognizant Grumman engineer and have him come to the work station immediately, which he did. Now he saw the facets, and we agreed to call the glass manufacturer and not allow the glass to be moved or touched by anyone. The manufacturer's team arrived the next day, inspected the glass and

agreed that was a real problem and probably the source of the previous window failures.

After extensive photographing, analysis of the previous operation, and a thermal test, things started to make sense, but Corning engineers wanted to take the window to do a pressure test to verify the failure mode. I said no dice, it goes into bonded storage and we'll process other windows to see if it happens again. I told him that "One in a row" wasn't decisive, as we found out in our high school games. We'd process other windows to see if it was a fluke. Sure enough, after processing several windows it happened again and we knew it was the thermal test which was the primary cause of the problem. Now I advised that he could release that particular window to Grumman for detailed analysis, but that Harry had to have his inspectors witness any test that might result in window failure. The first win-

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Left: Apollo 16 Moon Plaque Installation

Working inside the Apollo 16 Saturn V space vehicle at the launch pad, Grumman Aerospace Corporation technician Ken Crow attaches a plaque bearing the names and signatures of the Apollo 16 crew to the front leg of the lunar module's descent stage. The stainless steel plaque, which will remain on the lunar surface, measures 18 by 23 cm (seven by nine inches) and will bear the names of the Apollo 16 astronauts, John W. Young, mission Commander; Thomas K. Mattingly II, Command Module Pilot; and Charles M. Duke, Jr., Lunar Module Pilot. Image credit: NASA

History

(Continued from page 45)

dow would stay in bonded storage unless the analysis was completed to our satisfaction. Lew Fisher was keeping George Low informed with his daily twx reporting system and I recommended that he include words to the effect that JSC Systems Management be responsible with RASPO QA in closing the issue if we agreed with the analysis and corrective action.

In its analysis, Corning determined the real source of the problem. It seems that the anti-fog element was bonded to the glass panel in California, and

the place where the element wires came off of the anti-fog element was required to take the additional stresses due to hook-up, etc., and was bonded at that point with Hysol adhesive, which had a coefficient of expansion of practically zero. The bond between the Hysol adhesive and the glass was very strong, and when the glass was heated, it expanded, while the Hysol adhesive did not, resulting in the Hysol adhesive tearing out small parts of the glass.

The bonding adhesive was changed, the joint re-certified, and I'm proud to note that the problem was solved by the

close examination of a diligent government inspector on the RASPO team. I always felt bad that I did not nominate this inspector for a Silver Snoopy, the top award for QA personnel. I know that he understood that he saved the day, improved the safety of the LM, and made the lunar landing a success. But I'm still sorry he didn't have a Silver Snoopy.

Right: Gumdrop Meets Spider

Apollo 9 Command/Service Modules (CSM) nicknamed Gumdrop and Lunar Module (LM), nicknamed Spider are shown docked together as Command Module pilot David R. Scott stands in the open hatch. Astronaut Russell L. Schweickart, LM pilot, took this photograph of Scott during his EVA as he stood on the porch outside the Lunar Module. Apollo 9 was an Earth orbital mission designed to test docking procedures between the CSM and LM as well as test fly the LM in the relatively safe confines of Earth orbit. Image credit: NASA (photographer Russell L. Schweickart)



Wings Over Houston Airshow 2010

ELLEN GILLESPIE AND ROBERT PEARLMAN

Airshow



AIAA Houston had a booth drawing for a Celebrate Apollo NASA limited edition pin set. The winner is Lockheed Martin/Lorenn Vega-Martinez. Congratulations Lorenn!

Left: AIAA Houston booth Volunteers, Julie Read (in blue), Robert Pearlman, and Melissa Gordon (in stripes)

The Houston Section of EAA provided a circle of their experimental aircraft around our combined booth, which

Below: EAA Frank Caldeiro's Long EZ Aircraft, now owned by Richard Sessions

(Continued on page 48)

The AIAA Houston Section shared a static booth space at the Wings Over Houston Airshow on Saturday October 23, 2010 with the Experimental Aircraft Association (EAA) Houston Section and collectSPACE.com.

Robert Pearlman from collectSPACE volunteered his time and some of his organization's Space Shuttle artifacts for the booth display. This wonderful display included:

- ◆ Thermal protection tile (heat shield tile)
- ◆ STS-31 Launch Pad Hold-Down Post Frangible Nut
- ◆ STS-70 Landing Gear (Tire) segment
- ◆ STS-95 Space Shuttle Main Engine (SSME)
- ◆ Gimbal Bolt Vernier Reaction Control System (RCS) Engine Nozzle
- ◆ Reaction Control System (RCS) Engine Ground Cover
- ◆ Advanced Flexible Reusable Surface Insulation (AFRSI) Blanket
- ◆ STS-1 Orbiter Flight Deck Illuminating Panel Overlay
- ◆ External Tank Cross Section (Insulation Foam and Tank Skin)
- ◆ Spacesuit (EMU) Glove Thermal Micrometeoroid Garment (TMG) Layer
- ◆ 1/200 model of the space shuttle



Airshow

(Continued from page 47)
included their own booth display of EAA items.

AIAA Houston Section volunteers (Melissa Gordon, Julie

Read, Larry Friesen, and Angela Beck) had a great day, enjoyed the airshow, handed out AIAA booth giveaways, and talked about AIAA Houston

programs to the approximately 100 people who visited the booth. Come out and visit us at next year's airshow on October 15, 2011.

Right: EAA Booth Volunteers Brian Leriger (left) and Dan LaFon



Right: EAA Booth Volunteer Richard Sessions and the Long EZ with airshow attendees



Private Space Flights: A New Era

JEAN-PIERRE LAFON, PROJECT OFFICER "SPACEPORT" IN THE REGIONAL GROUP "LANGUEDOC ROUSSILLON" IN 3AF OBSERVATOIRE DE PARIS - MEUDON CEDEX GEPI-92195 (FRANCE)

3AF TMP

Joint Conferences by Dominique Teyssier and Garrett Smith at the Cité de l'Espace (City of Space) on June 08, 2010

Will human spaceflight always be limited to a few selected professionals? From the point of view of Garrett Smith, member of 3AF, founder of the Space Tourism working group of the regional TMP section of the 3AF, and of Dominique Teyssier, about to become passenger-astronaut with Virgin Galactic, the day is not far off when the general public may attain the dreams of spaceflight and the associated thrill. On June 8th, 2010 at the Cité de l'Espace (Toulouse, France), these two members of the 3AF each made a presentation to display their modest but resolute work with 3AF/TMP devoted to space tourism.

The first topic (in the image below) concerned how private companies are starting to play a role in space exploration, with non-government launch vehi-

cles, and what they can do in the future with respect to sub-orbital, orbital or something still more ambitious.

