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Roundup

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It's show time for NASA and Dreamtime

Activities to implement the unprecedented partnership between NASA and Dreamtime Holdings, Inc. announced June 2 are already under way.

The two parties agreed to collaborate in mutually promoting NASA's mission and educating the public about the space program principally through the development and implementation of a Web-searchable multimedia database filled with NASA archived imagery; shared use of state-of-the-art high-definition television equipment placed on board the International Space Station and the space shuttles as well as at NASA centers and the Jet Propulsion Laboratory; and production of documentaries and mini-series.

"This agreement was derived in part from an interest in getting NASA's message out to a much broader audience and in exciting the public about the space program," said Tom Cremins, lead, JSC Commercialization Initiative. "Knowing what was available to us in terms of the New Economy via all of the advances in information systems, both in the U.S. and globally, we saw that there may be synergies or collaborations that we might be able to enter into where our content, our message, our activities, and our mission and other companies' technologies, ways of getting media out in multi-venues and multi-platforms, could be brought together."

Brian Kelly

It's a way of merging content with the Internet, turning brick-and-mortar into click-and-mortar.

"This is the combination of the Internet and what we call brick-and-mortar," said Dreamtime Chairman and CEO Bill Foster. "We look at NASA as a brick-and-mortar company – lots of buildings, lots of atoms. You can touch it. You can't touch the Internet. When you combine the two, it becomes a click-and-mortar company. It uses the speed and interactivity of the Internet in conjunction with the archives and the technologies that NASA has to offer."

"During the first six months, Dreamtime will focus on the first version of the multimedia portal, www.Dreamtime.com, setting up the digital data vault of sounds and images, and certifying and deploying HDTV cameras," said Dreamtime President and COO Carleton Ruthling. This vertical portal, or "vortal," will provide worldwide access to thousands of images, sounds, documents, blueprints, and plans from NASA's archives along with in-depth access to information about space and Earth sciences.

NASA JSC Photo S99-05085

In preparation for an STS-93 DTO, astronauts Jeff Ashby, pilot, and Cady Coleman, mission specialist, train with a high-definition television camcorder.

Currently, visitors to the site can catch a glimpse of where Dreamtime is headed with this vortal. Its development intends to leverage the assets – the photos, documents, high-definition images, and so forth – in the best way possible to encourage and inspire people to learn more about science and space.

A major activity that is key to creating content for the multimedia database is the digitizing of NASA's analog archives. This digitizing effort will result in a NASA Digital Historic Archive. To complete this task, Dreamtime intends to digitize 50,000 still images and 17,500 hours of film/video by the end of the agreement, which is seven years with a five-year option.

Digitizing these materials and placing them online where they will be easily accessible on the new multimedia vortal will help fulfill the main objective of the partnership – to let people know what NASA is doing. Basic research access and low resolution of digital imagery will be available to the general public at no charge. A world of opportunity will be opened up to researchers and schoolchildren around the globe.

"I think the opportunity that we have here is something that works for innovation, not imitation," said Foster. "In other words, we're trying to go to a new place. Let's take the archives, all these amazing things that NASA has, digitize them, and make them available online instantaneously to people who are doing research and to young people. Allowing instant access to these resources will save time and energy. This digitized material, as well as shots from the high-definition television cameras around NASA centers and in space, will be available online for research and for educational opportunities."

NASA JSC Photo 2000e17758 by Bill Stafford

Tom Cremins

Integrating HDTV on the orbiters and the space station to provide for the first-ever high-definition TV coverage of astronaut activities aboard the station and the space shuttle missions is another key priority. To maintain NASA integrity, the information and imagery that will be captured and downlinked from space will be handled as always in terms of editing and reviewing. All normal operations will be in place, including review of the data by the Astronaut Office.

"I am very much interested in effectively integrating partner-provided state-of-the-art HDTV equipment capabilities, both on the ground and in flight, on the orbiters and ultimately on the space station," said Brian Kelly, NASA manager for commercialization for the Dreamtime collaboration. "To maintain integrity in this regard, the agency will provide certification requirements and our partners will meet those requirements."

NASA and Dreamtime have targeted completion of the establishment of a joint-use HDTV capability agency-wide to occur no later than 2004. This capability will fulfill a long-standing objective within NASA.

"There has been, for some time, an objective within NASA to try to get HDTV into NASA both for our on-the-ground production, for filming around NASA centers, and for flight operations aboard the space shuttle and the space station," said Cremins. "So a key part in forming this collaboration with a multimedia partner was to see if there were a way to reach out to the leading-edge HDTV technology that was out there and bring it into NASA as part of this whole activity of getting our message out."

