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Summer 2010



TABLE OF CONTENTS

From the Editor	3
Chair's Corner	4
1940 Air Terminal Museum at Hobby Airport	5
A Tribute to an Apollo Program Engineer : Albert Jowid	6
Dinner Meeting: The Augustine Commission and Beyond	8
A VASIMR® Update at UHCL	10
One More Story About Our Late Section Chair Mr. Algranti	12
AIAA Houston Section Annual Technical Symposium 2010	14
Patches for the Last Three Space Shuttle Flights	17
Chinese Sister Section: Shanghai Expo 2010	18
Art and Science: Voyage in the Solar System	20
The Late Guenter Wendt, Pad Leader at the Cape	22
Yuri's Night 2010	25
Two LnLs from our Astrodynamics Technical Committee	26
From Caves to Space	28
JSC 1968: More Photos from the McLane Archives	31
APR Corner: Aerospace Projects Review	32
Aeros & Autos 2010 at Ellington Airport	34
EAA Corner: Experimental Aircraft Association, Houston Chapter	35
Crossword Puzzle: Know thy Station! ...all about the ISS	36
Calendar	38
Cranium Cruncher	39
The Back Cover: The 2010 AIAA Haley Space Flight Award	40

Horizons and AIAA Houston Web Site
AIAA National Communications Award Winner



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Cover: Robonaut 2, highlighted at the AIAA-Houston 2010 Annual Technical Symposium and scheduled to fly to the International Space Station (ISS) late this year aboard Discovery during the STS-133 mission. (Image credit: NASA)

The Time is Right

The fate of Constellation is even more in question than when I wrote three months ago. Opinions across the country and on Capitol Hill vary as to whether it was legal, or even advisable, to begin shutting down the program after the President redefined the direction of NASA earlier this year. However, what is clear is that the momentum for commercial development in space is growing. Companies such as Boeing, SpaceX, Orbital Sciences, Bigelow Aerospace, and others are hoping to be players in this market. It remains to be seen whether Lockheed Martin would also eventually evolve the “Orion light” vehicle proposed by the President into its own offering to the growing array of commercial manned capsules or choose to avoid provoking its competitors by being satisfied with a contract which was drastically altered but never recompeted. SpaceX, at least, has shown that there is potentially money to be made with a commercially-developed launch vehicle, as evidenced

by its recent contracts with Iridium and the National Space Organization of Taiwan.

The debate is now shifting from whether a private company could duplicate NASA’s capability of putting humans into orbit, to whether it is ready to try. The perception is that private companies, in a short-sighted attempt to be competitive or just from lack of technical experience, may not provide the reliability and safety of a government-built vehicle. However, in their case it is money rather than MIL SPECS that enforce safety standards; the chance of being put out of business after an accident is a pretty powerful incentive to do the job right. While NASA may be reluctant to put career astronauts, who are accustomed to the oversight of a government program, on a commercial rocket, numerous others are willing to take the risk and spend hundreds of thousands for their chance at a view from orbit.

In the long view, commercialization is inevitable. If the free market allows it — com-

panies can make a business case out of selling seats on a rocket or hotel rooms in space — then the question of whether they are really ready is moot. There will unfortunately be a first fatality on a private rocket someday, but just as NASA has had to do after its own setbacks, companies will learn from those mistakes, make the necessary changes, and continue to blaze another path to expand our presence into space.

From the Editor



Right: Falcon 9 launch, June 4, 2010. (photo credit: Chris Thompson/SpaceX)

From the Chair

Chair's Corner

ELLEN GILLESPIE, SECTION CHAIR



I'd like to thank all of you for a great AIAA year. We ran a full suite of programs this year: a Robotics Workshop; Student Paper Conference; Annual Technical Symposium; and dinner meetings with Pete Olson, Augustine Panel Member Bohdan Bejmuk, AIAA Region IV Director on Near Earth Objects, and Apollo 13 veteran Sy Liebergot. We had Lunch and Learn programs; Apollo 40th anniversary celebrations; a Space Center Lecture Series at UHCL; a Mars Rover student competition; and a night of star gazing. It has been a pleasure to help with these events and serve

the community. Thanks so much for a great time.

I came to AIAA Houston a few years ago when I made the decision to start publishing again and return to mathematical work. I was excited to attend Lunch-and-Learns and dinner programs to learn about the work of others, and happily worked with members of the AIAA Houston team to build my own papers and presentations.

Since I was regularly attending technical events, I started to help out, then joined one of the technical committees. It wasn't long before I became more en-

gaged and started moving around the Org Chart trying out different positions and learning how to work each effectively. I grew into a better professional, helped others, and got to attend many wonderful events. AIAA Houston grew me in ways I never expected.

AIAA provides a wonderful opportunity to share information and problems, support projects and goals, give cool presentations, and work with a great team of people. Come out and join us – the next great adventure is always in the planning stage.



Left: STS132-S-002 (20 Nov. 2009) --- Attired in training versions of their shuttle launch and entry suits, these six astronauts take a break from training to pose for the STS-132 crew portrait. Pictured clockwise from bottom are Commander Ken Ham, Mission Specialists Garrett Reisman and Michael Good, Pilot Tony Antonelli, and Mission Specialists Piers Sellers and Steve Bowen. (Image credit: NASA)

Right: JSC2010-E-089697 (27 May 2010) --- At Ellington Field's Hangar 276, NASA's Johnson Space Center (JSC) director Michael L. Coats (far right on stage), addresses a large crowd of visitors at the crew return ceremony for STS-132 -- space shuttle Atlantis' final scheduled mission. Crew members, from the left, are NASA astronauts Piers Sellers, Steve Bowen, Michael Good, Garrett Reisman, Tony Antonelli and Ken Ham. (Photo credit: NASA, <http://spaceflight.nasa.gov>)



The 1940 Air Terminal Museum at Hobby Airport

DOUGLAS YAZELL, ASSISTANT EDITOR

Museum

Museum Administrator to Search for Amelia Earhart!

(Houston, Texas – May 10, 2010, 1940 Air Terminal Museum Press Release)

The administrator for Houston's 1940 Air Terminal Museum at Hobby Airport, Megan Lickliter-Mundon, will travel to the South Pacific later this month to participate in an archeological expedition intended to answer one of aviation's greatest mysteries: what happened to Amelia Earhart.

Lickliter-Mundon has been selected to be evidence manager for the upcoming expedition to Gardner Island by The International Group for Historic Aircraft Recovery ("TIGHAR"), a non-profit foundation dedicated to

promoting responsible aviation archaeology and historic preservation.

The Earhart Project is TIGHAR's science-based investigation testing the hypothesis that Amelia Earhart and her navigator Fred Noonan landed, and eventually died, on Gardner Island, now Nikumaroro in the Republic of Kiribati. Archival research and nine expeditions have uncovered a compelling body of supporting evidence. Archaeological excavations during the next expedition, scheduled for later this month, will aim to recover artifacts from which Earhart's DNA can be extracted. The expedition will also include a



deep water search off the atoll's fringing reef for the wreckage of the airplane.

Upon her return from the TIGHAR Earhart expedition, Ms. Lickliter-Mundon will give a presentation at the 1940 Air Terminal Museum on the expedition and its results.

Above: 1940 Air Terminal Museum at Hobby Airport. (Image credit: www.1940airterminal.org)



Left: Amelia Earhart. (Image credit: www.1940airterminal.org)

History

A Tribute to an Apollo Program Engineer

ANONYMOUS, EDITED BY DOUGLAS YAZELL, ASSISTANT EDITOR

The Marshall Space Flight Center (MSFC) was responsible for managing the Lunar Rover program and the Lunar Module was to begin carrying it to the Lunar surface on Apollo 15. I had assigned Albert Jowid, the RASPO Spacecraft Manager for LM-5 to this task after LM-5 was delivered to Kennedy Space Center (KSC). (Editor's note: RASPO is what they called the man leading an office called Resident Apollo Spacecraft Program Office.) He was a diligent person and arranged for the Grumman LM Test Team to demonstrate the installation of the Rover into the LM descent stage. This installation demonstration was then to be followed by a deployment demonstration. Al was

keeping me and the test team abreast of the schedule for the rover, and it was shortly after the flight of LM-5 on Apollo 11 that he thought the time was ripe for the demonstration. He asked to have the go-ahead to set it up. I advised Dr. Tripp and Joe Gavin, and they gave the Grumman team and the RASPO team a time and a place to have it done.

Al worked directly with Grumman and MSFC to get the rover to Bethpage, to get the descent stage scheduled and positioned for the operations, and he reported to Lew Fisher and me that all was ready.

On the day of the installation test and fit check, things went very well except Al reported to Lew and me that there was slack in the fit, and a shim would have to be applied to make sure the rover would not be so loose and rattle during launch. We told him to get Grumman and add the appropriate shim to the installation procedure and to go ahead with the demonstration the next morning.

Neither Lew Fisher nor I felt we had to interfere with the demonstration, so neither of us were there during the deployment exercise. In fact, I was in my office going over production schedules and problems when Al came into the office as white as a sheet and hardly able to talk. I motioned for him to sit at the conference table and gather his wits together and then he could tell me what had upset him so much. Mary Totter, my secretary, had noticed

how upset Al was and brought him a cup of coffee which he sipped, but was still not able to talk. We sat there for several minutes and finally Al said, "That rover almost killed me."

He was calming down now, and I asked what went wrong. He said, "When the Marshall guy initiated the deployment, the rover opened all of its wheels, the back straightened, and it was a real Jack-in-the-Box. If I hadn't jumped out of the way, it would have smashed me to the floor. It is not safe."

I waited a short time to let him really calm down, then asked him to go down and get the lead MSFC person and tell him I wanted to see him in my office immediately.

I waited, trying to think how to tell him he was promoting an unsafe device which could kill or cripple an astronaut on the Moon. I decided to be very direct.

When Al and the Marshall engineer entered my office, he immediately started to say it wouldn't happen that way in one-sixth g. I just said, "I don't want to hear anything you have to say. That deployment system is unsafe, and we will not have it flown on the LM. You take it home and redesign it to be deployed with the Apollo Lunar Surface Experiment Package (ALSEP) mechanism. I want it to be deployed by a crew member on the end of a long lanyard and to have each element, like one wheel,

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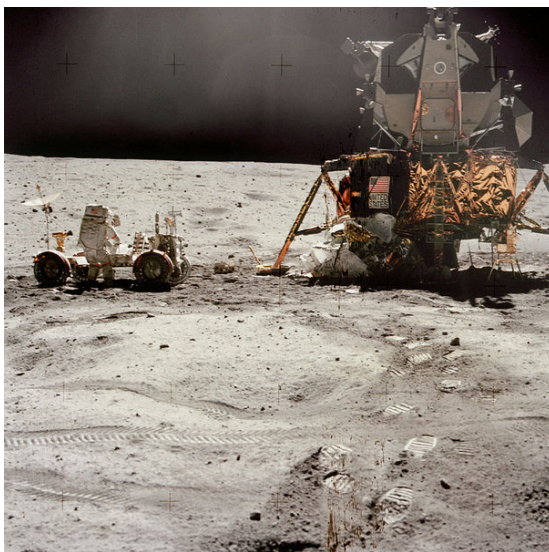
Below: NASA Lunar Module LM-5, Apollo 11, on the Moon. (Image credit: NASA)



(Continued from page 6)

deployed one click at a time, completely under crew member control, and no automatic sequences." He started to talk again, and I told him, "I don't want to hear any more from you. Gather your gear and go home and don't even think of coming back until you have met my requirements." Then I told Al to follow up and make sure of the redesign before he allowed him to come back to me. Al escorted him out, and when he came back, he said he gave the same comments to the other Marshall people. I said, "Thank you, I agree with that."

I then called Jim McDivitt, now the Program Manager, and told him what had happened and what I had told the MSFC engineer. He said he'd follow it up and make sure that they understood that

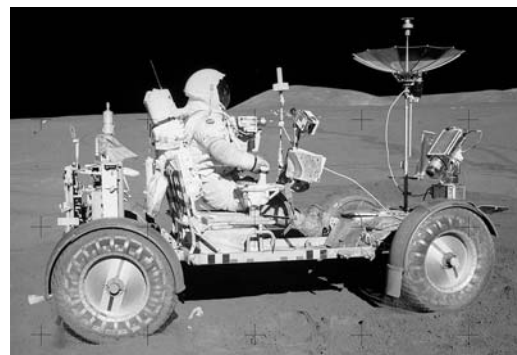


he wanted the deployment system fixed to be like ALSEP.

Mr. Jowid later died at about age 55 of pancreatic cancer. We note the letter of commendation shown below, dated February 6, 1970.

Left: NASA, John Young works at the Lunar Roving Vehicle near the LM Orion on Apollo 16 in April 1972.

Below: NASA, Apollo 15 Lunar Rover. (Image credits: NASA)



To: Manager, RASPO, PB
Grumman Aerospace Corporation
Bethpage, Long Island, New York, 11714

Dear Sir,

I wish to express my thanks to you, Mr. M. Albert Jowid, and the Grumman Aerospace Corporation team who, together, played a major role in the solution of several problem areas in the development of the lunar module/lunar roving vehicle interface in a highly efficient and timely manner, which has allowed both LM-10 and a lunar roving vehicle development to proceed on schedule. Your combined efforts also resulted in a more optimum interface design with associated savings in weight and complexity.