It was the result of a quite natural evolution. At the outset, there was the space exploration program. NASA's Constellation, with its main objective to send astronauts to the Moon about 2020 for long lasting missions, was the realization of the American long term strategy, the Vision for Space Exploration (VSE), as defined by President G. W. Bush in January 2004 to boost the exploration of the solar system using human spaceflight. The Constellation program planned two new launchers (Ares I and Ares V), together with two space vehicles, Orion and the lunar module Altair. In 2009, the program was behind schedule, and the objectives were questioned by

people who thought that Mars should be the next objective. Nevertheless, the first launch of the rocket Ares I, the mission Ares I-X, was successful on October 28, 2009. However, at the end of the year 2009, the project was again questioned by the Augustine committee in charge of the scrutiny of the American human space-flight program. In particular, it challenged the ability of NASA to follow its schedule with the available budget and the chosen architectural constraints. It proposed several alternative choices, including a launcher derived from the space shuttle, a Delta IV/Atlas V with astronauts, and also a private launcher. We could then clearly see that private operators in this branch of industry was a real possibility.

As it can no longer use its
(Continued on page 50)

3AF TMP:
l'Association Aéronautique et
Astronautique de France,
Toulouse
- Midi-Pyrenees chapter

Our French sister section. See
our web page at www.aiaa-houston.org (technical committees, international space activities committee)

English translation by the author



Left: Garrett Smith, 3AF TMP member

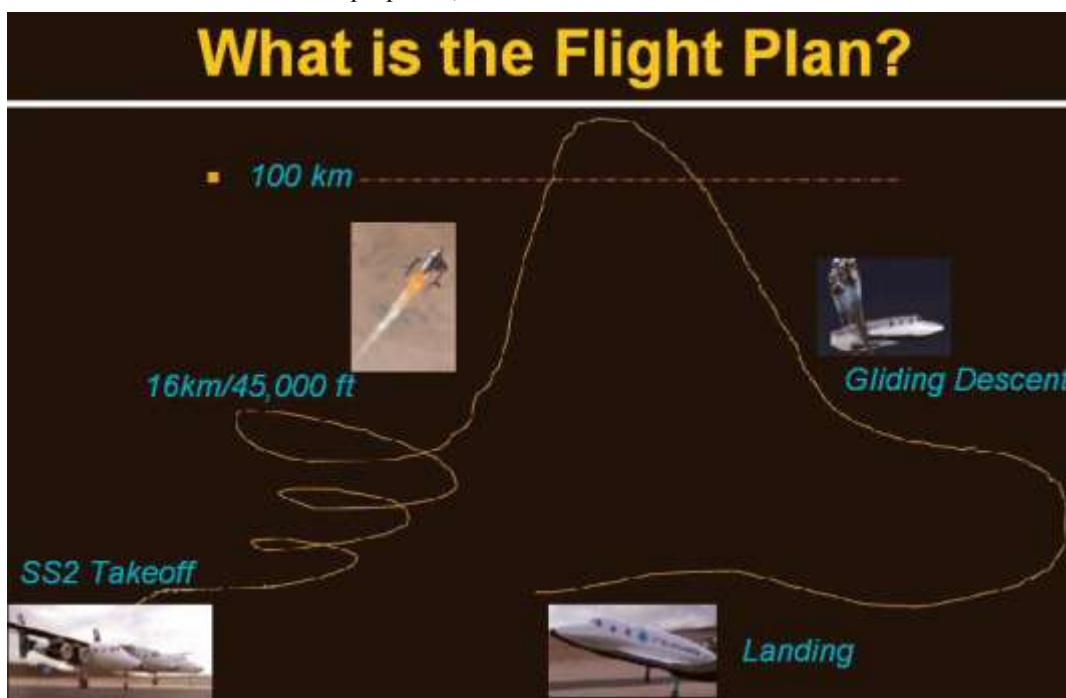
3AF TMP

(Continued from page 49)

shuttles, NASA intends to purchase transportation services from those companies that successfully develop vehicles in order to transport freight and crew up to the international space station, thanks to the program COTS (Commercial Orbital Transportation Services). This program was announced as early as January 2006. It should last until 2015. After a call for proposals, two solutions were

NASA will support this program in order to respond to policy guidance and to facilitate access to “near space” for researchers, engineers, technologists, and educators. The goal of CRuSR is regular, frequent, and predictable access to the edge of space at a reasonable cost with easy recovery (discussed later in this article) of intact payloads (weighing from 1 to 100 kg).

they can blast off on their own launch into space - Dominique Teyssier is about to be able to gaze upon the Earth from an altitude of 100 km. At this height, as opposed to the 15 kilometers which are a maximum for current airplanes, the Earth's globe can be taken in at a glance over about 160 degrees, thus disclosing that it is not flat (at least when the weather is clear enough).



The flight will also include the experience of a few minutes of weightlessness. As a rule, the suborbital flights cross the Kármán surface, which is fixed by international standards at 100 kilometers above the Earth's surface, in a layer called thermosphere. It is usually regarded as the final boundary of the atmosphere. Beyond this limit is the domain of space travel.

The path of Dominique Teyssier's flight into space will happen according to the scheme shown in the image to the left of this paragraph.

Every professional astronaut is subject to drastic selection trials with several potentially disqualifying steps. Many are called but few are chosen. Ordinary citizens not engaging in spaceflight will be content with a standard medical check-up, but these non-professionals must endure tests inside a centrifuge, because each person has a different reaction to the loss of landmarks.

During the flight (apart from time devoted to relaxation or scheduled physical training) the professional will focus his attention on the experiments and the objectives of his mission, as he is paid to do. On the

selected, respectively, for 2006 and 2008 : the vehicle Dragon associated to the launcher Falcon 9 of the company SpaceX and the vehicle Cygnus associated with the launcher Taurus II of Orbital Sciences Corporation. Each company is required to transport 20 tons of freight from now to 2015. The first test launches are planned for 2010 and 2011.

Another private service is now in view as the result of a new class of space launch operations, Commercial Reusable Suborbital Research (CRuSR).

The difference between a professional and a private flight

Before Dennis Tito became the first space tourist on April 28, 2001, who could imagine that common people would at any time gain membership to the club of astronauts? 7 days, 22 hours and 4 minutes after the lift-off of the Soyuz TM-32 mission, for a price of \$20 million, he changed his dream into reality. Nine years later, and for a much lower cost – so that the younger ones among us can hope that a day will come when

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contrary, the private spationaut will enjoy gazing at the landscape at his leisure. After all, he has paid for this, though, in the future, he may participate in simple experiments in weightlessness or he may work on astronomy tasks.

Now why did Dominique Teyssier choose Virgin Galactic? First, because of the opportunity. His flight may be take place at the end of 2011, in other words, “tomorrow”, and for only \$200,000, a cost which should become less than \$50,000 in 2022 and, if everything goes well, \$5,000 in 2050. However, what also appealed to Dominique is the design of Virgin Galactic’s suborbital vehicle which is very similar to that of the American space shuttle: a booster to take off and an autonomous shuttle to land. Moreover, its flight deck will be large enough for passengers to move as true astronauts, as shown in the figure to the right of this paragraph.

Indeed, while one could expect that candidates may be very nervous, people are lining up on the Virgin Galactic waiting list. Many wish to find a place in history, to achieve some dream, to fulfill a personal ambition, to feel the effects of weightlessness, or even to earn astronaut wings (the award for those in the USA who have completed a professional, military or commercial flight above 50 miles (80 kilometers). There is already a waiting list with 141 names!