Over the term of the agreement, the value of private participants' contribution is estimated to exceed $100 million. As part of the agreement, Dreamtime will provide flight-certified HDTV and Standard Definition TV equipment for testing, crew training, and flight aboard the space station and the four space shuttles. Dreamtime will also provide HDTV cameras and editing equipment to the 10 NASA centers and Headquarters.

The enhanced clarity of internal and external images of on-orbit flight hardware will provide extremely clear images for ground control and trainers to plan for and prepare astronauts for on-orbit repair and maintenance activities. In addition, HDTV will provide geographically separate training locations extremely clear views of earthbound

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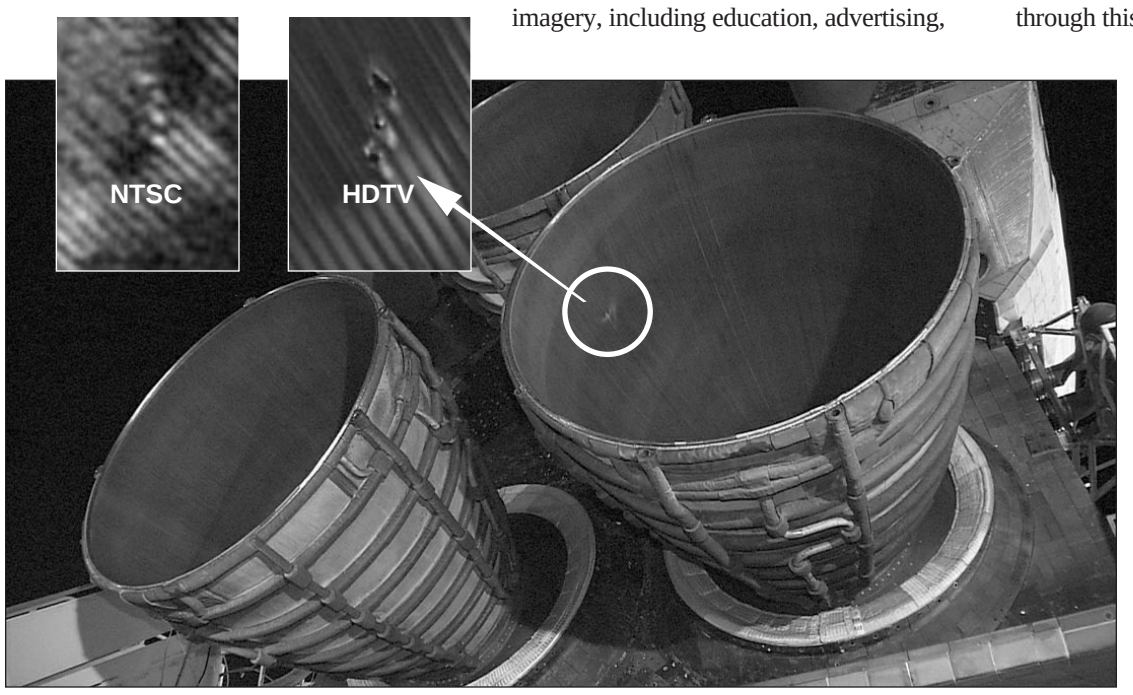
DREAMTIME

training of on-orbit assembly operations and related procedures.

HDTV will dramatically enhance coverage of dynamic on-orbit events including filming of approaching and departing vehicles, dockings, fly-arounds, experiments, and space walks.

Science users will benefit greatly from the ability to film in high-definition dynamic scientific processes (for example, liquid flows and mixing) that electronic still images don't capture. In addition, from a global monitoring/Earth management perspective, HDTV streaming to a Web, multi-platform arena will revolutionize the ability of multiple eyes to be monitoring the planet or monitoring dynamic events (for example, storms and spills) in real-time (versus satellites or shuttle/ISS still cameras which take time to down-link, catalogue and be analyzed).



STS-93 image analysts were able to use post-flight HDTV footage to help identify hydrogen leak sites on the main engine bell, shown in inset compared to NSTC image.