Specifically, the Grumman Aerospace Corporation is to be commended for their cooperation in assisting with the interface design, and for their willingness to work long hours to deliver the interface tooling.

As a result, this interface area has moved from being a major problem area to being the best defined area in the Rover Program at this date.

Sincerely yours,

James A. McDivitt
Colonel, USAF
Manager
Apollo Spacecraft Program

cc:
Mr. M. Albert Jowid
Vehicle Management, PB7

Event

Augustine Commission and Beyond

AIAA- Houston Dinner meeting with Mr. Bohdan (Bo) Bejmuk

May 26, 2010

NICK PANTAZIS, AIAA HOUSTON OPERATIONS CHAIR



Above: Augustine Commission Committee member Bohdan Bejmuk addressing members of the AIAA-Houston section (Image credit: Douglas Yazell)

Mr. Bohdan (Bo) Bejmuk provided a very entertaining and informative evening for the AIAA-Houston Chapter during a recent dinner. Over 50 people attended to hear Mr. Bejmuk speak about his involvement with the Augustine Commission and his thoughts on where the industry is heading.

Mr. Bejmuk began by going through the list of Augustine Committee members and discussing their collective experience. The distinguished panel, led by Norm Augustine, had quite a resume. Collectively, the group had 293 years experience working on space matters, 175 years in science, 144 years in engineering, 143 years in management, 77 years in government, 35 years in the military (one member was a general) and 160 years in the private sector.

Mr. Bejmuk stressed that the group had an emphasis on thoroughness and transpar-

ency during the 90-day investigation. All meetings were publicly held and comments from the public were extremely important. The group also established a web site, Facebook and Twitter accounts as well as email contact for those unable to attend in person who wanted to provide comments.

Mr. Bejmuk noted that the Committee's charter was to "conduct an independent review of ongoing U.S. human space flight plans and programs, as well as alternatives, to ensure the Nation is pursuing the best trajectory for the future of human space flight – one that is safe, innovative, affordable, and sustainable." During this review, Mr. Bejmuk noted that the Committee aimed "to identify and characterize a range of options that spans the reasonable possibilities for continuation of U.S. human space flight activities beyond retirement of the Space Shuttle." In addition, the Committee addressed the following four objectives: a) expediting a new U.S. capability to support utilization of the International Space Station; b) supporting missions to the Moon and other destinations beyond low-Earth orbit; c) stimulating commercial space flight capability; and d) fitting within the current budget profile for NASA exploration activities.

Based on the charter, Mr. Bejmuk then explained each of the Commission's findings as well as list of integrated options developed by the

Committee. Mr. Bejmuk stressed that the Commission's findings were supported unanimously by the members, primarily due to the group developing options instead of recommendations. He pointed out that the current program (Space Shuttle, International Space Station, Orion) is not sustainable due to a mismatch between scope and funding. In addition, the exploration initiatives did not appear viable under the current FY2010 budget and would require a higher budget level of around \$3 billion/year in order to permit human space exploration to proceed in a useful manner. Mr. Bejmuk also noted that NASA should help the commercial space industry by creating markets for: Commercial crew to Low Earth Orbit (LEO); Fuel delivery to LEO and in-space fuel transfer and Commercial components such as hubs, and lunar elements. He further indicated that this would not only help the smaller companies such as SpaceX and Orbital, but would also benefit the larger established players such as The Boeing Company and Lockheed Martin.

Mr. Bejmuk presented some additional findings of the Commission such as the technical, schedule and cost challenges with Ares I and Orion, the necessity to build a robust technology program to enable future exploration, the absolute need to continue involving international partners in the exploration of

(Continued on page 9)

(Continued from page 8)

space and a discussion of NASA's workforce challenges and impact to exploration.

Mr. Bejmuk spent a few minutes discussing the current NASA situation and how it will affect the future of Human Space flight. He noted that the President's budget increases NASA annual funding by about \$1 billion/year. It proposes to increase significant new technology development and mandates development of commercial crew capability to LEO but it also proposes to cancel the Constellation Program. Consequently, the congressional representatives from affected States oppose the cancellation. Mr. Bejmuk also noted that he attended the May 25-26 ESMD workshop in Galveston, put on jointly between NASA and AIAA, where NASA unveiled plans for working within the President's budget framework.

Mr. Bejmuk left the audience with some final



thoughts. He pointed out that in Human Space Flight, NASA has contributed one of the greatest achievements by humanity in 20th century. However, today's NASA needs to reinvent itself in order to rediscover its greatness. This would help it to get back into a position of prominence where it could continue to lead US industry and facilitate international cooperation in order to explore the wide open solar system.

Above: Mr. Bejmuk responds to comments from Guy Thibodeaux, AIAA Fellow and former Chair of AIAA Houston Section . (Image credits: Douglas Yazell)



Left: Presentation of the speaker gift, an official NASA souvenir medallion for the 40th anniversary of Apollo containing metal flown to the Moon during the Apollo program, by Nick Pantazis to Bo Bejmuk. (Image credit: Douglas Yazell)

Event

A VASIMR® Update at UHCL**DOUGLAS YAZELL, ASSISTANT EDITOR, & BEN LONGMIER***Editor's note:*

Staying Informed: After this public lecture, an excellent article about Ad Astra Rocket Company appeared at <http://www.spaceflightnow.com>.

I enjoyed the privilege of attending a public lecture on Monday, April 5, 2010, at the UHCL campus which is less than a mile from my home and my work. The subject was VASIMR®, the Variable Specific Impulse Magneto-plasma Rocket. The speaker was Dr. Benjamin Longmier of The Ad Astra Rocket Company in the Houston Clear Lake area. His host was Professor David Garrison of the Physics department at the University of Houston at Clear Lake. I later found the PowerPoint charts (about 75 pages), an audio recording of the presentation, and some video files of VASIMR® testing. These files are on the UHCL web site. I encourage our readers to seek out those details by going to www.uhcl.edu/physics and clicking on Spring Schedule under Seminars at the bottom left of the screen.

Since President Obama's team spoke about this technology while proposing (in his 2011 budget proposal, announced in February of 2010) to cancel Project Constellation (zero budget proposed for the two rockets, Ares I and Ares V, the Orion space vehicles, which are



Above: VX-200 image of June 22, 2010

(All photo credits: Ad Astra Rocket Company)

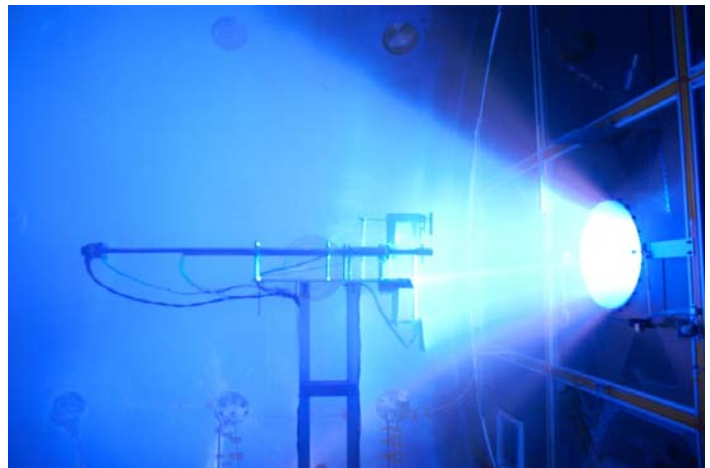
capsules, the Altair lunar landers, the lunar rovers, etc.), I was all ears at this VASIMR® presentation, listening for comments about how soon this might help NASA send people to Mars in 39 days instead of 6 months or longer. Dr. Longmier stated, "...you can think about nuclear reactors to power megawatt flavors of VASIMR®, getting people to Mars in a much shorter amount of time than you can with a Hohmann transfer." That was about 20 minutes and 56 seconds (20:56) into the audio file. After his lec-

ture, during the question and answer session (at 1:01:49), I asked him about that. His reply was as follows: "Given a healthy base of NASA funded research and development, we think that VASIMR® will be ready to deliver cargo-based spacecraft to Mars in this decade and eventually humans within the 2020-2030 timeframe. Right now, NASA is standing at a cross roads in terms of future goals and destinations. If NASA decides to fund advanced propulsion at a high level, technologies like VA-

(Continued on page 11)

Below, left: Employees of Ad Astra Rocket Company in Houston in front of the vacuum chamber.

Below, right: Plasma exhaust from the VX-200 firing at full power during and experiment campaign in 2009.



(Continued from page 10)

SIMR® promise to enhance our space faring capabilities and will change the way we think about exploration in our neighborhood. The solar system will be at our disposal.

“We need two things to get people to Mars, a good rocket and a good power source. We need megawatts of power, and we need a rocket capable of processing that fuel and power. Neither exist now.”

Dr. Longmier and Dr. Leonard Cassady spoke about VASIMR® at our section's Annual Technical Symposium (ATS 2010) on Friday, April 30, at NASA/JSC, and our plans include putting charts from all of our 41 technical presentations on our web site at www.aiaa-houston.org.

Slide 8 from this VASIMR® presentation at UHCL states, “We believe that very soon there will be a market requiring thrusters that use 200 kW to 20 MW of power and that VASIMR® is best suited to fill that market.” And slide 61 shows Technology Readiness Level plotted against calendar years, penciling in late 2010 for testing on The International Space Station (ISS) with the VASIMR® VX-200 engine, and 2014 for commercial operations. Wikipedia states, “Ad Astra Rocket Company developed the VX-200, a full-scale prototype of the VASIMR® engine intended for ground

testing. The company successfully tested the prototype in September 2009. Following the test, the company will begin preparations for the VF-200-1, the first flight unit. Ad Astra hopes to send the VF-200-1 into space by late 2012. The VASIMR® technology could be useful in the near future for interplanetary space travel. The VASIMR® design would be capable of reducing the trip to Mars to less than four months, whereas current chemical rockets take around eight months. A nuclear-powered VASIMR® engine could further shorten the trip to under six weeks, while smaller scale solar powered engines could tug satellites through different orbits and deliver loads to the Moon, asteroids, and even Phobos and Deimos.”

From Ad Astra Rocket Company's web site, “Human Transportation to Mars: For humans to travel safely to Mars and beyond, it will be important to make the trip as quickly as possible and thereby reduce the crew's exposure to weightlessness and space radiation. With today's chemical rockets, a round-trip mission to Mars would take over two years, with much of that time spent waiting for the right planetary alignment to return. More rapid transit is possible with a VASIMR® propulsion system powered by a nuclear-electric generator. A 12 MegaWatt



VASIMR®-powered craft could reach Mars in less than four months. A 200 MegaWatt ship could make the trip in as few as 39 days.”

It is a nice surprise to find the US branch and headquarters of this American company in our Houston Clear Lake area, where they now have an immense vacuum chamber. The subsidiary is in Costa Rica, birthplace of the VASIMR® inventor, Dr. Franklin R. Chang Díaz, former NASA space shuttle astronaut (veteran of seven Space Shuttle missions) and founder of Ad Astra Rocket Company. There are exciting and plausible mission concepts in these presentation charts, including a lunar tug (low Earth orbit and low lunar orbit and back), working to eliminate some orbital debris problems, ISS reboost, and interplanetary missions.

Above: La Flor Campus, 7,000 square feet, in Liberia, Costa Rica.

Below: Ad Astra Rocket Company in Houston Texas USA



History

One More Story About Our Late Former Section Chair Mr. Algranti

ANONYMOUS, EDITED BY DOUGLAS YAZELL, ASSISTANT EDITOR

Below: NASA's super guppy at Ellington Field, Saturday, May 8, 2010, a donation years ago from the European Space Agency (ESA) as part of its participation in the International Space Station (ISS) program. Thanks to the second annual Aeros & Autos at Ellington Airport for this photo opportunity. For more information, see www.fly2houston.com. (Image credit: Douglas Yazell)

Mr. Albert Jowid was the NASA engineer who served as Spacecraft Manager for Lunar Module 5 — the first LM to land on the Moon — on the Apollo 11 Mission. After the Apollo Program, he was transferred to the Johnson Space Center (JSC) Space Shuttle Office. There he was assigned the responsibility for coordinating the design, development, and delivery of crew mock-ups and trainers for the Orbiter Project Office. He worked directly with the Crew Systems people to understand their needs and had direct access to Rockwell International to meet these needs. A major training article was the mockup of the Orbiter's forward fuselage, which had great safety implications re-

lated to egress in case of emergency and access to various equipment in the upper and lower decks. The design depended on crew inputs, and crew inputs depended on having the forward fuselage trainer available to create those inputs, a bootstrap operation. Since the crew and crew systems people had nothing to work with, the result was a continued delay in design and a monstrous delay in delivery. It was decided by management that the crew would have access, as it was being updated with crew-initiated design changes. Albert (Al) Jowid asked Rockwell International to deliver the trainer as soon as possible. He was advised that it was so large it could not be shipped over-

land and shipping via the Panama Canal was going to take at least 8 to 10 weeks. They proposed cutting the trainer into several pieces for land transport, but it would cost a lot more and cause about the same delay in delivery, and then it would still have to be reconstructed at JSC.