With the support of American public funds, most of the flights by Virgin Galactic from Spaceport America will lift off from its tarmac in the state of

New Mexico. However, while North America was the historic birthplace of space adventure, Europe is not at rest – notably concerning launchers, and also thanks to participation in the American manned flights. Thus, although the emergence of private companies in suborbital flights also started in the USA, several spaceports are expected to emerge throughout the world. Several companies are already at work in Europe. Among the most advanced projects, Spaceport Sweden is working to become the first European launching site for suborbital flights. In spite of its unfavorable geographical location, the spaceport at Kiruna, at the extreme north of Sweden, has the important advantages of the skill and the expertise of Esrange, the Swedish space agency. Nevertheless, there are companies to be reckoned with, such as EADS (European Aeronautic Defense and Space Company), ACE (Astrium Central Europe), and others.

The Space Tourism working group, founded by Garrett Smith in the Toulouse section of 3AF, intends to promote private human spaceflight in France and in Europe. It is developing a guide for passengers and simultaneously investigating the possibility of a spaceport close to Montpellier. This site has advantages (low latitude, clearness of the sky most of the year, safe trajectories, and more). A neighboring site, not far to the west, was suggested in 1962 as a launch site, later contemplated at Reggane (Algeria), then actually created at Kourou (Guyana). The Space Tourism working group of 3AF TMP is something like a think tank in which Dominique Teyssier is now explaining how he prepares for his flight. After the flight he will report there and through conferences about his feelings and his conclusions.

To summarize, the fourth and last figure in this article

(Continued on page 52)

3AF TMP

*Below: Burt Rutan in a Virgin Galactic vehicle
Credit: Virgin Galactic*

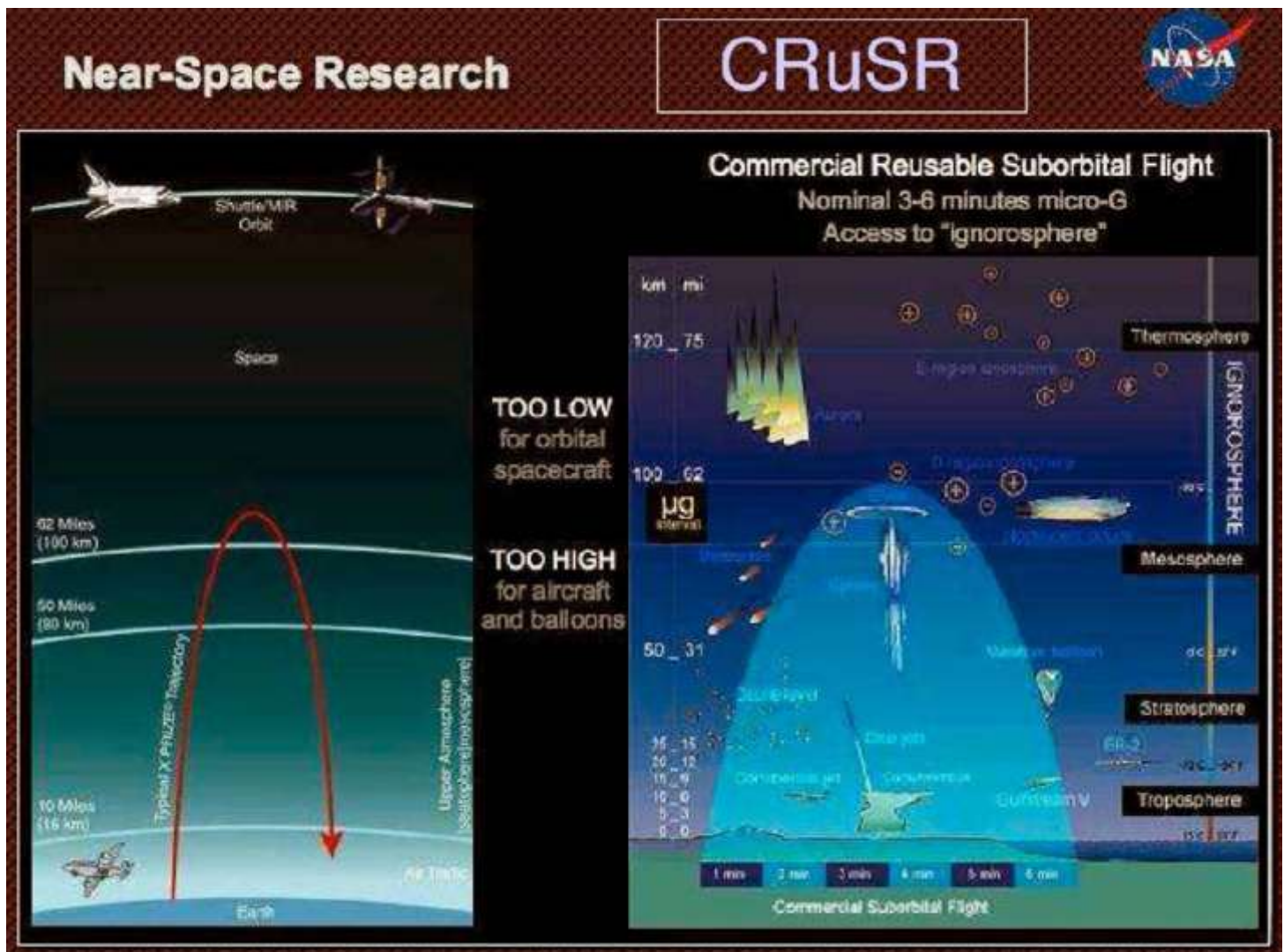


3AF TMP

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illustrates the CRuSR program. It gives the reader a fairly good idea of the objectives of most of these low-altitude space flights. Orbital spaceflight is dominated by governments, while suborbital spaceflight is now dominated more and more by private companies. That is not true only for NASA, but also for other organizations using launch vehicles of various kinds elsewhere. This orbital and suborbital distinction of stakes should nevertheless be specified in any discussion. For instance the NASA COTS program is a mixture of these orbital and suborbital tasks.

It is interesting to note that beyond the big thrills that space travelers may feel, there are many potential scientific by-products. Physical and chemical experiments in weightlessness, even during short time intervals (a few minutes) are very useful. For a long time already, research laboratories have been renting airplanes with lower levels of performance and less reusability because of the huge equipment involved. Outside the terrestrial atmosphere, the universe can be observed at resolutions requiring very elaborate techniques from the ground. Observations of the Earth and the atmosphere from different heights leads to anal-

yses of phenomena at largely varying scales. All this comes with costs which can become lower and lower, just as costs decreased with computers, telephones, television,... and spaceflight. Indeed, in 2030 the costs are expected to be reduced by a factor 10 or 100. All of that justifies the subtitle of this joint conference, "A New Era". Maybe a new Renaissance!



A Boost for Commercial Human Spaceflight

MARCO CACERES

Reprint

THE VISION FOR SPACE EXPLORATION (VSE), first announced to the public by President George W. Bush on January 14, 2004, officially ended on February 1, 2010, with the cancellation of its cornerstone program, Constellation.

The VSE, which envisioned returning astronauts to the Moon and eventually using the lunar surface as a launch site for manned missions to Mars, was intended as a way to rebuild slumping morale at NASA and provide a road map for the future after the 2003 loss of the shuttle Columbia. Another goal of the strategy was to reenergize the public's interest in human spaceflight and recapture the sense of excitement and national pride felt during the Apollo era of the late 1960s and early 1970s.