Education is a key aspect of this agreement. NASA and Dreamtime will collaborate on the development of educational products and documentary programming with the objective of increasing public awareness of the ISS and other NASA programs. Dreamtime will produce two documentaries per year related to the ISS and other NASA subjects and will air over major broadcast outlets. The first production is due within 18 months. In addition, Dreamtime has the rights to produce educational programming for broadcast over NASA TV. Dreamtime will work closely with the Educational Affairs Division to ensure NASA's educational objectives are met. Educational content planned in the documentaries will be linked to educational modules in the portal.

The 1998 Commercial Space Act paved the way for the agreement between NASA and Dreamtime. In that act, Congress declared commercial utilization to be one of the primary goals of the U.S. Space Station Program and directed NASA to actively seek commercial users for the ISS. That same legislation required that NASA fund an independent market study of potential commercial uses. One of the most promising commercial markets identified by the study was in the area of space imagery, including education, advertising, and entertainment. The imagery area was recommended due to its potential for early commercial revenue generation and for increasing overall awareness of the commercial potential of the station.

NASA commissioned a number of studies as part of its effort to commercialize. These studies concluded that NASA's name recognition is unparalleled throughout the world and that the agency's content–imagery, sounds, and documents–is something people would want.

"Part of what makes the content and the name valuable is that they are untainted," said Cremins. "Because they are untainted, the studies noted that they should be retained. But the studies also indicated that if we could identify areas where we could leverage and gain value for our programs and gain technology from the outside, it would make a lot of sense to partner.

"So that's the approach we took with this agreement. We haven't sold the name NASA. Maintaining the integrity of NASA will not be sacrificed, and our partner understands the value of keeping NASA's positive image intact. We were very sensitive to keeping the heart and soul of NASA intact, but, at the same time, leveraging the information technologies and techniques that are out there that the Internet world has spawned and bringing those capabilities into NASA."

In addition to maintaining NASA's integrity, the agreement allows the agency to use gainsharing from what is created through this partnership to further the exploration and development of space, providing great benefits to the U.S. taxpayer.

Another unique part of the NASA/Dreamtime agreement is that the parties established it as an open, nonexclusive arrangement. "What is most important about this deal, as far as I am concerned, is that it is inclusive, not exclusive," said Foster. "So current vendors who are working in areas such as NASA's archives and NASA TV will be included in this deal. Their wealth of expertise and knowledge is very valuable, and we need to make use of what they know to make the pie bigger for all of us."

With so much of the agreement focused on ISS and space shuttle activities, the Johnson Space Center, as NASA's lead center for human space flight, is key to the success of this partnership and any additional commercial ventures. "JSC is at the tip of the spear in terms of implementing this project," said Kelly.

But all NASA centers and Headquarters will work to implement the agreement. Rodney Grubbs at the Marshall Space Flight Center will serve as deputy collaboration manager supporting Kelly in the overall implementation of the Space Act. The Public Affairs team will be spearheaded by Patti Reilly, director of commercial projects, and Debbie Rivera, deputy director of commercial projects. Marguerite Broadwell is the agreement manager at NASA Headquarters.

With everyone working toward the common goal of educating and exciting the public about the space program, NASA and Dreamtime see the endeavor continuing to grow.

"This opportunity could be limited only by the imagination," said Foster. "But that's something that could never happen here because this is the opportunity for innovation. How much innovation and imagination can people have?"

According to Cremins, NASA's business lines up nicely with Dreamtime's business model, both stressing the need for growth and the need to bring in new partners. He notes that the partnership that Dreamtime brings to the collaboration represents a wide range of economic sectors.

"This is a unique business in the sense that both Dreamtime and NASA are about growth and opportunity," said Cremins. "This is an ongoing growth enterprise. Dreamtime has aligned with companies in aerospace, Internet, marketing, and advertising. Out of the relationships that we'll develop with these companies, we're hoping that there will be a lot more opportunities and new approaches and practices to come out of this partnership in the future."

For the immediate future, Kelly says that the onus is now on NASA and Dreamtime to prove that they can do what they have said they will do.

"The goal here is to add this activity to a long list of firsts that this agency has accomplished," said Kelly. "We have a lot of work ahead of us, but we'll get it done." ■

NASA JSC Photo S101e5010 by Alan Bartos

The Dreamtime logo floats inside *Atlantis* during the STS-101 mission.

Guiding Principles *of the* NASA/Dreamtime Agreement:

- Work together to promote NASA's mission and space activities to a broader audience.
- Apply proven multi-platform information systems and techniques to NASA.
- Integrate commercially provided enhanced capability into flight and ground systems.
- Promote commercial use of space through nontraditional partnership, which aligns a diverse complement of industry sectors in a growing and evolving enterprise.