Al was keeping me informed, and I happened to be in California when I passed Van Nuys airport and saw the guppy we had been using on Project Apollo on the tarmac — engines missing of course. I called Al and asked him to get with Rockwell to see if the guppy could carry the trainer and, if so, hire it for the delivery. Al found out it would do the job, but the cost was about \$600,000. When he told me, I asked him to get a meeting going with the crew training personnel, some crew members, Rockwell personnel, and NASA procurement people and buy the thing. It couldn't cost that much, and he had a lot of mock-ups and trainers to deliver. He did that, and I was advised later that it was now a NASA guppy.

Mr. Joe Algranti (Editor's note: The late Mr. Algranti was once Chair of AIAA Houston Section, as reported in a recent issue's cover story.) was head of the JSC Aviation Department and he called me the following Monday morning (I also got Al in my office to listen) to say he was upset that the Orbiter Project Office had the gall to buy an airplane and

(Continued on page 13)



(Continued from page 12)

put it in his stable to have him train pilots, maintenance people, and buy the gas, spare parts, etc., without consulting him. Al and I listened. After his ranting ended, I just said that when we were through with it, he could sell it. We heard no more, but he subsequently put the plane to good use when the Challenger accident happened; he had the only large cargo vehicle to help Marshall Space Flight Center move large objects for the subsequent investigation.

The guppy was retired to Biggs Air Force base because of potential problems with wing fatigue from flying large cargo all its life. Recently, I've seen a new, bigger guppy flying over my home. I guess that JSC finally noted that a large cargo lift vehicle is a prime requirement for the new space vehicle program.



Left: Test pilot Stuart Present ejects safely from crashing Lunar Landing Training Vehicle (LLTV) (NASA), 29 January, 1971. (Editor's note: only two other pilots ejected from these rather dangerous training vehicles, both safely, Neil Armstrong and Joe Algranti.) (Image Credit: NASA)

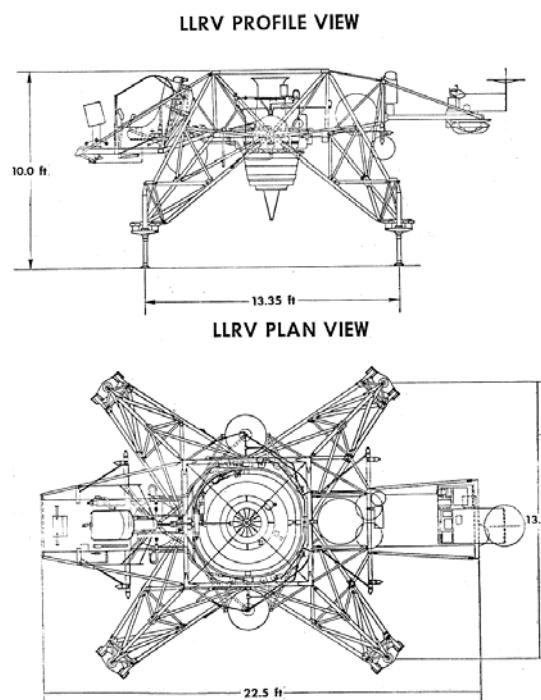
Below, left: The 100th flight group photo. It is possible that Mr. Algranti is in this photograph with his coworkers. Image credit: NASA

Below, right: The Lunar Landing Research Vehicle (LLRV) (Image credit: NASA)



NASA Dryden Flight Research Center Photo Collection
<http://www.dfrc.nasa.gov/gallery/photo/index.html>
 NASA Photo: E-14754 Date: 1 Apr 1966

Lunar Landing Research Vehicle (LLRV) 100th flight group photo



ATS2010

AIAA Houston Annual Technical Symposium 2010

STEVEN EVERETT, EDITOR



Above: AIAA Annual Technical Symposium 2010 chair Satya Pilla with the morning's keynote speaker Myron Diftler. (Image credit: Douglas Yazell)

Below: Robonaut 2, exhibiting its improved grip and arm strength. (Image credit: NASA)



status and future of that project. Robonaut was conceived to offload the crews' extra-vehicular activities (EVAs) by acting as an assistant in setting up before and tearing down after a task, providing a quicker response by eliminating the extended preparation which would be necessary for a human astronaut, and serving as a surrogate on other worlds. The robot has been designed and built in cooperation with General Electric (GE), who expects that a humanoid robot could provide automation of nontraditional and ergonomically difficult tasks and work alongside humans more comfortably. The current incarnation, Robonaut 2, has been able to improve on the original Robonaut 1 by incorporating expanded ability and dexterity with a slightly smaller frame. Several videos were presented illustrating Robonaut's grasping ability and dexterous fingers, which have friction grip surfaces and, reputedly, the world's smallest load cells on each phalange. The stiffness of the fingers, hands and arms can also be actively controlled. While Robonaut's strength does not exceed a human's, its endurance at human strength levels does. A video was shown of Robonaut lifting a twenty pound weight at arm's length — a task which usually proved difficult for visitors to the lab. The friction inherent in the finger joints was also used to maintain a stronger grip than the actuators would otherwise have been capable of. The

range of the workspace provided by the mounting of the arms and the additional neck joint was also illustrated. Visual sensors — as well as those using laser range finders and structured lighting — have been incorporated into the head. Since the robot was intended to work alongside humans and to do human tasks, it has been built roughly human size and several levels of force-limiting incorporated in case of unintended contact. The controller for Robonaut is based on a simple graphical user interface (GUI) with reusable skills that can be built up to accomplish a desired task. Plans exist to send Robonaut to the International Space Station (ISS) to work internally, for the time being. During this time, its responses to weightlessness and the electromagnetic and radiation environment will be tested at a task board. Among the questions were those about the levels of autonomy available to Robonaut, its power source, and its weight and restraint to be used during launch. While Project M, a recently publicized plan to send Robonaut to the Moon, was mentioned by one audience member, Ron pointed out that this was unofficial and no definite plans currently existed. Satya concluded the morning's session by presenting Dr. Diftler with a 40th Anniversary of Apollo commemorative coin.

After the morning's parallel sessions on topics such as astrodynamics and

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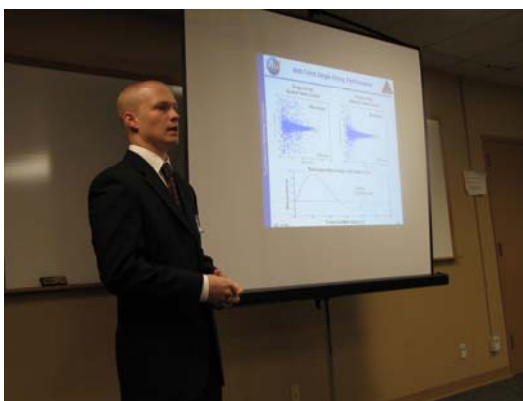
the Constellation program, Michael Coats presented his view of the “State of the Johnson Space Center” to an expanded crowd of about 60. He summarized his vision of the future of JSC by reminding the audience that “Houston” was the first word spoken from the Moon and could be the first word spoken from Mars as well if JSC can retain and develop its existing technical expertise. He believes the world still sees the US as a leader in space flight, and it is due to the amazing teams assembled at JSC that the next 50 years of advances in space flight can surpass the first 50. Director Coats first reviewed the current events at JSC,

including preparation for the last few shuttle flights, first year of full occupancy of the International Space Station, and the progress on the Constellation project (whose cancellation, he pointed out, has not yet been approved by Congress.) Next, he summarized the current direction for JSC and NASA over the next year. Unexpectedly, a restructuring of the Orion capsule as an “Orion Light” crew rescue vehicle was proposed in the President’s April address at KSC, and operation of the ISS will be extended to 2020. While there has been an increase in the proposed budget for NASA of \$6 billion over the next five years, the lack of clarity in NASA’s direction will undoubtedly impact



jobs in this area. He pointed out that the proposed budget, for which the process of approval has just begun, is intended to support development of human exploration beyond low earth orbit (LEO) at NASA as well as the commercial sector, which may well not be ready as soon as hoped. JSC manages \$5 billion per year, half of which is spent in the

Above: Johnson Space Center (JSC) director Mike Coats delivering the afternoon’s lecture “The State of JSC.” (Image credit: Douglas Yazell)



Above: The lunch crowd gathers after listening to speakers such as Mark Jackson (top), Terry Hill (left), and Mark Kane (right). (Image credits: Steve Everett)



Above: Bill Bluethman describes the lunar rovers as they traverse the Gilruth Recreation Center grounds. (Image credits: Steve Everett)

(Continued from page 15)
Houston area on the approximately 16,000-member workforce. The primary challenge in the near future, he stated, was continuing to fly out the shuttle safely while maintaining the talent pool during the upcoming transition. He stressed that aggressive plans are being formulated to get new contracts in place to minimize job losses as the previous contracts end. Director Coats closed by reviewing the ongoing teamwork, innovation, and knowledge capture initiatives, as well as the environmental and educational projects at JSC.

After his formal comments ended, he responded to a question about JSC a year from now, and stressed that he believed Constellation would be restructured rather than terminated. He said that a continuing resolution by Congress would unfortunately prohibit spending of any of the new money proposed but that permission would have to be granted to continue Constellation. He finally reiterated that the major challenge over the next year would be in getting new contracts rolled out to spend the existing funding, and that potentially 6000 contractor jobs could be lost if those contracts are not in place soon. While JSC is staying busy trying to figure out how to respond to the new directives and formulating a preliminary 2012 budget, aggressive acquisition strategies such as direct procurement, augmenting funding to existing contracts and establishment of Space Act Agreements are also being developed to retain technical skills. The talk concluded with a presentation of an Apollo 40th anniversary commemorative

coin by conference chair Pilla.

After a brief drawing for door prizes, during which a commemorative coin was won by AIAA member Tom Anderson, the group temporarily gathered outside the Gilruth building for the highlight of the day. Two of the prototype lunar rovers were present for a discussion by Bill Bluethman and a twenty minute drive around the grounds. Their capability for kneeling down on their six-wheel base for close inspection of the ground by the crew, as well as their speed and coordinated movements were demonstrated. The sun shield which covered the "suit-lock" on the rear deck of the vehicle was also opened and closed.

After the demonstration, another successful ATS ended with the afternoon series of sessions on topics such as space suit architecture, nanotechnology, and vision navigation. For those interested, presentations will be available on the AIAA Houston website at <http://aiaa-houston.org> in the near future.

Patches for the Last Three Space Shuttle Flights

Patches & Portraits

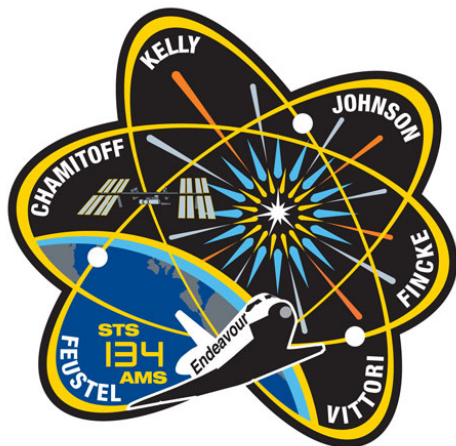
DOUGLAS YAZELL, ASSISTANT EDITOR

Atlantis, Discovery, then Endeavour. For now, that's the order to be used for the last three flights of the space shuttle program, first launched on April 12, 1981. Those three orbiters are the current space shuttle fleet.

STS-132 has already launched and landed with Atlantis, and Atlantis will be standing by on a launch pad during the next two launches in case a rescue at the International Space Station (ISS) is needed. It's possible that Atlantis will then be used for one final space shuttle mission after STS-134.

This led to the related ISS Expedition patches, for example, Expeditions 23, 24, 25, and 26. Sometimes we get a preview of those patches at <http://www.collectSPACE.com>. That led to Wikipedia for patches for flights such as Soyuz TMA-17, 18, etc., taking astronaut and cosmonaut crews to and from ISS.

That brings us back to the subject of this article, the excellent artwork available for patches, lapel pins, etc., for these three historic space shuttle missions.



Left: STS134-S-001 (March 2010) --- The design of the STS-134 crew patch highlights research on the International Space Station (ISS) focusing on the fundamental physics of the universe. On this mission, the crew of Space Shuttle Endeavour will install a cosmic particle detector called the Alpha Magnetic Spectrometer (AMS) experiment. By using it to study sub-atomic particles in the background cosmic radiation and searching for antimatter and dark matter, scientists will better understand the evolution and properties of our universe. The shape of the patch is inspired by the international atomic symbol, and represents the atom with orbiting electrons around the nucleus. The burst near the center refers to the big-bang theory and the origin of the universe. The Space Shuttle Endeavour and ISS fly together into the sunrise over the limb of Earth, representing the dawn of a new age, understanding the nature of the universe.