Six years and \$9 billion later, the Obama administration has decided to terminate Constellation by canceling work on its core elements—the Orion crew exploration vehicle and Ares I rocket. Orion/Ares I would have been the follow-on system to the space shuttle fleet, scheduled for retirement by the end of this year. It would also have served as the basis for development of a more powerful system designed to transport astronauts and supplies to the Moon by 2020.

The decision to terminate Constellation will essentially leave NASA without its own

manned space transportation system for the first time in half a century. Some within government and industry are interpreting this as the beginning of a marked decline in America's space leadership and the start of a trend that will see countries such as China and India catch and even surpass the U.S. in the area of human spaceflight. We see the exact opposite.

The root cause

The reality is that the VSE has never been adequately funded, and was never going to succeed without a massive infusion of funding for NASA, a move that was not going to happen anytime in the near future given the immense demands on the federal budget (including two wars), the growing U.S. budget deficits, mounting debt and the continuing stagnation of the economy. So the choice was between funding an increasingly expensive R&D program with insufficient budgets, in hopes of eventually producing an Orion/Ares I system, or deciding to radically change the strategy for the way NASA conducts human spaceflight.

In a report submitted to Congress in October, a U.S. human spaceflight policy review panel headed by Norman Augustine noted, "The U.S. human spaceflight program appears to be on an unsustainable trajectory. It is perpetuating the perilous practice of pursuing goals

that do not match allocated resources." We think that this observation goes to the heart of why the current administration felt it had to end Orion/ Ares I and change course.

The Augustine panel concluded that the budget for Orion/Ares I would have to be increased by at least \$3 billion a year to keep the program relatively on track. The Obama administration was only willing to grow NASA's overall budget from \$18.7 billion in FY10 to \$19 billion in FY11, which means the agency was simply not going to be given anywhere close to the amount of money needed to keep Orion/Ares I alive.

In addition, the panel's recommendation that the administration allocate \$11 billion more for manned space exploration than it had previously budgeted for FY11 through FY15 reflects a commonsense realization that there will be program delays that add to costs.

The point is that the U.S. has finally arrived at a crossroads where there is a vast disconnect between the country's human spaceflight goals, as broadly outlined by the VSE and Constellation, and the financial investment the U.S. government is willing and able to make. It is a crossroads that could easily have been foreseen by the Bush administration and the industry in 2004, but at that time there was an inherent

Editor's note: We received permission to reprint this article from Elaine Camhi, Editor-in-Chief of Aerospace America, the magazine of AIAA. This Space Update article appeared starting on page 20 in the April 2010 issue of that magazine, which is generally available only to AIAA members. Horizons receives about 6,000 hits (downloads) per issue, though AIAA Houston Section has only about 1,100 members. AIAA has 90 corporate members and over 35,000 members. We aimed at publishing this article in Horizons by September 30, 2010, and we now seem close to publishing it early in May of 2011.

Reprint

unwillingness to discuss the question of what the vision would end up costing U.S. taxpayers.

As part of an effort to collect feedback on the VSE from industry and academia, the Bush administration established a nine-member space policy advisory panel of scientists and business leaders. The President's Commission on Moon, Mars and Beyond, chaired by former astronaut Pete Aldridge, held a series of public hearings in 2004 to help formulate a blueprint for the vision.

Ultimately, the commission published an extremely superficial report, more a collection of vague ideas and possibilities in support of the vision than a detailed plan for how that vision would be implemented and funded and how it would benefit the U.S. It was an exercise in rubber stamping the VSE rather than determining whether or not the strategy was realistically possible and why it was worthwhile to undertake.

From the start of the VSE, our sense was that no one in the Bush administration wanted to talk about its potential cost, because estimates that ranged in the hundreds of billions of dollars would be politically unpalatable and would derail the program before it ever got off the ground. But everyone knew that to make even the first phase of the VSE happen, NASA's budget, which at that time was still less than \$16 billion, would have to grow at a pace significantly higher than the annual rates of inflation over the course of at least a decade.

The silver lining

It was determined that the details of how to come up with the funding needed for the VSE would be left up to future administrations. It was also decided that a detailed rationale for why the effort was so important to the U.S. would eventually become self-evident. After the loss of the shuttle Columbia, morale at NASA was low. The VSE was designed more as a morale booster, and to give the agency a new sense of purpose and direction. It succeeded—and in the process, the strategy stimulated the U.S. civil space industry and funded some billions of dollars of R&D work. However, as a vision for attaining a specific goal, it was a dead-end strategy.

The good news about the VSE and Constellation is that they highlighted a reality fast becoming apparent under the tenure of NASA Administrator Michael Griffin, from April 2005 through January 2009: that the U.S. civil space program as it has always existed had to be overhauled. There was growing talk about NASA becoming less the dominant player and gradually allowing commercial industry to lead.

In 2008, NASA awarded contracts to Orbital Sciences (OSC) and Space Exploration Technologies (SpaceX) to provide cargo launch services to and from ISS through 2016. This was a major step toward the agency growing more dependent on the commercial spaceflight industry and thus becoming more of a facilitator of the industry's growth rather than a competi-

tor. The contracts, worth a total of \$3.5 billion, have fueled the development of SpaceX's Falcon 9 rocket and Dragon capsule and OSC's Taurus II and Cygnus capsule. They not only have provided development funding for the systems but also have sent a clear signal to industry that there is now a new and potentially lucrative market for ISS cargo transport services.

This new market has been made possible precisely because in seeking a cargo transport service provider NASA has been forced to look to the commercial spaceflight industry as an alternative to Russia and its Soyuz rocket/capsule. With the shuttle fleet nearing the end of its lifetime and Orion/Ares I many years from completion, NASA was facing a gap of six to seven years without its own space transportation vehicle.

During that time, the agency would be forced to lease space aboard Russian vehicles to ferry its astronauts and cargo to and from ISS. In May 2009, NASA actually signed a contract with the Russian space agency worth \$306 million covering two Soyuz missions in 2012 to transport astronauts to ISS and two return flights in 2013.

In short, NASA was forced by circumstances beyond its control to turn to U.S. commercial industry to meet a need that the agency could no longer meet without relying on the Russian government. The question that had been lingering before the Obama administration's deci-

sion to end Constellation was, “What happens to the emerging commercial space transportation services industry when Orion/Ares I is completed and NASA becomes the dominant player again?” That question has now been rendered irrelevant.

A second Moon race

A major concern of some who oppose the cancellation decision is that the U.S. is ceding its world leadership position in the area of human spaceflight and space exploration. Without its space shuttle, NASA next year will be completely reliant on the Russians for gaining access to ISS—a facility that has cost the U.S. government more than \$100 billion to build and assemble over the past quarter-century. Russia will unquestionably be the premier country in this arena, followed by China, which is now spending \$2 billion annually on its human spaceflight program.

China has already launched taikonauts to LEO aboard its Long March CZ-2F/Shenzhou system. It is also aiming to launch space stations to LEO by 2015 and a manned mission to the Moon sometime between 2020 and 2022.