Space and exploration studies at the University of Houston-Clear Lake

Working in the aerospace industry, you know you're part of exploration history. Think how much satisfaction it would give you to know the history you're a part of.

Does exploration send your imagination soaring? Space exploration, of course, but also the voyages of Odysseus, Marco Polo, Columbus, Lewis and Clark, Darwin, Cook, and Amundsen.

This fall, the University of Houston-Clear Lake is launching a concentration in Space and Exploration Studies as part of its M.A. in Humanities degree. Courses emphasize the historical, philosophical, and global meaning of the space pioneers' achievement. Application requirement for this program is a bachelor's degree in any field from an accredited institution. Classes are scheduled primarily in the evening to meet the needs of adult students, and all classes will be given at the University of Houston-Clear Lake campus.

Through study of the history, politics, and literature of exploration, this concentration's courses examine the relationship of space exploration to exploration throughout the ages. Concentration courses also investigate humanity's future in space and stress the intercultural understanding needed for international cooperation in space exploration. Courses in cultural diversity and writing for today's workplace are also available in this degree. As a final project, you may choose to write an oral history of a space traveler's experiences or a historical study of an as yet unchronicled NASA project.

The first course in the concentration, "The History of Exploration" from prehistory to the 21st Century, will be offered Monday evenings. Taught by University of Houston-Clear Lake Professor Keith Parsons, it will include topics such as Lewis and Clark; the discovery of the Americas; and the peopling of the Earth: the Arctic to Patagonia to Australia. Course books will include Boorstin's *The Discoverers*, Ambrose's *Undaunted Courage*, and McCurdy's *Space and the American Imagination*.

Evening courses in "Writing for the Workplace" and "Cultural Diversity" will also be available fall 2000 and can be included in the M.A. degree.

For information about concentration requirements and enrollment, contact Dr. Gretchen Mieszkowski, director of Humanities, mieszkowski@cl.uh.edu, (281) 283-3312; or Ann Hinojosa, advising coordinator, hinojosa@cl.uh.edu, (281) 283-3333. ■

COMMUNITY NEWS

Ribbon cut on Longhorn Project and Western Heritage Pavilion

It has been an unlikely pairing but for the past several months six trophy longhorn steer have grazed in the shadows of JSC's Rocket Park. Now, in a ceremony making their unorthodox pasture their permanent residence, JSC Center Director George Abbey, Clear Creek Independent School District Superintendent Dr. John Wilson, Houston Livestock Show and Rodeo President H. Mike Wells, and Don Limb of the Texas Longhorn Breeders Association officially christened the Western Heritage Pavilion and Longhorn Project.

"This is a unique achievement for not only NASA and the folks in this area, but also for the Houston Livestock Show and Rodeo," said Wells. "This is for the benefit of youth and education and that's what we're about so we're very pleased to be involved in the project and we think it's a great idea."

Wells was joined by other HLSR representatives at the dedication ceremony including Hal Hillman, former president of HLSR and member of the Executive Committee; Constable Bill Bailey, lifetime vice president, HLSR; John C. Cook III, lifetime vice president, HLSR; Keith Steffek, vice president, HLSR; Dick Hudgins, director, HLSR, and chairman of the Speakers Committee; and Gene Hollier, vice chairman, HLSR Speakers Committee.

> ***JSC is a unique facility and we are very fortunate to be located in the state of Texas which has a great heritage that goes back to the early pioneers who came to this land, very tough land, and made it the great state it is. They, in their time, were explorers and pioneers much like the people that are working in the space program today.***
>
> –George Abbey

NASA JSC Photo 2000-04494 by James Blair

Left to right, Don Limb, president, Gulf Coast Chapter, Texas Longhorn Breeders Association; Hal Hillman, chairman, Houston Livestock Show & Rodeo Education Committee; Mike Wells, president, Houston Livestock Show & Rodeo; JSC Director George Abbey; and Dr. John H. Wilson, superintendent, Clear Creek Independent School District.

More than 1.2 million visitors annually are expected to peruse the pavilion site as part of Space Center Houston and JSC tour routes, but the Longhorn Project is actually designed to be a first-of-its-kind educational interface between area high schools and NASA. Organizers hope to foster student education in animal care and breeding, fruit and vegetable cultivation, recycling, and soil research.