Left: STS133-S-001 (June 2010) ---- The STS-133 mission patch is based upon sketches from the late artist Robert McCall; they were the final creations of his long and prodigious career. In the foreground, a solitary orbiter ascends into a dark blue sky above a roiling fiery plume. A spray of stars surrounds the orbiter and a top lit crescent forms the background behind the ascent. The mission number, STS-133, is emblazoned on the patch center, and crewmembers'

names are listed on a sky-blue border around the scene. The Shuttle Discovery is depicted ascending on a plume of flame as if it is just beginning a mission. However it is just the orbiter, without boosters or an external tank, as it would be at mission's end. This is to signify Discovery's completion of its operational life and the beginning of its new role as a symbol of NASA's and the nation's proud legacy in human spaceflight.

(Photo credits: NASA, <http://spaceflight.nasa.gov>)



Left: STS132-S-001 (February 2010) The STS-132 mission will be the 32nd flight of the space shuttle Atlantis. The primary STS-132 mission objective is to deliver the Russian-made MRM-1 (Mini Research Module) to the International Space Station (ISS). Atlantis will also deliver a new communications antenna and a new set of batteries for one of the ISS solar arrays. The STS-132 mission patch features Atlantis flying off into the sunset as the end of the Space Shuttle Program approaches. However the sun is also heralding the promise of a new day as it rises for the first time on a new ISS module, the MRM-1, which is also named "Rassvet," the Russian word for dawn.

International

Shanghai Expo 2010

SHEN GE

The World Expo — occurring once every four years in a host city somewhere around the world — showcases not only technology from companies around the world but also that of the host country. This year, the Expo lasts from May 1 to October 31 along the banks of the Huangpu River in Shanghai, China. The theme of the exposition is “Better City – Better Life” and indicates Shanghai’s status as a world city. The Shanghai Expo is the most expensive Expo in the history of world fairs as well as covering the largest area.

More than 190 countries and 50 international organizations have set up booths at the fair. The 100 million visitors will make it the most visited fair in history. Much of the domestic exhibits focus on technology, including that of aerospace technology. The Chinese Aerospace Science & Technology Corporation,

the China Aerospace Science & Industry Corporation, and the China Electronics Technology Group Corporation have spent several years constructing the permanent building.

The Space Pavilion residing in Shanghai Expo’s Puxi district D not only shows mankind’s future dreams and cutting edge technology, but also exemplifies how aerospace technology can aid humanity. There have been over 500,000 people that have visited the pavilion so far, and many are kids who very well may become the next generation of space enthusiasts. The pavilion vice-director Xinqi Ma, recently interviewed by Shanghai Expo TV, had many exciting things to note about the exhibitions.

A definite interest grabber in the pavilion is the mockup of a lunar rover that actually moves around on a mock lunar surface. The next

Chinese lunar mission is planned to progress according to *rao* (circle around the Moon), *luo* (land on the surface), and *hui* (return to Earth). The mockup is an actual representation of the Chinese lunar mission’s second step. To do this, the heavy launch vehicle Changzhen V needs to be completed. In the pavilion, there are monitors showing a video modeling the entire launch process of the Changzhen V and its ensuing trajectory.

The 3D theater in the pavilion showcases the 3D movies *Wanhufaitian* (Wan Hu Flies) and *Taikongxia* (The Outer Space Paladin). The former film shows the past while the latter film shows the present. As the reader may already know, Wan Hu was the first man in history to use rockets as a mode of transportation. He strapped 47 rockets to his

(Continued on page 19)

Editor's note:

Shen Ge is a student of aerospace engineering at Texas A&M University. He is helping Marlo Graves with the work of our Chinese sister sections. The sister section work in Shanghai is well documented since its beginning in 1987. Marlo has recently been working with them and new sister section initiatives in Beijing. Shen Ge's name will soon appear with Marlo's on our web site at <http://www.aiaa-houston.org> (technical committees, International Space Activities Committee, or ISAC, whose Chair is Ludmila Dmitriev-Odier)

Right: Artist's rendition of the exterior of the space pavilion. Resembling a floating cube, the surface is supposed to resemble that of outer space. (Image credit: Shanghai Municipal Tourism Administration)



(Continued from page 18)

chair while he held two giant kites in his hands for steering. Records say that after all 47 were lit, he disappeared into the sky. Whether he suffered an unfortunate mishap or “ascended to heaven,” as he hoped is open to speculation. The second movie shows the trials and ultimate triumphs of the Chinese taikonauts who enabled China to become the 3rd nation in the world to achieve human spaceflight and space walks. The future of China’s manned space program including the planned Chinese space stations in the next decade is also shown. Both highly-praised films were designed by the Chinese Electric Science Institute.

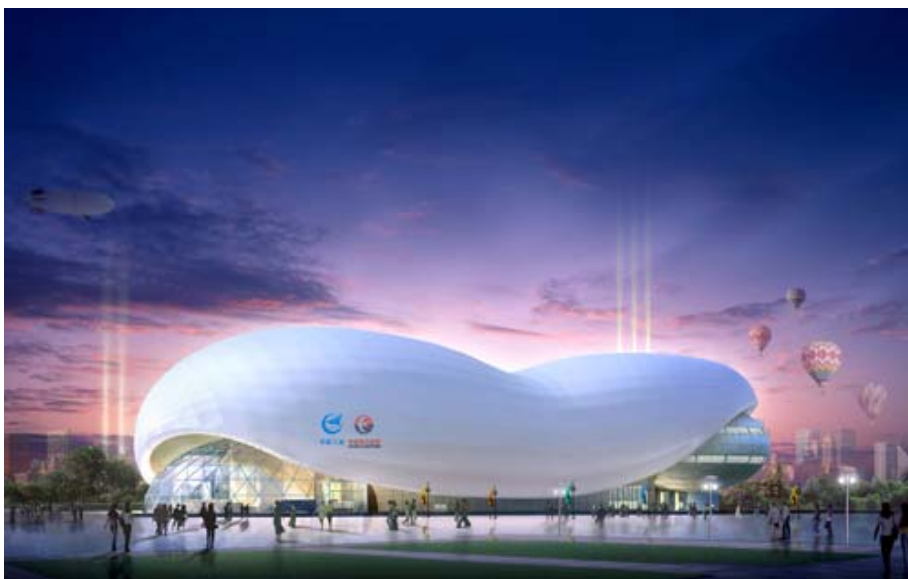
Another cool thing is the store where visitors can see flowers grown in space. For instance, the Shanghai City flower, *baiyulan* (white magnolia), grew at least twice the size of its terrestrial counterparts. They can also buy seeds of hot peppers, pumpkins, etc. that have been placed in space. The pavilion doesn’t guarantee giant plants resulting from planting the “space seeds” though.



Left: Illustration of Wan Hu's rocket (source: Evidence of Wan Hu Rocket)

Another domestic exhibition to note is the Aviation Pavilion constructed by the China Aviation Industry Corporation and China Eastern Airlines. The 4000-square-meter pavilion looks like a white cloud and is supposed to give visitors the feeling of “flying in the sky.” Inside, the main attraction is on the second floor where visitors can ride the 4D Ride Show System, where trackless ride vehicles combined with 3D video of nine amazing scenes and environmental multimedia like sound, liquid, water, electricity, fog, and pressure gives visitors the feeling of soaring into the air.

Below: Aviation Pavilion, constructed by the China Aviation Industry Corporation and China Eastern Airlines. (Image credit: Shanghai Municipal Tourism Administration)



3AF TMP

Art and Science: Voyage in the Solar System

MARC RIEUGNIE, 3AF TMP, MEMBER OF OUR FRENCH SISTER SECTION

Well before becoming an aerospace engineer, I was an amateur astronomer. At the time when Viking and Voyager were transmitting their first detailed images, I had learned

to see small details on their surfaces with my little 4.5" diameter telescope. Astronomers were relying on specialized commissioned work by amateur astronomer societies

for long-term monitoring of the changes on planetary surfaces. This was done by film-based photography, a technique mastered by few people and heavily limited by terrestrial atmosphere disturbances ("seeing") and film sensitivity. This was also done by sketching, which was more affordable and gave better results. So I learned to record the details of Mars and Jupiter on a drawing board, through our bubbling atmosphere. Later I had better instruments, up to a 16" telescope. So I was a privileged witness and a constant sketcher of the planets. This situation lasted until about 1995, when the CCD sensors, and then the webcams, took the advantage over the human eye for planet observing.

Instead of throwing myself in a technological race in order to master these new technologies, I instead chose to give a new artistic dimension to my passion for planetary astronomy. I had the idea to create an original interior decoration, by a few paintings of my favorite planet, Jupiter, as seen from the surface of its main satellites. So in 2003, I made four acrylic canvases measuring 100cm x 80cm, based upon the best Galileo high-resolution images to determine the look of the satellite's surface. Having made a round trip in the Jovian system, I decided that I should not stop here, and I went to the other moons of the solar system. Everywhere there were images as seen from above, accurate enough to permit me to make a drawing as seen from below. I impatiently waited for images of Saturn's satellites taken by



Top: Jupiter seen from Io
Right: Saturn seen from Rhea
(Image credits: Marc Rieugnie)



3AF TMP

Cassini. I looked for Voyager 2's best images of Uranus and Neptune satellites. I gradually improved my skill, rigorously computing planet shadows and phases, and carefully studying the terrain observed by the space probes. Sometimes, I did not hesitate to remake a painting that I did not find satisfactory (three to four months of work). So, year after year, my exhibition "Lunes d'Ici et d'Ail-

leurs" (Moons from Here and Elsewhere), in 15 frames, was born. It was ready just in time for the International Year of Astronomy (2009), and I took this opportunity to propose it to the "Cité de l'Espace" in Toulouse.

Since then, I go on traveling in the solar system, landing everywhere the space probes could make a low enough flyby. Recently, I even

dived into the clouds of Jupiter, and then of Saturn, discovering its majestic ring arch above its yellowish haze. Perhaps I will come back there, but there are many more places to visit, and the probes launched recently promise us even more...



Above: Mars seen from Deimos
Left: the exhibition room in the Cité de l'Espace in Toulouse
(Image credits: Marc Rieugnie)

Staying Informed:

Be sure to visit <http://www.enjoyspace.com>, "Enjoy Space, your new space news web site". Its opening page currently contains the editor's blog which includes an article about Horizons and our French sister section work with 3AF TMP, including a link to our latest issue. (This blog also contains the STS-134 Star Trek-inspired poster.)



3AF TMP

The Late Guenter Wendt, Pad Leader at the Cape

LAURENT MANGANE, 3AF TMP, MEMBER OF OUR FRENCH SISTER SECTION



(Image credits: NASA)

Guenter Wendt (August 28, 1923—May 3, 2010)

His presence had become synonymous with security for all of the NASA astronauts headed to space. Guenter Wendt, the “Pad Leader” of the Mercury, Gemini, then Apollo missions and of the Space Shuttle missions is no longer since the third day in May. To understand his impact on the beginnings of space exploration, we must recall the scene related to us in the book by Jim Lovell, “Lost Moon,” and retold in the film, “Apollo 13,” adapted from the book by Ron Howard. Tom Hanks, who

plays the role of the Commander of Apollo 13, is in a white room, the launch ante-chamber, where the astronauts are dressed and where all is controlled on their vehicle before the big departure. Then he speaks these words¹, “Aah, Guenter Wendt! I vonder vere Guenter went?,” which merely reflects a simple play on words or some harmless teasing about Mr. Wendt’s pronounced German accent. In fact, Guenter Wendt was probably right there by his side because, seemingly since forever, his presence, exuding seriousness and professionalism, reassured those who were going to take the risk to close themselves in a tight-fitting capsule to launch themselves into space on top of a giant rocket. Gordon Cooper (Mercury 9 & Gemini 5) wrote of Mr. Wendt, “Guenter was always a welcome sight in the white room. He was the very essence of integrity and reliability and gave us a terrific boost in confidence on every launch.”

Contrary to other Germans who worked during this era for NASA, Mr. Wendt had not arrived via Operation Paperclip, which led to recuperating Werner von Braun and part of his team to perfect intercontinental nuclear missiles. Mr. Wendt also, after having studied at The Technical University of Berlin, was an apprentice in aeronautical construction when the war broke out. He was thus used as a navigation mechanic and radar operator for the Luftwaffe night bombers. At the end of the conflict, without

employment and in a devastated Germany falling prey to unemployment and misery, he decided in 1949 to rejoin his father in the United States. Initially, the only employment he found in the US was as a mechanic for heavyweight trucks because of restrictions imposed on foreigners in aerospace industries. Once he acquired his American citizenship in 1955 (he changed his first name at that time from Günter to Guenter F.), his mechanical engineering diploma allowed him to be hired immediately by McDonnell to work on tests and preparations for Mercury and Gemini launches. In this role, he quickly became a kind of mascot which the astronauts saw as a good luck charm. In fact, his functions conferred upon him the heavy responsibility of supervising the last operations on the space vehicle before their launch. He had developed the habit of leaning over toward the astronauts in their capsules to pull their belts tight one last time before closing the airlock, not without shaking hands and wishing them good luck. His appearance — with heavily framed eyeglasses and a bow tie — gave him an air of formality and reinforced a perfectionism which demanded respect. He became a legend. He initiated a ceremonial exchange of gadgets at the start of each mission as a means to reduce the tension with a gag.