India could soon have a national human spaceflight capability as well. Following the successful Chandrayaan-1 unmanned lunar orbiter mission in November 2008, India is now conducting a serious effort to send a manned mission to the Moon by 2015. Earlier this year, the Indian government announced that it plans to spend \$2.7 billion on

this program, with the ultimate goal of landing an Indian astronaut on the lunar surface by 2020.

It is an extremely ambitious undertaking, particularly since India has never had a human-rated space vehicle. Nonetheless, it is becoming apparent that the second race to the Moon will be between China and India.

The Russian government has expressed an interest in sending a manned mission to the Moon by 2025, but its focus seems to be less on winning the second lunar race than on eventually building a permanent lunar base. The Russian space agency has speculated that it could begin assembling a manned station on the Moon as early as 2027.

There is no doubt that this next race to the Moon will receive considerable international publicity and help advance the human spaceflight capabilities of India and China. The technological stature of both countries will be enhanced during the coming decade, and when each country successfully completes a manned lunar landing. So is the U.S. making a mistake by giving up on the VSE?

The answer depends on whether or not you assume that repeating the Apollo program's achievements of four decades ago is a worthwhile goal. Obviously, it is worthwhile for countries that have never come close to attaining what NASA did by the end of the 1960s. It is different for the U.S. The VSE never satisfactorily answered the question, “Why are we going to

the Moon again?” And it definitely did not address the question, “How does it justify the necessary financial investment?”

Getting out of the way

The cancellation of the VSE is a pragmatic decision by the Obama administration. There is just not enough money in the U.S. budget to pay for a space transportation and exploration initiative in which the tangible benefits to the nation are not clear. It is important to note, though, that the decision is pragmatic not only because of what it eliminates, but also because of what it will allow to occur as a result.

Without its own human spaceflight capability, NASA will now no longer be both the main customer for and the main provider of human spaceflight services in the U.S., as it has always been before. The agency will quickly become noncompetitive as a provider of such services and thus will gradually become less dominant as a customer.

By looking to the still-nascent U.S. commercial spaceflight industry to compete with the Russians for ISS cargo transportation services, NASA will help fund efforts by companies like SpaceX and OSC to develop human-rated space vehicles that will eventually be able to transport astronauts. These vehicles can, in turn, be adapted and offered to spur the development of new commercial markets such as space tourism. This will stimulate private capital investment in these types of space

Reprint

transportation programs, and before you know it you will have a growing and vibrant commercial human space-flight industry.

NASA's evolution from being the dominant player in human spaceflight to being a facilitator for the expansion of this commercial industry will take time, and it will not happen without the usual setbacks and delays that occur with any new industry. Neither will it occur without considerable pain to some of the agency's traditional contractors, who stood to secure lucrative long-term business by building hardware and creating software for the follow-on to the shuttle.

The good news is that you can already begin to envision the potential benefits that this sudden paradigm shift could bring to the U.S. NASA announced in February a total of \$50 million in contracts for work on "space taxis" to several aerospace companies, including Paragon Space Development, Blue Origin, Sierra Nevada, and United Launch Alliance. There also are other companies besides these—SpaceX and OSC are working on cargo and human transportation space vehicles. All they need is a consistent series of incentives and R&D investments from NASA, in much the same way that the U.S. government provided the railroad and aircraft industries in their early years.

While China and India are busy racing to the Moon to plant their respective national flags, the U.S. will be fueling the growth of a commercial industry, one that may well lead to innovations that spark

the creation of countless other industries—in much the same way that the invention of the Internet permanently changed the technological landscape.

Marco Cáceres

Teal Group
mcaceres@tealgroup.com

In December of 2010, we received this comment from Daniel Adamo in response to the article written by Marco Cáceres, and Mr. Adamo kindly allowed us to reproduce his two paragraphs of comments here, slightly edited for this context.

"This article never really states it, but the policy shift begun by the G. W. Bush Administration with the 2008 inception of COTS does more than cede NASA's LEO transportation of cargo (and subsequently, under CCDev, crew) to foster a new commercial industry. For the first time I can think of, this policy shift disengages NASA from a fixed-cost obligation in its budget, potentially freeing those funds for something new and different like beyond-LEO human exploration. In my opinion, this policy of disengagement is essential to a NASA whose inflation-adjusted budget is flat as the Federal government keeps assigning it new missions. Without disengaging from mature missions, NASA cannot move on to assume the new ones and pay to keep its ever-expanding institutional 'lights' on.

"The only statement in the Cáceres article with which I disagree is the lead sentence in the fourth paragraph. 'The decision to terminate Con-

stellation will essentially leave NASA without its own manned space transportation system for the first time in half a century.' My opinion is this capability gap was created by previous decisions to retire the Space Shuttle and to underfund Constellation. Furthermore, as Cáceres himself points out (reference the second-to-last paragraph in his article), Constellation termination frees up NASA funds supporting development of commercial human transport capability to LEO. Depending on how associated D.C. politics play out and how Fortune smiles on these space companies, Constellation termination could actually end up closing the U.S. capability gap as opposed to what the Augustine Commission was predicting in 2009."

Daniel Adamo, astrodynamics consultant

"The End of the Apollo Era—Finally?",

<http://www.spacenews.com/commentaries/100630-blog-end-apollo-era-finally.html>, Space News International guest blog by Dr. John M. Logsdon, The George Washington University

"Human Spaceflight on the Brink of Extinction? What Might We Learn from the 1967 Planetary Science Crisis",

<http://www.spacenews.com/commentaries/100721-blog-human-spaceflight-brink-extinction.html>, Space News International guest blog by Roger Launius

"2 Asteroids to Pass Within 154,000 miles of Earth", Houston Chronicle, September 7, 2010,

<http://www.chron.com/disp/story.mpl/space/7190140.html>

"Next Giant Leap: With Support Growing, NASA Takes a Small Step Toward Walking on an Asteroid", Houston Chronicle, September 6, 2010,

<http://www.chron.com/disp/story.mpl/space/7188211.html>

The NASA web site recently posted special posters of each Space Shuttle Orbiter. These are large enough for printing 8 x 10 inch posters. Each poster includes images of all mission patches for the relevant Orbiter, as well as additional images. The posters are very nicely done, and we can see they are the work of professional artists who worked with these images.

Atlantis

<http://www-pao.ksc.nasa.gov/kscpao/images/large/2010-4450.jpg>

Challenger

<http://www-pao.ksc.nasa.gov/kscpao/images/large/2010-4451.jpg>

Columbia

<http://www-pao.ksc.nasa.gov/kscpao/images/large/2010-4452.jpg>

Discovery

<http://www-pao.ksc.nasa.gov/kscpao/images/large/2010-4453.jpg>

Endeavour

<http://www-pao.ksc.nasa.gov/kscpao/images/large/2010-4454.jpg>



New book: *Space Commerce, The Inside Story, By the People Who are Making it Happen*, edited by Dr. Kenneth Cox and others. From the foreword: "This third book by the Aerospace Technology Working Group (ATWG) is a broad and fascinating survey of the important topic of Space Commerce. The authors are genuine experts in their fields, and many of them have been together in the loose collaboration of the ATWG for two decades. They share a common impatience with incremental development and bureaucracy, and will lead the reader in exploring the frontier of this emerging business venue." Bruce McCandless II, 24-Year NASA astronaut. See <http://www.lulu.com>.

Nanotechnology: On Tuesday, May 18, 2010, NASA/JSC hosted about 30 nanotechnology presentations in two concurrent rooms by professors and students from Rice University. This event took place at Gilruth Center. The PowerPoint presentations are now available to the public:

<http://mmptdpublic.jsc.nasa.gov/jsnano/default.asp?content=JSCRice&l1=9&l2=1&l3=0>

The NASA/JSC Nano Materials Project web site is also available to the public:

<http://mmptdpublic.jsc.nasa.gov/jsnano/>

At the event this past May, someone mentioned that another such event was planned for later, with NASA/JSC making presentations at Rice University in Houston. And someone made the suggestion that by partnering with Rice University, NASA/JSC might make this subject one of its core competencies.

Section News



Groupe régional Toulouse-Midi-Pyrénées



Proclamation

Whereas

The American Institute of Aeronautics and Astronautics (AIAA) and the "Association Aéronautique 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, exploration and observation of space, 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 confirm, on a permanent basis, 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 April 13, 2010, and approved by AAAF Toulouse – Midi-Pyrenees branch on May 26, 2010, following a successful three-year trial period.

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 May 13, 2010:

AIAA Houston Section: Douglas Yazell and Chair Ellen Gillespie

Douglas J. Yazell

Ellen Gillespie

Francis Guimera

Signed on May 26, 2010:

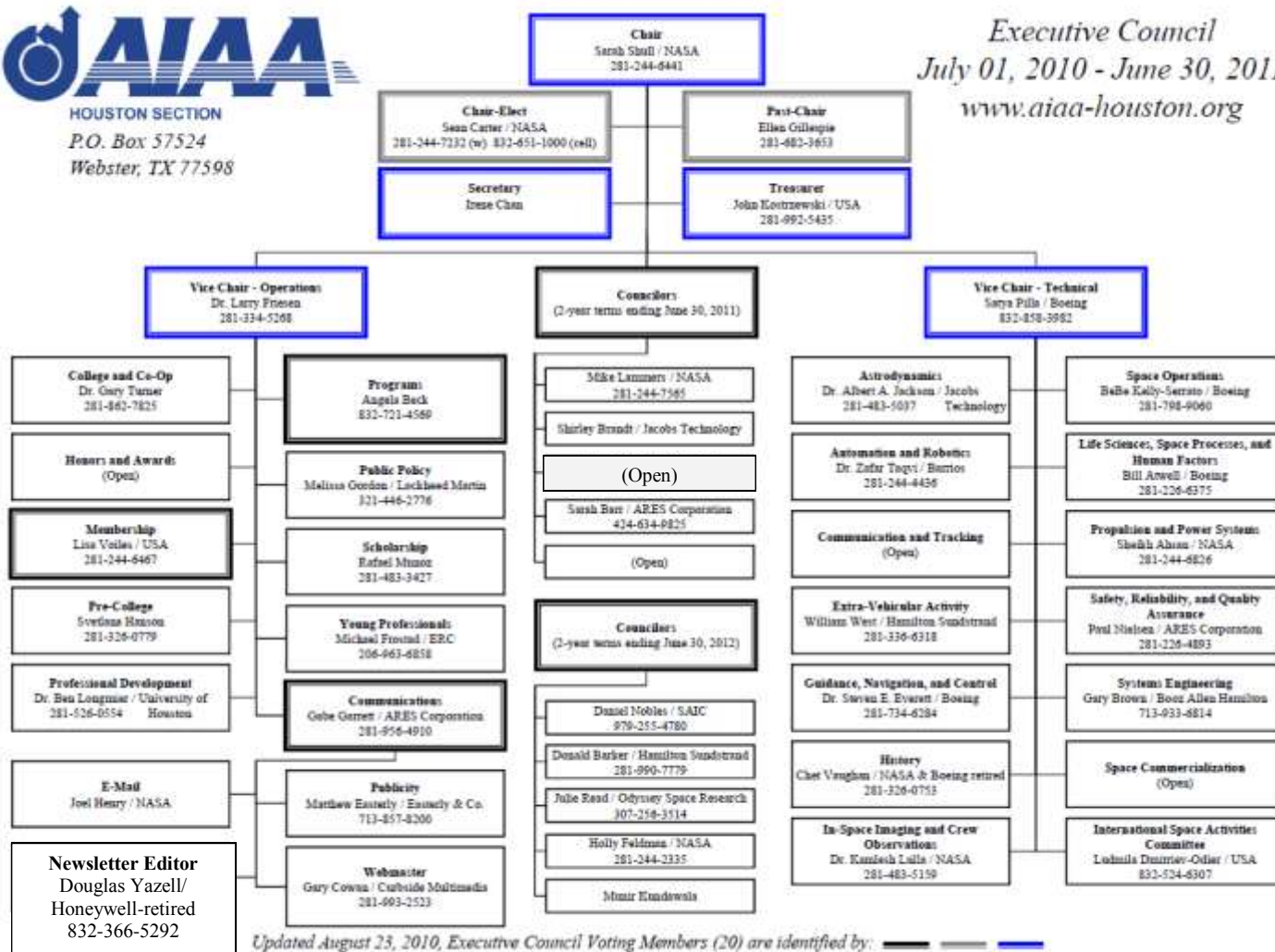
AAAF Toulouse – Midi-Pyrenees branch: President Francis Guimera

Above: This is now a permanent sister section relationship. It continues to thrive via exchanges of newsletter articles, and we always plan to make it come alive with meetings in person. Maybe the next such meeting will be in a country easy for both groups, such as Ireland or England. In their region of France, our French sister section includes a large variety of aeronautics and astronautics companies and institutions, the largest of which is Airbus. In our region of the USA, one of three sections in Texas, AIAA Houston Section includes a variety of aeronautics and astronautics companies and institutions, the largest of which is NASA.

Section News



Executive Council
July 01, 2010 - June 30, 2011
www.aiaa-houston.org



Above: The organization chart for AIAA Houston Section contains about 45 people. We can see there are a few vacancies at the moment. Some of these positions include a committee, not just a Chair, as shown on some of the pages on our web site at www.aiaa-houston.org.

Right: Dr. Paul Abell (NASA) in the cowboy-style hat is one of the few to participate in the return of Hayabusa, the Japanese space mission. This mission was the first to touch down on an asteroid (Itokawa) and the first to return to Earth from an asteroid. Its attempt to return samples of asteroid material is still under study. This canister contains some tiny particles not yet confirmed to be from the asteroid. Dr. Abell was a recent lunch-and-learn speaker for AIAA Houston Section's astrodynamics technical committee. Image credit: JAXA (published on June 16, 2010, at www.enjoyspace.com, as part of a Hayabusa portfolio)