As Guenter himself said, “There is no reason to say I am narrow-minded. Just do it my way and you will have no prob-

(Continued on page 23)

¹To re-establish the real history, these were not originally the words of Jim Lovell on Apollo 13, but of Don Eisele, Lunar Module Pilot of Apollo 7.

3AF TMP

(Continued from page 22)

lem at all.” Even the loudest among the astronaut corps respected that. They tell a story in which a strong-willed individual insisted on carrying out a vehicle change with or without Mr. Wendt’s authorization: Guenter called a security agent to drag him out. Because of these inflexible and dictatorial qualities, John Glenn (Mercury 6 and STS-95) gave Mr. Wendt a nickname which alluded to his German past, “The Fuhrer of the Launch Pad,” which stuck with Mr. Wendt all of his career. Another famous astronaut, Pete Conrad (Gemini 5 & 11, Apollo 12 & Skylab 2) spoke of Mr. Wendt in these terms, “It’s easy to get along with Guenter. All you have to do is agree with him.”

McDonnell was not retained for the Apollo Program, NASA preferring North American Aviation (NAA, later N.A. Rockwell). Mr. Wendt was reassigned in January of 1967 to the test installations in Titusville, Florida, where he learned of the tragic accident of Apollo 1. “I remember the sudden weight I felt in my shoulders. I slumped down in my chair as if I weighted a thousand pounds.



Left: Guenter Wendt supervising altitude tests for Apollo 11.

It seemed the blackest moment of my entire life, and I cried at their loss.”

Many say that if Mr.

Wendt had been there, none of that would have happened. It is for that reason that at the insistent request of Walter Schirra (Mercury 8, Gemini 6A, Apollo 7), who we see beside Mr. Wendt in this photo from December of 1965, the chief of the astronaut corps, Deke Slayton, then asked NASA to offer once again to Guenter the opportunity to work at Kennedy Space Center as “Pad Leader” for the Apollo missions. Humble in the face of this tragedy, Guenter said several years later, “...maybe it was meant for me not to be there because I would have taken it very hard.” However, he demanded to have 100% control of the white room, as had been the case

(Continued on page 24)



(Continued from page 23)

during his prior position with Mercury-Gemini. Methodical and meticulous, his first task was to implement the necessary changes to recreate the security of the launch pad and to redefine all procedures in order to ensure that such a tragedy would never happen again.

After the decision to put an end to the Apollo Program, Guenter collaborated one last time as “Pad Leader” for Apollo-Soyuz and then Skylab missions, conceived to utilize the Saturn rockets already fabricated for the missions until Apollo 20.

That led to him being reassigned to the Space Shuttle Program, which was just starting up its preliminary study phase. In 1977, he was there in charge of crew safety during the approach and landing tests, then during all of the following Space Shuttle flights. He was one of the few, the most famous of which was Roger Boisjoly, who warned of the risks taken at the time of the tragic Challenger launch (STS-51). As a member of the Rogers Committee investigation, he retired in 1989, only a few months after the Space Shuttle Return to Flight, concluding — like many others —

that the implemented changes to the managerial structure of NASA were not deep enough. (The Columbia accident proved him right once again, sadly.)

Thereafter, he became a consultant for films and TV shows, while keeping close ties with astronauts from the prior epoch. Jim Lovell notably hired him as technical advisor for the series, “From the Earth to the Moon,” in which he even made a brief cameo appearance.

One of the last notable events marking his life took place in 1999, his participation in recovery operations for the Liberty Bell 7 capsule, which, we recall, sank on July 21, 1961, at the end of Gus Grissom’s Mercury 4 suborbital mission. Seated opposite the recovered capsule on the bridge of the ship, he approached it saying, “Let me go ahead and touch it after 38 years.” His last public appearance was at a conference organized at The Kansas Cosmosphere and Space Center in Hutchinson, Kansas, on the occasion of the 40th anniversary of Apollo 13. NASA’s highest honor for the success of a life dedicated to spaceflight safety was given to him last year as part of the commemoration of 40 years of “Man on the Moon.”

With the disappearance of Guenter Wendt at age 86,

we leave one of the last incarnations of courage too often relegated to the background today: rigor in the service of spaceflight safety. He will lie from now on at the side of his spouse, who passed away before him, leaving behind 3 daughters, 5 grandchildren, a great-grandson, and a great-great-grandson. Neil Armstrong, at the time of the departure of Apollo 11, also received one of those ceremonial gag gifts from Mr. Wendt, a crescent Moon in polystyrene representing the keys to the city on the Moon. Mr. Armstrong must now be thinking that Guenter will finally be able to use what Neil gave to him in exchange: a space taxi ticket good for any planet.

Laurent Mangane, National Technical Committee for l’Association Aeronautique et Astronautique de France (3AF), “Exploration and Observation of Space”



Left: Preparing with the Apollo 13 crew. Apollo 13 lunar module pilot Fred Haise chats with Guenter Wendt and other members of the pad closeout crew in the White Room following a countdown demonstration at Launch Complex 39A. Image Credit: NASA

(Editor’s notes: The late Pad Leader Guenter Wendt’s web site: <http://www.collectspace.com/padleader/home.html> was found via Wikipedia. Mr. Haise is currently a Houston area resident.)

Yuri's Night Houston 2010

DOUGLAS YAZELL, ASSISTANT EDITOR, WITH MICHAEL FROSTAD

Yuri's Night

Yuri's Night is a world-wide celebration of the historic events of April 12, 1961 and 1981, the launches into Earth orbit of Yuri Gagarin and Space Shuttle flight STS-1 (John Young and Bob Crippen), respectively. Yuri's Night Houston began years ago, thanks to Houstonians active as members of The American Astronautical Society (AAS). In recent years, AIAA Houston Section has been described in various ways in taking on that role, making it an AIAA Houston Section event, or hosting (or co-hosting) Yuri's Night Houston, etc. It starts early in the morning with a 5 km fun run for charity, continues with Space Day for precollege students, and ends with an evening celebration reaching out to the public (usually out of our comfort zone in the Houston Clear Lake area near NASA and closer to Houston inside the 610 loop highway). It is celebrated with unique entertainment (some of it space-themed and NASA-related) and traditional events, including excellent live music. Here is some of Mike Frostad's post-event reporting from the web site:

"Wait, What Happened???"

"by mike on Jun.21, 2010, under Amazed, Awesome, Celebrate, Dream, Explore, Space Day Holy Cow!"

"It's been over two months already! I think Time is accelerating more and more. Anyway here's a drastically delayed synopsis of Yuri's Night Houston...Hope you've all been well and are using this Summer to find yourself under the Stars often. Enjoy!"

"April 10th, 2010 -

Yuri's Night Houston

"...setup for the nearly 200 racers...received a swanky running shirt with their package! ...Thanks...helped us raise nearly \$3000.00 for the Houston Museum of Natural Science: Challenger Learning Center!! (A branch of the Challenger Center for Space Science Education).

"The next event was Space Day at Discovery Green in downtown Houston! With it's friendly park atmosphere...Discovery Green is a great venue for Space Day but luckily the Sun powered through the clouds and soon the park was packed and our exhibits were engaging the crowds. ...Also out were AIAA Houston Section, a local High school robotics team, and a bunch of exhibits from NASA JSC! All of which intrigued the public and spurred great conversations. Finally we had the Society of Women Engineers (SWE)... out with Water Rockets! They were obviously the big hit of the event and were constantly launching...

"The final event from Yuri's Night Houston was the Celebration at the Hilton America's right next to Discovery Green. Before the evening got too far in, a short celebration of Yuri's Gagarin's flight occurred with Mr. Robert Pearlman of Collect-

(Image dredits, and for more information, start with

<http://>

www.yurisnighthouston.net)

Space.com... He Wow-ed us with stories for both Vostok-1 and STS-1 Columbia, sharing some of the inside stories he's discovered and showing us some real pieces of history...

"After the late night snack, the Spiney-Norman Texas retook the stage. Their energy and great instrumentation got the people on the dance floor and moving... for the third year in a row Jacobs Technology was able to sponsor a raffle for one lucky person to experience weightlessness on a Zero-G flight!"



Photography by Jason Tenenbaum

Lunch & Learn

SETI: James N. Benford, Ph.D.

DOUGLAS YAZELL, ASSISTANT EDITOR &

DR. ALBERT A. JACKSON, CHAIR, ASTRODYNAMICS TECHNICAL COMMITTEE

**How to Build Cost-Optimized Interstellar Beacons
(and How to Search for Them)**

Right: Dr. James Benford
(Image credit: Dr. Benford)



A video of Dr. Benford's lecture presented at the SETI Institute Colloquium series may be found on YouTube at <http://www.youtube.com/watch?v=te2IGSZOhT8>

Dr. James Benford delighted the audience of 20 or so attendees on Monday, April 26, 2010, at NASA/JSC Gilruth Center Longhorn Room. The subject related to the Search for Extra-Terrestrial Intelligence (SETI).

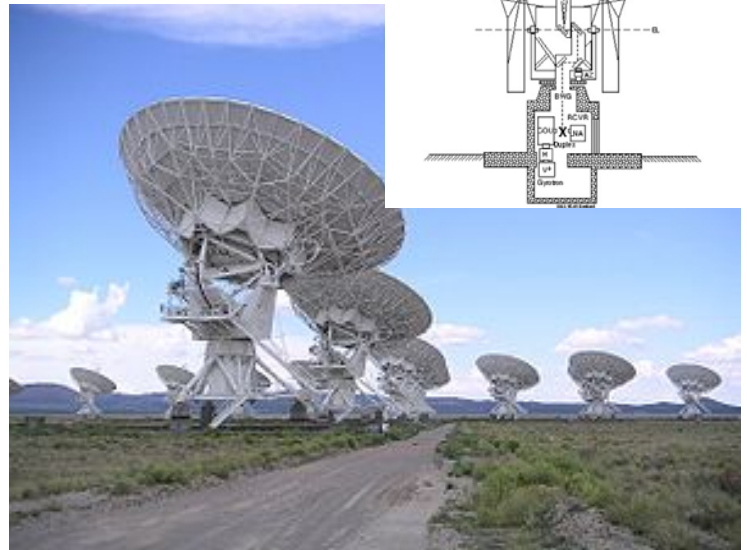
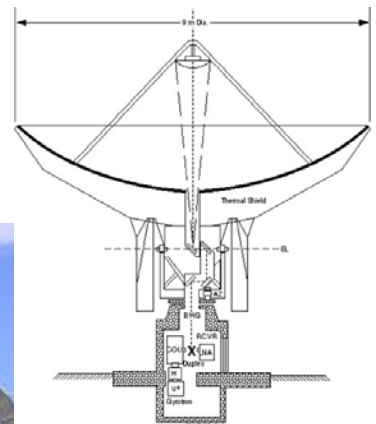
Dr. Benford is the older twin brother of a science fiction author, Gregory. Although they both earned Ph.D.'s in physics, James specialized in experimental physics, while Greg studied theoretical physics.

James Benford is President of Microwave Sciences, Inc. a contracting firm specialized in High Power Microwave (HPM) systems. Microwave Sciences provides expert services from conceptual designs to hardware, HPM effects testing and power beaming. His education includes a Ph.D. in Physics from the University of California, San Diego, and he has 135 scientific papers and has written 6 books on physics topics.

The evening's lecture focused on the question of what

SETI Beacon transmitters would be like if built by civilizations with a variety of motivations, but who cared about cost. If someone like us were to produce a Beacon, how should we look for it? High-power transmitters might be built for wide variety of motives other than two-way communication; Beacons built to be seen over thousands of light years are such. Altruistic Beacon builders will have to contend with other altruistic causes, just as humans do, so may select for economy of effort. Cost, spectral lines near 1 GHz and interstellar scintillation favor radiating frequencies substantially above the classic water hole. Therefore the transmission strategy for a distant, cost-conscious Beacon will be a rapid scan of the galactic plane, to cover the angular space. Such pulses will be infrequent

events for the receiver. Such Beacons built by distant advanced, wealthy societies will have very different characteristics from what SETI researchers seek. Future searches should pay special attention to areas along the galactic disk where SETI searches have seen coherent signals that have not recurred on the limited listening time intervals we have used. Observers will need to wait for recurring events that may arrive in intermittent bursts. Several new SETI search strategies emerge from these ideas. A new test for SETI Beacons, based on the Life Plane hypotheses was proposed.



Right: Very Large Array in New Mexico (Image credit: Hajor/Wikipedia)

Inset: Power beaming module (Image credit: Microwave Sciences, Inc.)

Astronauts at NEOs: Dan Adamo & Rob Landis

DOUGLAS YAZELL, ASSISTANT EDITOR &

DR. ALBERT A. JACKSON, CHAIR, ASTRODYNAMICS TECHNICAL COMMITTEE

Lunch & Learn

Exploring Near-Earth Objects (NEOs) with Human Crews and Robotic Systems

Rob Landis (NASA) and Dan Adamo (astrodynamics consultant) gave this briefing to the Mission Operations Directorate (MOD) at NASA/JSC (in the Bldg 30 auditorium) on Monday, June 7, 2010. The role of AIAA Houston Section was to help with publicity at the last minute, which worked well, with over 100 attendees.

Additional names on the first presentation slide are Paul Abell, Lee Graham, Tom Jones, and Tim Kennedy. More names are included on "The NEO Team" on the second slide.

Disclaimer (slide 6): "This was only a Phase 1 technical feasibility study. NASA has not endorsed this mission concept..." Phase 1: Feb. 2007...

Slide 7 mentions an early NEO exploration study paper by Eugene Smith (1966), as well as a few others up to 2005. Slide 8 shows some possible launch vehicles.

Slide 9 compares 3 asteroids to scale, and Mr. Landis said (not an exact quote), "(1) Ceres may contain more fresh water than Earth." Slide 10 shows 25143 Itokawa is much smaller than 433 Eros. Asteroids are numbered according to order of discovery. The diameter of Ceres is about 1000 km. Itokawa is longer than ISS, 540 m vs. 100 m.

Slide 13 reports that as of June 4, 2010, we have a count of 7081 Near Earth Objects (NEOs) and 1127 Potentially Hazardous Objects

(PHOs), and an improved NEO survey will likely find more than 50,000 NEOs (> 140 m) and more than 10,000 PHOs. Conclusion: before we target a date such as 2025 for asteroid exploration by astronauts, we must complete that survey.

Slide 15 shows small NEO impacts to Earth (2003-2005). Only about 8 are in the continental USA. One seems to be Houston, Texas. A quote from 2002, "U.S. early warning satellites detected a flash that indicated an energy release comparable to the Hiroshima burst... one of the largest we have ever seen...small asteroid... 5-10 m in diameter, on the Earth's atmosphere."

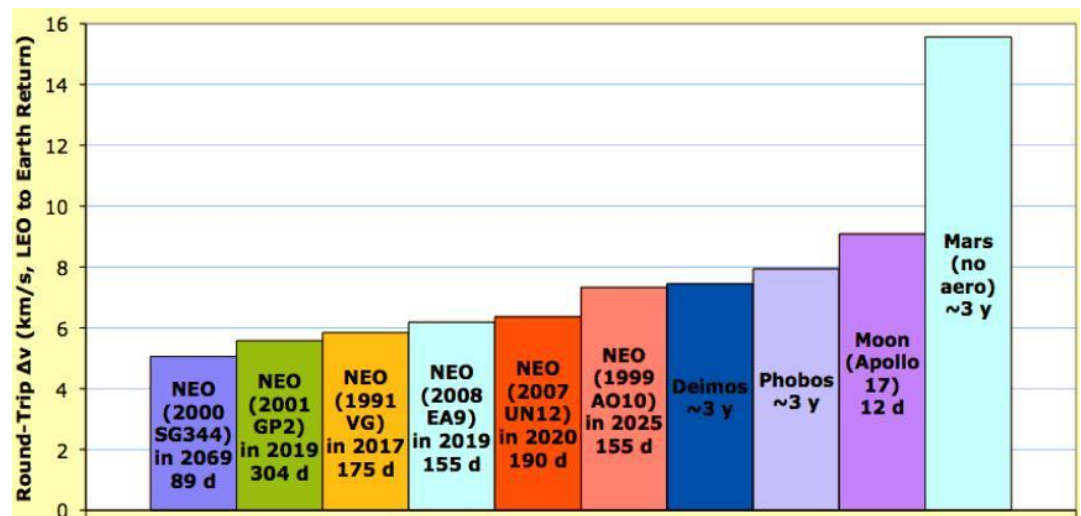
Slide 44: "Value of Human Exploration of NEOs. Expand human capability to

operate beyond LEO and the Earth-Moon system... physiological impacts outside Earth's magnetosphere and in the interplanetary environment... psychology of crew autonomy; ground/crew interactions at 7 to 10 sec One-Way Light Travel (OWLT) delay for deep space operations...resource potential for NEOs for exploration and commercial use... utilitarian nature of the Constellation Program."

Summary: "In general, mission delta-V can be reduced by longer mission duration... "Can we do it? Yes. And—more NEOs are being discovered all the time."

Look for presentation charts and other information at <http://www.aiaa-houston.org> soon.

Round Trip delta-V to Some "Nearby" Destinations NEO Stepping-Stones to Mars



From Caves to Space

JAMES C. MCLANE III

Apollo engineers imitate cave exploring equipment to make safety falling restraints.

Right.: 1968 photo of author Jim McLane holding Jumar rope ascender.

Below: Cave explorer climbing a rope out of Mexican pit Sotono De Las Huahuas. The photo shows part of the 482 foot drop into the first chamber. This is followed by a 502 foot free drop down into a lower room. (Photo credits: Greg Passmore).



deep pits had appeared and American cavers were in the forefront of this technology. The technique was based on descending and then climbing back out of the pit on a single length of 7/16" diameter nylon rope.

In the 1950s, the Swiss began to market a device that would enable roped-together mountain climbers to rescue themselves if they fell into a crevasse. These rope climbing clamps were called Jumar ascenders. They consisted of an aluminum handle enclosing a toothed-cam that would slide up a rope, but would not slide back downward. A climber could attach one of these clamps to each leg by a short tether and then basically walk up the hanging rope.

http://en.wikipedia.org/wiki/Ascender_%28climbing%29

Cavers usually descend pits by sitting in a harness and repelling down a single rope. The new Swiss Jumars became indispensable for climbing back up. Such

climbs could easily span hundreds of feet with the rope hanging completely free from the rock walls. The record for a Mexican pit is a 1,350 foot vertical drop! Descending and then climbing back out of a cave like that is a great adventure. Perhaps a couple of hours are needed to climb from bottom to top, all the while hanging from a single slim rope in the dark.

For a couple of months in the summer of 1968, the Space Environmental Simulation lab (SESL) in JSC's building 32 was the focus of America's efforts to place humans on the Moon. The lab's two largest test chambers, A and B, were designed to allow astronauts to live inside a functioning spacecraft under simulated deep space conditions of vacuum, heat and cold. Crews that were sealed inside the chambers would practice an entire mission to the Moon and back. The tests were risky; if there was an emergency, it

(Continued on page 29)

(Continued from page 28)

would take considerable time to repressurize the chambers back to sea level atmospheric conditions and evacuate the astronauts. During manned testing, a rescue team (man lock observers) always stood by, breathing pure oxygen in an airlock held at a partial vacuum so they could enter the main chamber and render assistance even before it was fully repressurized.

Chamber B was designed to test the Grumman-made Lunar Module (LM), the two-man vehicle that would land on the Moon. SESL received a flight-like production item — designated LTA-8 — directly off the assembly line. The testing of LTA-8 would be performed by astronaut Jim Irwin (later to be the eighth person to walk on the Moon) and Grumman test pilot Gerry Gibbons.

My father, James C. McLane Jr., was Chief of the Space Environment Test Division. He had ultimate authority over the lab and the success of the test program. He was especially concerned about one potential safety issue. The Apollo Space Suit, (even versions that had been modified to use breathing umbilicals instead of on-board oxygen) was very heavy. After all, it was designed to be worn in the low gravity of the Moon, so on earth it weighed six times more. When testing the LM inside Chamber B, the astronaut would have to ascend and descend stairs on the side of the Lander. If a crewman wearing the heavy and awkward backpack should lose his balance, he might fall off the stairs with disastrous results.

The 13.5 foot high stairway and associated equip-

ment were items of ground support equipment built by Grumman. A foldable slide could be deployed on top of the stairway to extract an incapacitated astronaut. The official report referenced at the end of this article states:

The stairway and platform that were used to provide access from the manlock door to the LTA-8 forward hatch are shown in figures 1 and 10. The I/E stand consisted of a stairway, handrails, restraint assemblies, a foldable slide assembly (for emergency egress), and the ingress platform.

This hardware was subjected to one of the stranger qualification tests ever performed at NASA. It needed to be shown that the equipment would work under the extremely cold temperatures experienced inside the Space Simulation chamber. There were worries that during a chamber emergency a heavy load of ice (from the fire suppression system) could form on the cold ladder and the escape slide might not unfold properly.

An open-top wooden tank the size of a small room was constructed on a concrete apron outside Building 32. The tank was filled with hundreds of gallons of liquid nitrogen. The stairs were immersed in the cryogenic liquid, removed when cold, and the folding mechanism was evaluated. A test safety officer insured that no one stood downwind as the nitrogen gas boiled off the huge vat. This unusual sight drew a lot of attention. No one had ever looked down into hundreds of gallons of -320 degree F liq-

uid nitrogen.

My father was familiar with the Jumar Ascender rope clamps that I used to climb out of caves. He thought that a safety device for the manned LTA-8 tests might be based on this same principle. He took one of my Jumar clamps to Grumman, and their engineers designed rail camps based on the same concept. These hand-operated mechanisms would slide up and down a slim steel tube rail mounted beside the stairway. Inside the housing, a lever was attached to a spring loaded, serrated cam. If the astronaut were to begin to fall, the clamp would instantly grab the tube and hold him securely on the ladder. There were clamps on either side of the crewman and he would slide them up (or down) as he ascended (or

(Continued on page 30)



Above: Jumar ascender (left) compared to Grumman designed falling restraint (right)

(Image credits: NASA)

Below: Crewman attached to falling restraints.



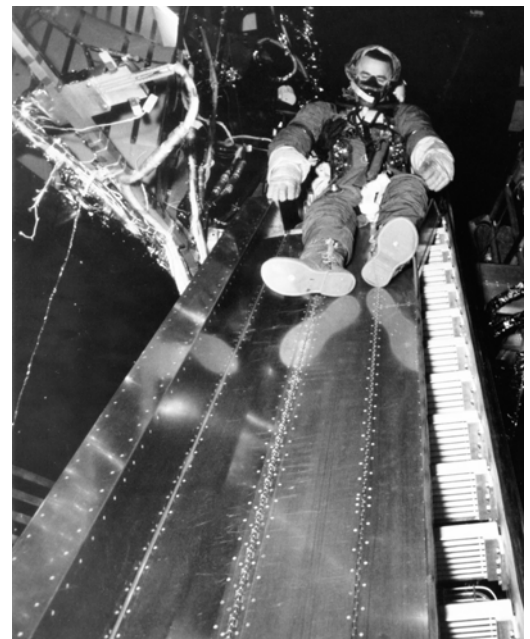
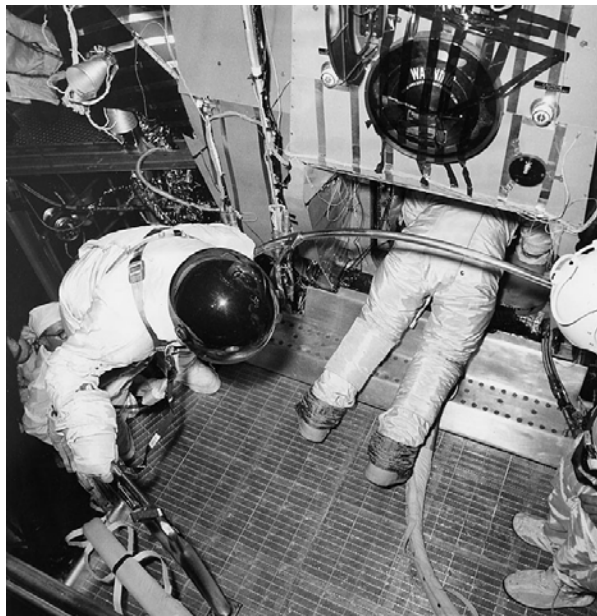


descended) the stairs. The new safety restraints were successfully used during the important tests performed that summer in SESL. These manned vacuum tests of the Lunar Module involved over 600 people and enabled humans to land on the Moon just one year later.

Notes:

The testing of LTA-8 is described (including an overview of the crew falling restraints) in NASA Technical Note TN 0-5760 "Manned Operations For The Apollo Lunar Module In A Simulated Space Environment" by O.L. Pearson and P.R. Gauthier.

This report can be read online at: http://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/19700024466_1970024466.pdf



Crewmen and rescue personnel practice with falling restraints. On far right, wearing pressure suit, Lee Pearson, a Space Environmental Test Division engineer evaluates the emergency evacuation slide. (Image credits: NASA)

More Photos from the McLane Archives

James C. McLane III

JSC 1968



According to FloridaToday.com and other sources, Transformers 3 will be filming at KSC for about eight days in September, including depictions of the shuttle launch pad, crawler, and Vehicle Assembly Building..