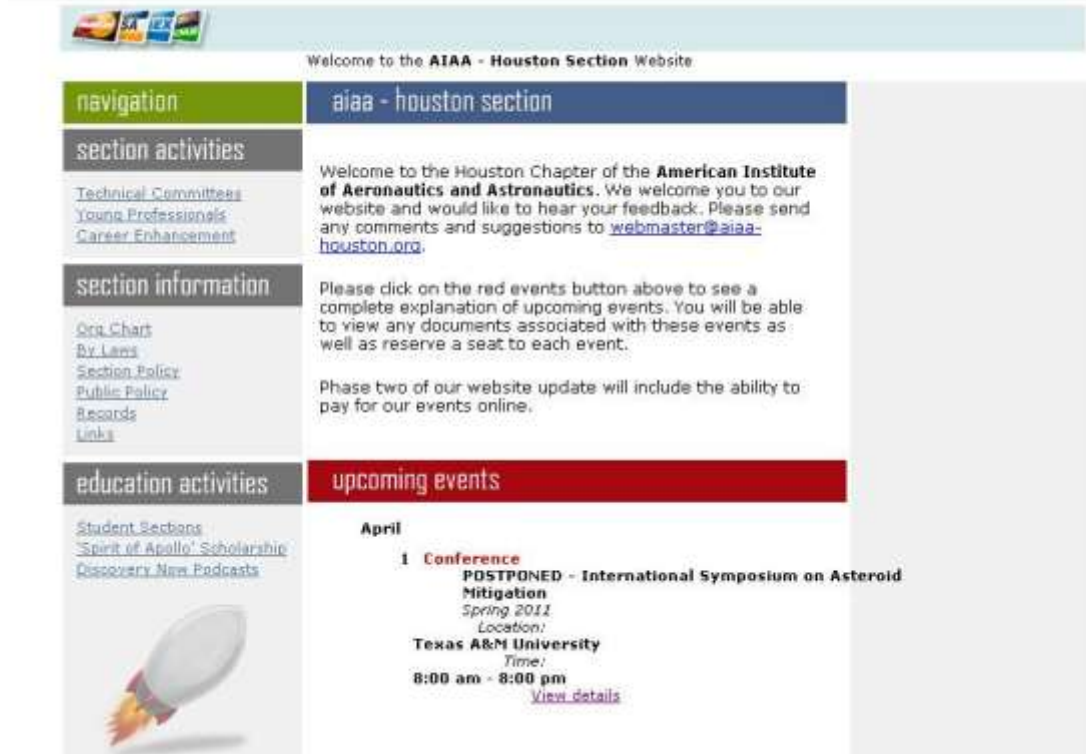


Section News



Left: Our section's new web site at www.aiaa-houston.org was created by Gary Cowan, the AIAA Houston Section webmaster. This is the third generation for our section's web site. The first was created by Glenn Jenkinson in 1999 or later. The second was created by Murugan Subramaniam using phpwebhosting.com.

Our web site now has this great new look thanks to Gary Cowan.



newsletter	
Current Edition	
July 2010	9932 kb
Older	
July 2010	9932 kb
March 2010	7770 kb
November 2009	2025 kb
June 2009	2280 kb
April 2009	3275 kb
December 2008	2644 kb
October 2008	4456 kb
June 2008	7273 kb
April 2008	1621 kb
February 2008	1420 kb
December 2007	2247 kb
August 2007	2029 kb
May 2007	1628 kb
January 2007	902 kb
July 2006	955 kb
May 2006	848 kb
March 2006	971 kb
January 2006	978 kb
November 2005	1251 kb
September 2005	1254 kb
July 2005	1252 kb
May 2005	954 kb
March 2005	223 kb
January 2005	936 kb

Left: Current and back issues of Horizons are now available on our web site. A link may soon appear there to even more back issues, making them available for members. That link connects to a national AIAA web site called Sharepoint, created for section contributors. Until that link is added on our web site, members may write to chair@aiaa-houston.org to request that web site address. Members can see those additional back issues by signing in with the same userID (an e-mail address) they use for the national web site, www.aiaa.org. But for now, a different password must be created. The earliest back issue there for now is from 1977. In those days, it was called "newsletter", not Horizons. Thanks to Vice Chair Operations Dr. Larry J. Friesen for loaning us many back issues, as far back as 1977, for conversion to PDF files. We are pretty sure that the first issue of our newsletter appeared in 1971, when our Chair was James C. McLane, Jr.

AIAA Houston Section events and other events related to aeronautics and astronautics:**Friday, May 20, 2011 AIAA Houston Section Annual Technical Symposium (ATS 2011)**

Location: NASA/JSC Gilruth Center

Time: 8:00 AM to 5:00 PM

Registration: (available in SATERN at JSC, too): \$15 for attendees, free for presenters, panelists, etc.

Keynote speakers: morning & luncheon

More information: www.aiaa-houston.org and the publicity flyer in this issue of Horizons

Friday, May 20, 2011 Engineers as Educators

Location: NASA/JSC Gilruth Center, co-located with the Annual Technical Symposium

More information: www.aiaa-houston.org

Tuesday, June 21, 2011

Dinner meeting with AIAA Distinguished Lecturer Robert Zimmerman

Location: Space Center Houston is the planned site for now

Time: starting at 5:30 PM

Details: TBD

AIAA Houston Section council meetings

Time: 5:30—6:30 PM

Day: First Monday of most months

Location: usually in the San Jacinto room at NASA/JSC Gilruth Center

More information: chair @aiaa-houston.org or events@aiaa-houston.org

ATS 2011



AIAA

American Institute of Aeronautics and Astronautics
Houston Section

Annual Technical Symposium

ATS 2011

May 20, 2011 (Friday)
Gilruth Center NASA/JSC



Image Courtesy of www.nasa.gov

Topics

- Space Commercialization
- Space Exploration
- Systems Engineering
- Robotics
- Engineers as Educators
- Aerospace Technologies
- Guidance, Navigation, and Control (GN&C)
- Extra-Vehicular Activity (EVA)
- Space History
- Space Journalism
- AERCAM Sprint
- International Space Station
- Space Shuttle Program

Invited Speakers

Kickoff Speaker
NASA/Mark Erminger
Commercial Crew and Cargo

Luncheon Speaker
Boeing/Brewster Shaw
Commercial Spaceflight

Symposium Plans

Registration all day at the Gilruth Center 0745-1630
\$15 for attendees (lunch included)
Register Online: www.aiaa-houston.org, pay at check-in.
Advance reservations are required for those selecting the optional lunch buffet (see deadlines)
Civil Servants should register through Satern (search "AIAA" in the catalog). CS registration fee will be paid if registering through Satern.

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 at the registration desk.

Complimentary coffee, beverages, and snacks

Lunch buffet available
Reserve online in advance
Buffet includes vegetarian option

All are encouraged to attend or present

Take advantage of this opportunity to present your current efforts and to showcase your company or organization

Schedule

0745 Registration (*open all day*)

0815 Speaker: Mark Erminger

0900 Morning Sessions

1200 Speaker: Brewster Shaw

Lunch (provided by Gilruth)
Optional but requires reservation by Thursday, 5/12/11 (A limited number is available after that time)

1330 Afternoon sessions

1630 End of Symposium

Deadlines

May 2, 2011 (Monday)
Abstracts due online

May 9, 2011 (Monday)
Abstract acceptance notices sent out

May 12, 2011 (Thursday)
Reserve optional lunch

May 20, 2011 (Friday): ATS
Registration all day;
Pay for registration at check-in

Deadlines

May 2, 2011 (Monday)
Abstracts due online

May 9, 2011 (Monday)
Abstract acceptance notices sent out

May 12, 2011 (Thursday)
Reserve optional lunch

May 20, 2011 (Friday): ATS
Registration all day;
Pay for registration at check-in

Contact

Satya Pilla, General Chair
vicechair-tech@aiaa-houston.org

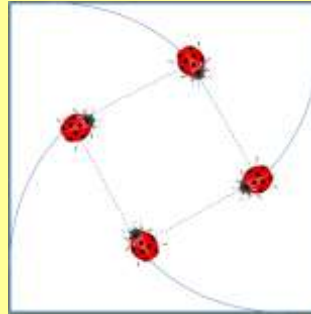
www.aiaa-houston.org

Cranium Cruncher

STEVE EVERETT

Last issue was a tough one that went like this:

Four bugs are placed at the corners of a square. Each bug walks always directly toward the next bug in the clockwise direction. How far do the bugs walk before they meet?