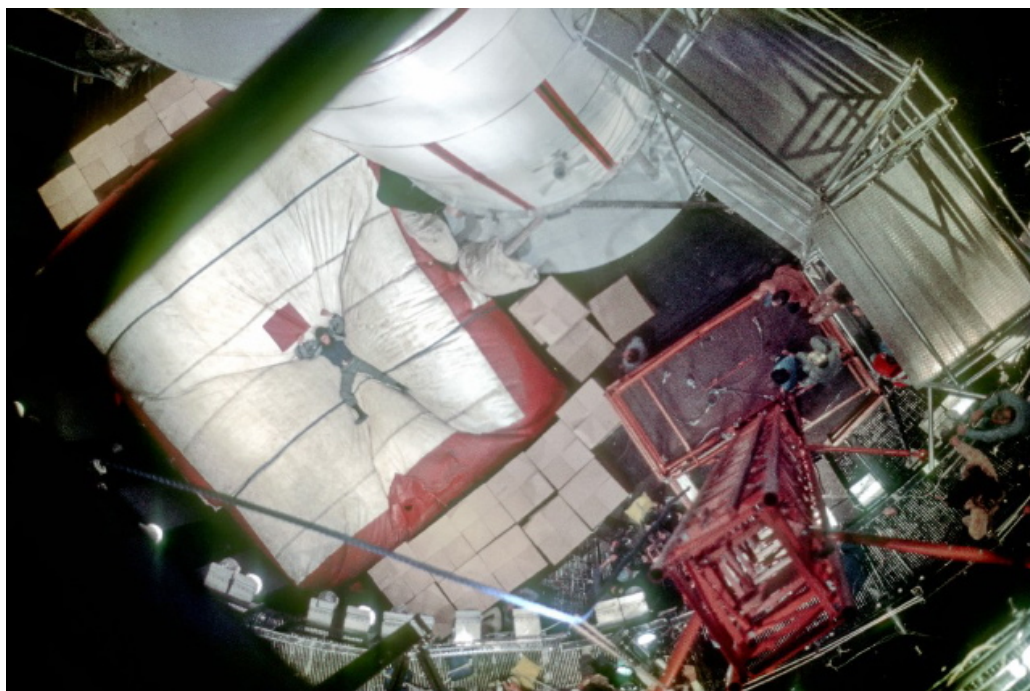
History repeats itself.

After the end of the Moon-landing program, a cash-strapped NASA allowed movies to be filmed at JSC.

One in particular (Future World, starring Peter Fonda) made heavy use of the giant space chambers in Building 32. I went out to watch the filming and saw a stunt man make \$10,000 by taking a dive off a platform and falling over 100 feet into an air bag.

I took the attached photos in 1976 during the filming.

- Jim McLane III



Aerospace Projects Review

APR Corner
SCOTT LOWTHER

APR Corner is presented by Scott Lowther, whose unique electronic publication is described as a "journal devoted to the untold tales of aerospacecraft design." More information, including subscription prices, may be found at the following address:

Scott Lowther
11305 W 10400 N
Thatcher, UT 84337
scottlowther@ix.netcom.com
<http://www.up-ship.com>

Below: Destruction of the XCH-62, October 2005.

From <http://www.aero-web.org>

Right: XCH-62 in better days (Image credit: US Army)

The history of aviation is loaded to the gills with aircraft of every description that did not make it into the air. Everything from concepts that never got past doodles on a napkin, to aircraft that were built and ready to fly, but the funding ran out. Many saw hardware actually constructed, but not the actual vehicle. One such design was the Boeing Vertol Model 301 Heavy Lift Helicopter (HLH), the XCH-62. But the HLH was somewhat unique in the level of outrage that was generated not so much in the program's cancellation, but for what happened to the surviving hardware decades later.

In the late 1960's, numerous aerospace corporations were looking into the next generation of large helicopters, capable of lifting main battle tanks. Boeing-Vertol was no exception, examining designs with one, two, three and even four lifting rotors. In 1971, the US Army awarded a contract to Boeing-Vertol to develop their Model 301 design, which looked like a scaled-up CH-47

"Chinook." Apart from size, the new vehicle would differ in that it was meant from the outset to be primarily a "flying crane," using long, spindly landing legs to straddle external payloads up to fourteen feet tall. Additionally, three turboshaft engines, rather than the more common one or two, would provide power. Unlike the Sikorsky CH-54 "Tarhe" flying crane, the XCH-62 had a substantial fuselage and could carry a fair load of passengers or cargo internally. The three Allison T701-AD-700 turboshaft engines would power two 92-foot diameter rotors. Empty weight was 59,580 pounds, mission fuel was 11,080 pounds and design payload was 45,000 pounds, for a design gross weight of 118,000 pounds. Fuselage length was 89 feet, 3 inches.

As often happens, the program did not continue to completion. The end of the war in Vietnam, the existence and success of the CH-53E "Super Stallion," and the poor economy led to the cancellation of the project in August of

1975, when Congress cut funding. However, the first prototype was well underway at that time. It was stored at Fort Rucker in Alabama, in the hopes of eventually being finished. Hopes for a revival came along in the early 1980's, with plans for experimental flights for NASA and DARPA, but again funding did not come through. So, it stayed at Fort Rucker, spending part of the time in open-air storage, and since 1987 on open-air display at the US Army Aviation Museum at Fort Rucker.

As anyone who has ever been to Alabama can attest, humidity is a constant. And as unpleasant as heat and humidity are for humans, they are devastating for typical aircraft structural materials. And over the years, as the XCH-62 was left outside and exposed to the elements, the elements were busily chewing away at it. Rain collected wherever it could inside; sunlight burned away at it; bugs and critters nested, and by 2005, the fiftieth anniversary of Fort

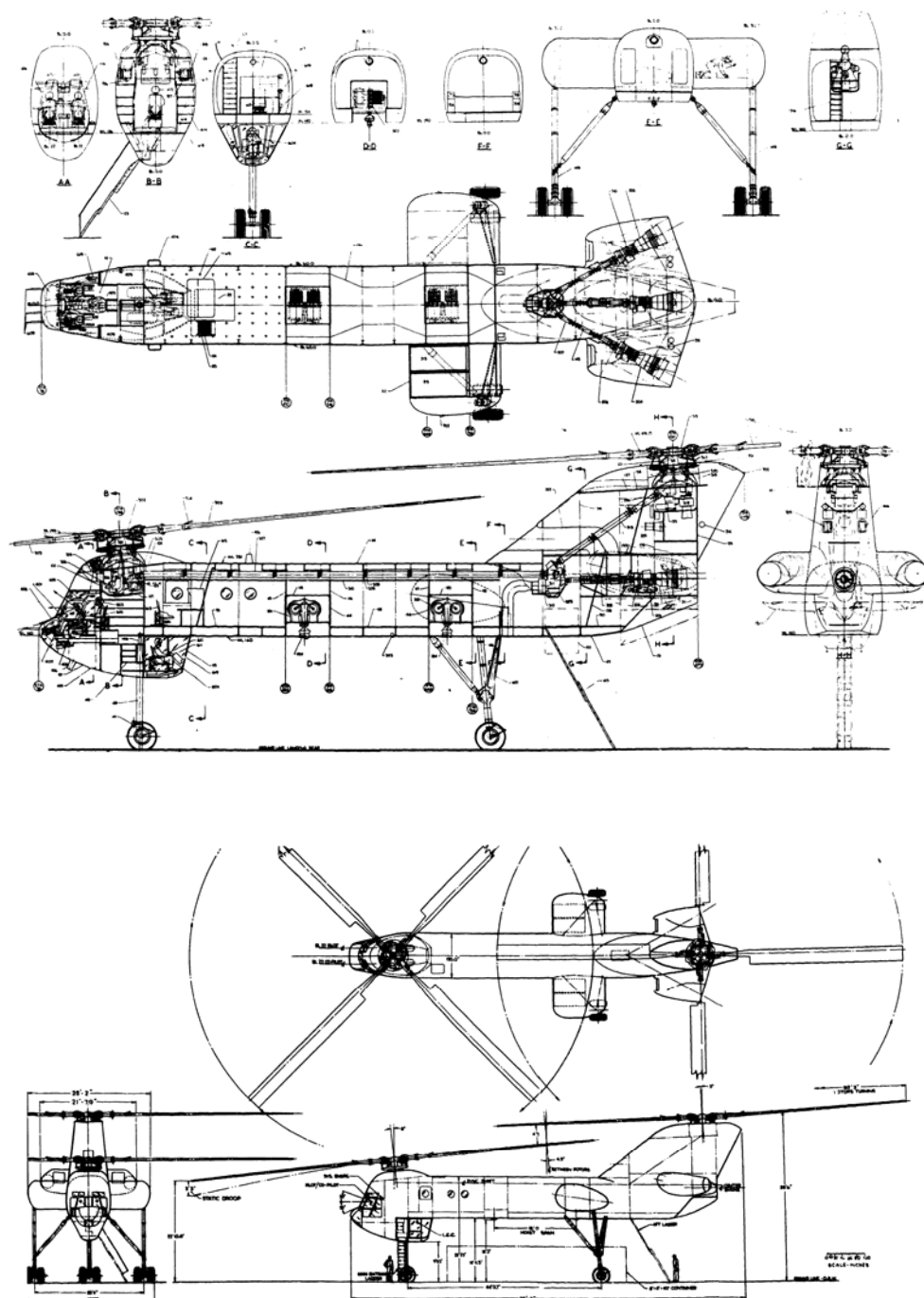
(Continued on page 33)



(Continued from page 32)

Rucker, the museum's director, Steve Maxham, decided that it was simply too unsafe to repair, move or retain. As a result, the XCH-62 was broken up. This decision caused outrage across the aviation world, and created far more anger and discussion than the actual program cancellation thirty years earlier seems to have. The anger many felt was not assuaged by Maxham's published comments on the subject (which were not phrased in the most diplomatic of all possible terms), nor by the fact that the XCH-62 was unceremoniously destroyed out in the open with an excavator.

The fact is that the XCH-62 was, by 2005, never going to fly. Mother Nature had long since seen to that. It is probably arguable on both sides whether destroying it was the only responsible thing to do... restoration would have been extremely expensive, and very possibly unsafe. Of course, expensive and unsafe restorations are carried out with considerable frequency. But aerospace history often does not receive the attention that those of us interested in it would wish, and thus much passes into oblivion.



Top: Inboard views of the HLH prototype (Image credit: Boeing)
Bottom: General arrangement of the HLH prototype (Image credit: Boeing)

Event

Aero & Autos 2010 at Ellington Airport

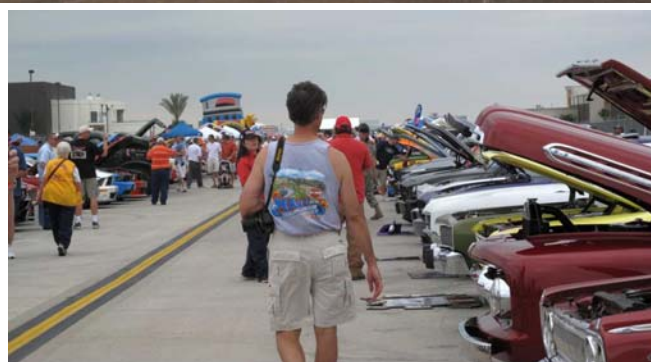
DOUGLAS YAZELL, ASSISTANT EDITOR

This second annual event took place on Saturday, May 8, 2010. In 2009, the crowd was so unexpectedly big that a long line was required for the one food vendor. This year, several food vendors were on hand and the event became even bigger. Hundreds of cars were on display, along with the aircraft. Admission was only \$5, with free parking. For those displaying a vehicle, registering it cost only \$30, which included one admission ticket, one goodie bag (while supplies lasted), an event shirt, and a free 4 x 6 photo of the vehicle with a military aircraft. Details are always at www.fly2houston.com/AerosAndAutos.

*(Photo credits: Ellen Gillespie and Julie Perea)
Horizons assistant editors
Douglas Yazell and Louis
Abney also attended.*



Below: Our 2009-2010 AIAA Houston Section Chair Ellen Gillespie and her daughter Emily.



EAA Corner

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 inter-

action 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 aviation 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!



Above: VariEze LongEz built by former Astronaut Frank Caldeiro and currently flown by Richard Sessions at 2010 Aeros & Autos at Ellington Field. (Image credit: Douglas Yazell)

Ideas for a meeting? Contact Richard at rtsessions@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:

EAA Chapter 12 will be hosting a discussion with Former Flight Director Gene Kranz regarding the Apollo 13 flight at Houston Southwest Airport on 28 August 2010. Refer to the www.eaa12.org website for updates and details.

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)

More than 1,000 chapters have been formed since the first one in 1953. Chapter 1310, for example, is East Windsor, Connecticut. Nearly 1,000 of these chapters are currently active. The Houston chapter, created in 1955, was a real pioneer: the 12th chapter formed, and the first in Texas.

Chapter 1 (1953) Riverside, California (<http://eaach1.org/>)

Chapter 2 Fort Wayne, Indiana (no information about chapters 3 and 4 found in time for this article)

Chapter 5 Middlefield, Ohio

Chapter 6 Atlanta, Georgia

Chapter 7 Long Beach, California

Chapter 8 Piedmont Triad (Greensboro, High Point, Winston-Salem) and Southern Virginia area

Chapter 9 Central Ohio, Ohio State University Airport

Chapter 10 (1955) Tulsa, Oklahoma

Chapter 11 Santa Monica, California

Chapter 12, Houston, Texas

Chapter 13 (1955), Detroit area, Michigan

Chapter 14 San Diego, California

Crossword

Crossword Clues

DOWN

1. Up to 2000
2. U.S. part became this in '05
3. First differential height maneuver
4. Part of the MSS
6. Inertial attitude hold
7. These honor cosmonauts
8. Crews see 16 daily
9. An irreplaceable ride
11. Flight data file
12. Items packaged for flight
13. Largest satellite seen from windows
15. ISS partner
16. Keeps your footing
19. Famous Russian jettison
21. System controlling contaminants
22. Attitude control assembly
23. Semiconductor crystal development
25. Program and earth scientist
26. A US-Russian mating in 1998
28. A gem of a lab
32. A "chic" orthopedic surgeon
33. Necessary for science
36. Synchronous data link communication
37. \$40,000 per gallon
40. Test in a box
42. Becomes more virulent in space
43. Flight Engineer Oleg
47. Hope, also
48. You can carry this life support system
49. Space pen pal of Jane
50. Instant weight loss
52. The last piece of science
54. Reagan's name
55. ФГБ
56. Type of Support Simulator
58. A handy robot
60. Radiator dings
62. Space dock
64. The wealthiest astronauts
66. MAGIK helps make these
67. A type of astronaut
71. A tracking & com system
72. Hand-held device detects biochems
73. Important ISS com band
75. International partner
76. List of shipped goods
81. One of the 'twins' 93 across roomed with
83. The first permanent US 'resident'
86. School kids will send these to space
88. Overall sound pressure level
89. Device managing rotation fluids
90. Commanded 1st crew with woman

ACROSS

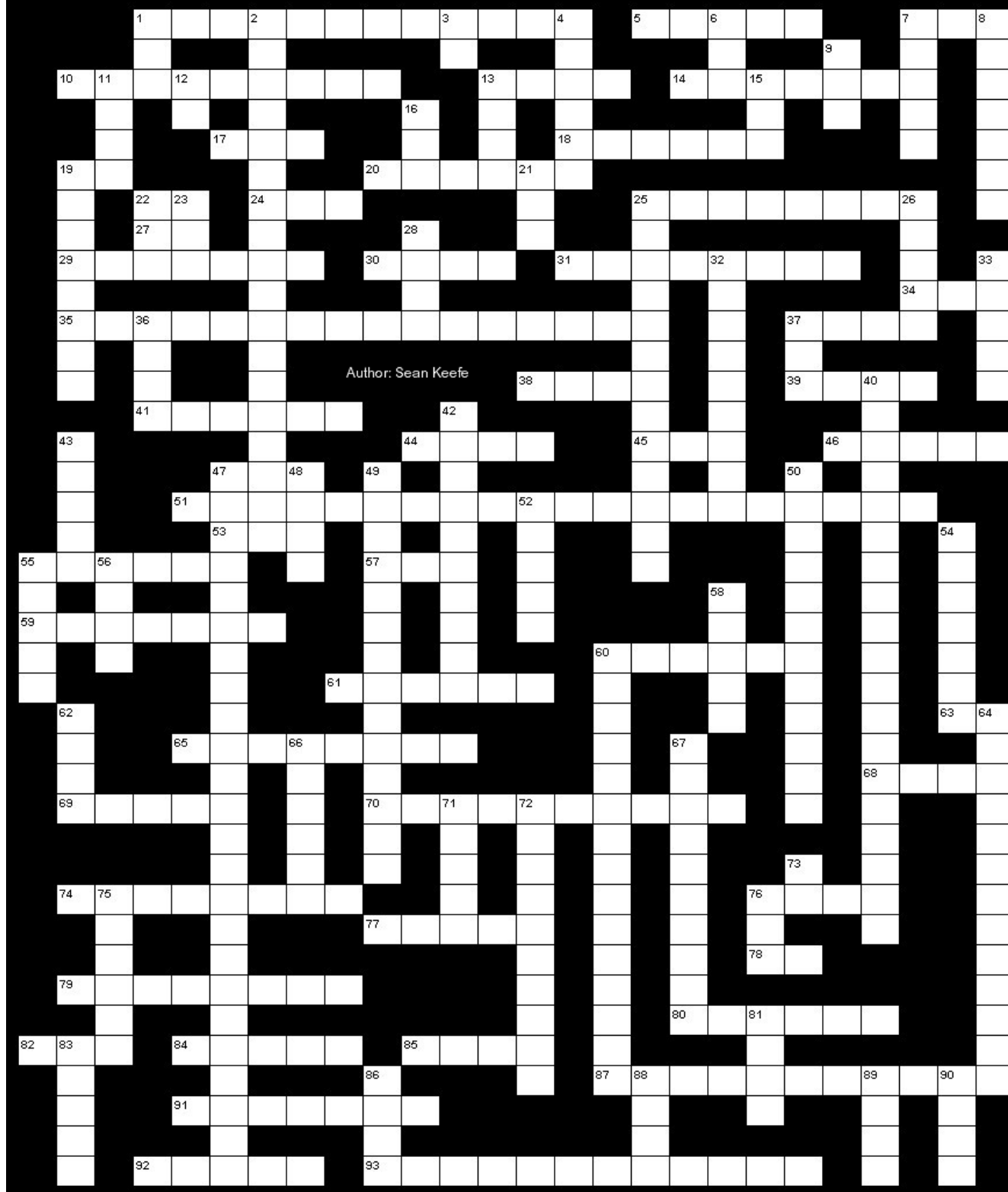
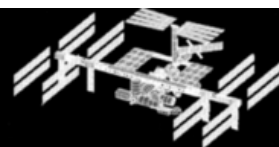
1. Contingency plan
5. Research modulette
7. Mike replaced this
10. Downside to Expeditions
13. JAXA camera
14. Soft landing
17. Toxic byproduct of reboost
18. International partner
19. Canadian robot needs this
20. International partner
22. Assembly element
24. Cargo visitor
25. Taking out the trash
27. Control Center
29. Bones after expeditions
30. Monitoring system for plasma integration
31. Named for West Indies governor
34. Gives the best view of Earth
35. ISS in 2011
37. Nicole took the trash out in this
38. Watches Earth's coastlines
39. Operations management ground app
41. International partner
44. Brought his keyboard
45. Hold inertial attitude
46. Clear liquid shipped in small glass tubes
47. Before every expedition, NASA has these
51. Tossed by Clay in 07
53. Not dog years or cat years, but...
55. The star of ISS
57. Crew's quotidian task
59. Sunrise module
60. 61 across look alike
61. Energizers
63. Crew assignment
65. Critical crew activity
68. Risk analysis for integrated operations
69. Potassium hydroxide created this
70. Micro-G decreases this
74. What Expedition crews lose
76. Favorite tape
77. First Expedition gal
78. Astro-keyboardist
79. What crews need after landing
80. NASA's 1st space station
82. List of software
84. Don't leave Station without it!
85. One of the 'twins' 93 across roomed with
87. There are 20 of these on ISS
91. Crews like to experiment with these
92. Astronaut 'tent'
93. Famous Shanghai baby



Know Thy Station!

A crossword puzzle all about the International Space Station

(solution in next Horizons issue)



Calendar

April 1-3

AIAA Region IV Student Paper Conference held by AIAA Houston Section

June 24

Dinner meeting, "Inside the Process of Airplane Accident Investigation", Mr. John Purvis, Safety Services International and AIAA Distinguished Lecturer

No council meeting in July 2010 for AIAA Houston Section

July 25-28

46th AIAA/ASME/SAE/ASEE Joint Propulsion Conference & Exhibit
Nashville, TN

Nashville Convention Center & Renaissance Hotel

Co-located with:

8th Annual International Energy Conversion Engineering Conference

July 29-30

2010 Regional Leadership Conference (RLC)

Nashville, TN

Nashville Convention Center & Renaissance Hotel

No council meeting in August for AIAA Houston Section

August 2-5

AIAA Guidance, Navigation, and Control Conference
Toronto, Ontario, Canada

Sheraton Centre Toronto

Co-located with:

AIAA Atmospheric and Space Environments Conference

AIAA Modeling and Simulation Technologies Conference

AIAA/AAS Astrodynamics Specialist Conference

August 21

AIAA Houston Section leadership retreat, Gilruth Center at JSC

AIAA Houston Section 45-person council and interested volunteers

For information: chair@aiaa-houston.org

AIAA Houston Section dinner meeting with a Congressman in August?

"August is for Aerospace" That is a national AIAA activity. This dinner meeting is in the planning stages as part of that activity.

September 6

Council meeting, first Monday

October 4

Horizons published quarterly, online late March, June, September and December.

See <http://www.aiaa-houston.org/horizons>



Left: Medallion ideas not used this year. The art for the Space Shuttle Program patch is by Don Kulba, Horizons Assistant Editor. It was among 85 entries and 15 finalists. The additional artwork is by NWT Mint (<http://www.nwtmint.com>). Since AIAA Houston Section started in 1962 and will celebrate its 50th year in 2012, a lapel pin is under consideration, with a design not yet selected.

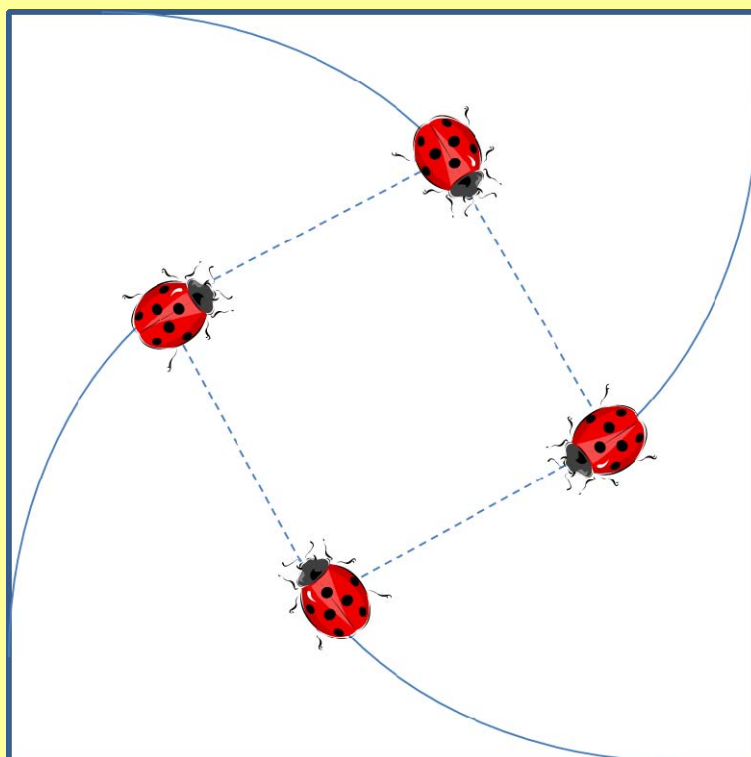
Cranium Cruncher

STEVE EVERETT, EDITOR

Congratulations to Wes Dafler (Boeing) and Greg Pierce (ESCG) for their correct answers to last quarter's Cranium Cruncher. Their answer of **6210001000**, satisfied the template AB-CDEFGHIJ such that A is the count of how many 0's are in the number, B is the number of 1's, and so on.

And now for this issue's puzzle: 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?

You can submit your answer with explanation to editor@aiaa-houston.org.





Houston Section
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Webster, TX 77598

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The 2010 AIAA Haley Space Flight Award

Dr. John M. Grunsfeld and the STS-125 Crew have been selected to receive the 2010 AIAA Haley Space Flight Award. The award is presented for outstanding contributions by an astronaut or flight test personnel to the advancement of the art, science, or technology of astronautics. The citation will read, "For their tremendous accomplishments in the service of science by repairing and upgrading the Hubble Space Telescope and proving the unique value of manned spaceflight."

Image Credits: NASA



Above: JSC2006-E-47144 (31 Oct. 2006) --- A few hours after NASA Administrator Michael Griffin announced from Goddard Space Flight Center the astronauts selected for the final shuttle mission to perform work on the Hubble Space Telescope, the crew met the news media at the Johnson Space Center. Following the press briefing, the members posed for this group portrait. From left to right are astronauts K. Megan McArthur, Michael T. Good, Gregory C. Johnson, Scott D. Altman, John M. Grunsfeld, Michael J. Massimino and Andrew J. Feustel. Altman will command the final space shuttle mission to Hubble, and Johnson will serve as pilot for his initial spaceflight. Mission specialists include veteran spacewalkers Grunsfeld and Massimino and first-time space fliers Feustel, Good and McArthur.

Right: STS125-S-001 (December 2007) --- This STS-125 crew patch shows HST along with a representation of its many scientific discoveries. The overall structure and composition of the Universe is shown in blue and filled with planets, stars, and galaxies. The black background is indicative of the mysteries of dark-energy and dark-matter. The new instruments to be installed on HST during this mission, Wide Field Camera -3 and the Cosmic Origins Spectrograph, will make observations to help understand these unseen components which seem to dominate the structure of the Universe. The red border of the patch represents the red-shifted glow of the early Universe, and the limit of the Hubble's view into the cosmos. Upon completion of STS-125, the fifth mission to service HST, the Hubble will provide even deeper and more detailed views of the Universe. Soaring by the telescope is the space shuttle which initially deployed Hubble and has enabled astronauts to continually upgrade the telescope, significantly contributing to the expansion of human knowledge.



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.