Since the bugs start out walking perpendicularly, and there is nothing in the problem to alter this symmetry, the bugs are always walking perpendicularly. Since each bug is walking perpendicularly to the line separating it from the bug chasing it, the gap is closing at the speed of the chasing bug. Therefore, each bug walks a distance equal to the side of the square before it meets the next bug.

In order to conveniently express the equation of the bugs' motion, use standard polar coordinates, and let the first bug's position at any instant be $(r(t), \theta(t))$. Assume the initial square is centered at the origin.

Then by symmetry the bugs are always at four corners of some square centered at the origin, and if they meet they meet at the origin. Also, each bug is always walking in a direction $\pi/4$ (45 degrees) away from the radial line to the origin. This means that in the limit as the time step goes to zero, the bug travels $\sec(\pi/4) = \sqrt{2}$ units along its path for every unit of progress made good toward the center. Since the corners are initially $d/\sqrt{2}$ distance from the center, each bug travels distance d before they meet, assuming they meet at all.

Since a bug's path always crosses radial lines at angle $\psi = \pi/4$, the path is a logarithmic spiral with angle $\psi = \pi/4$ and equation

$$r(t) = e^{(a \cdot \theta(t) + b)}$$

Moreover since the bugs walk clockwise, both $r(t)$ and $\theta(t)$ decrease as t increases, in other words r increases as θ increases, hence a is positive. Also, $\psi = \pi/4$ gives us

$$d(r)/d(\theta) = r$$

(this is easiest to see by drawing the path for a small time step Δt and taking the limit as Δt goes to 0). The solution is

$$r(t) = e^{(\theta(t) + b)}$$

(that is, $a = 1$). As we know, this spiral makes infinitely many "wraps" around the origin as the radius approaches zero, but it does have finite length from any point inward and its limit point is the origin, where the bugs will meet (unless one wants to quibble about the behavior at the exact limit point).

How much closer is the bug to the origin after its first complete cycle

(Continued on page 64)

Cranium Cruncher

STEVE EVERETT

(Continued from page 63)

around the origin? Recall that $r(0) = d/\sqrt{2}$. As the bug walks clockwise around the origin, after one full circuit its angle decreases from $\theta(0)$ to $\theta(t_1)$, where t_1 (the time at which full circuit occurs) is defined by

$$\theta(t_1) = \theta(0) - 2\pi$$

Hence

$$r(0) = e^{\theta(0) + b}$$

$$r(t_1) = e^{\theta(0) - 2\pi + b}$$

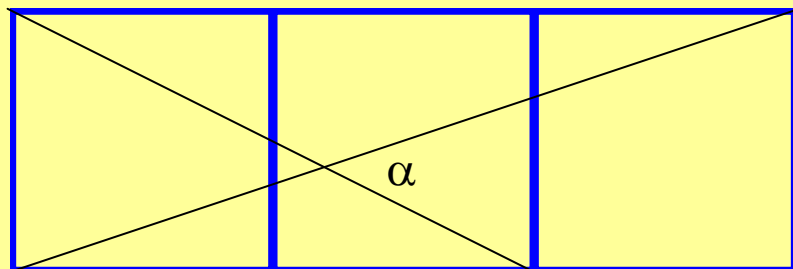
$$r(t_1)/r(0) = e^{-2\pi}$$

The quantity we want is

$$\begin{aligned} r(0) - r(t_1) &= r(0)(1 - e^{-2\pi}) \\ &= d * (1 - e^{-2\pi})/\sqrt{2} \end{aligned}$$

Now for this issue's problem.

The blue figure is composed of three squares, with the diagonals connecting corners as shown. Find the angle α without using trigonometry!



Send solutions to steven.everett@boeing.com

The Environmental Impact of Future Suborbital Vehicles of Space Tourism

PHILIPPE MAIRET, MEMBER OF THE TECHNICAL COMMITTEE EXPLORATION AND OBSERVATION OF SPACE (EOS), 3AF

3AF TMP

Currently there are numerous ongoing projects involving suborbital vehicles for space tourism.

We can cite Virgin Galactic, of course. It is the most advanced. But there are others such as those of XCOR, EADS Astrium, the European Astronaut Club, etc.

If space tourism is now the hot topic, then to my knowledge, unless I am mistaken, not a single in-depth study publicly distributed concerning the impact of future suborbital vehicles of space tourism on the environment. But...

In an article recently appearing in the famous *The New Scientist*, researchers put forth the hypothesis that products of combustion such as soot could cause problems.

In fact, the explanation advanced by these researchers is that given the number of flights currently planned in the decade or decades to come, the products of combustion could contribute to a worsening of the greenhouse effect for two reasons. First, a change in the thermal exchanges in the upper atmosphere, consisting mostly of a variation in the temperatures at the poles. Secondly, that change might have an impact on the ozone layer.

It seems to me that this is a real challenge. Future subor-

bital space tourism vehicles must not, in my opinion, lead to the degradation of the phenomena occurring in the (upper) atmosphere. If not, how can we guarantee for current and future generations that all that was possible was done, in the area of space tourism, to preserve our planet?

*3AF TMP:
l'Association Aeronautique et
Astronautique de France,
Toulouse
- Midi-Pyrenees chapter*



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Above: From the NASA/JSC newsletter *Space Center Roundup* (July 8, 1964), some of the Mission Analysis Branch of the Space Task Group: From left to right: Richard Koos, Paul Brumberg, John O'Loughlin, Doris Folkes, Emil Schiesser, Cathy Osgood, Jim Dalby, Morris Jenkins, Carl R. Huss (plaid jacket), John Mayer, Bill Tindall, Harold (Hal) Beck, Charles Allen, Ted Skopinski, Jack Hartung, Glynn Lunney, Shirley Hunt Hinson, John Shoosmith, Bill Reini, Mary Shep Burton, Lyn Dunseith, Jerry Engel, Harold (Harry) Miller, and Clay Hicks. Missing from the photograph: Nancy Carter, Marty Jenness, and Ed Lineberry.

For a high-resolution copy of this picture (1 MB), please e-mail editor@aiaa-houston.org.

Image credit: NASA (A3-S64-26644HalBeckGroup1964.jpg). (Some empty sky is cropped out of the above copy of the photograph.)

Editor's note: Carl R. Huss (McDonnell Douglas) was the 1987-1988 chair of AIAA Houston Section for our section's 26th year, as shown in a document in Chester Vaughan's history technical committee web page on our section's web site (www.aiaa-houston.org).

See the columns by the editor and assistant editor for more information about this photograph.

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

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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.