"We are responsible for providing food for astronauts on orbit and solving the problem of growing food in space and on other planets, so the Longhorn Project, the aqua-farming, and the raising of fruit trees and vegetables, relates right back to what goes on at JSC in our own life science research," said Abbey. "It's a very natural partnership and a good partnership and we feel very fortunate to be a part of it."

The Longhorn Project is part of the CCISD Agricultural Science Center Learning Laboratory, developed in partnership with CCISD, the Texas Longhorn Breeders Association, which provides the cattle as well as livestock for the students to raise and show in livestock competitions, and the HLSR.

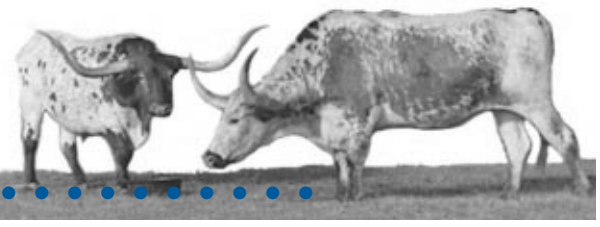
Site design, which was led by JSC Architect Don Holick, also includes land for vegetable crops, an orchard, a greenhouse, and two aquaculture ponds where bass and other freshwater species will be raised. Texas A&M University and its Agricultural Extension Service provide technical consulting for the agriculture and aquaculture projects. EARTH College of Costa Rica provides technical expertise for the recycling and soil conservation initiatives.

The cornerstone of the site is a 26-foot by 50-foot open-air pavilion providing viewing of the longhorn pasture to visitors. Inside, a display wall narrates the story of the HLSR and its contributions to youth education. There also are two buildings to provide administrative offices for teachers and the Dow Chemical Company Learning Center.

"That provides a classroom for on-site science laboratory lessons," said Hollier. "Other facilities include a barn, storage building, windmill, and water storage tank. Long-term plans call for closed-circuit video capability that will bring the experiments performed at the project to classrooms worldwide."

The Longhorn Project was created without using taxpayer dollars. Volunteers, like Melba Eveler and Hollier from the HLSR, secured donations from local companies, individuals, or corporate sponsors.

"We now have a great link to a heritage that we need to maintain, understand and continue as we go into the future and explore the stars," said Abbey. "We are very fortunate that we are located here and that we have the partners and a community that supports us. This is a great facility for the youth of our state and all the visitors that are going to have the opportunity to come here to learn." ■



Volunteers needed for Open House 2000

JSC is making final preparations as Open House 2000 approaches. This year's event will be held on August 26.

C.C. de la Garza, volunteer coordinator for the JSC Open House, says that about 150 volunteers are still needed to prepare for the anticipated 120,000 Open House guests who will visit JSC for this year's event. "Although the response to our call for volunteers has been tremendous, support for the peak hours in the afternoon is still critical to the success of the day."

Civil service and contractor employees can volunteer to staff information booths, act as rovers, assist visitors with directions, staff the lost child care center, help keep the cafeterias clean during peak times, and oversee children's activities at the Teague Auditorium. NASA and contractor retirees are also encouraged to volunteer in this effort.

The easiest way to sign up is by pointing your browser to http://www4.jsc.nasa.gov/openhouse/Databases/ and selecting the time and position you would like to work.

Volunteers who have already signed up should attend one of four training sessions to receive vital information needed for Open House 2000. These sessions will be held in the Teague Auditorium. Please attend one of the following sessions:

10 a.m. Monday, August 7
1 p.m. Wednesday, August 9
9 a.m. Friday, August 11
2 p.m. Tuesday, August 15

Guests tour Bldg. 9 during last year's Open House.

For more information, contact de la Garza (281) 483-1033 or Wendy Starr (281) 336-5373, who is representing TEAM NASA on the committee.

Open House, which begins at 9 a.m. and ends at 5 p.m., is free to the public. Visitors may enter the center through three gates not normally open to the public – on NASA Road 1 just east of Saturn Boulevard, on Space Center Boulevard near Bay Area Boulevard, and on Space Center Boulevard near NASA Road 1. Parking in JSC lots is available at no charge.

JSC's annual Open House coincides with the annual Ballunar Liftoff Festival, a three-day event sponsored by local communities and held on the NASA grounds. The festival includes more than 100 hot air balloons, midway rides, games, skydiving exhibitions and other displays. Festival admission is $3 for adults. Children under 12 are admitted free.

For more information on this year's Open House event, visit the JSC Web site at http://openhouse.jsc.nasa.gov/ or call the information hotline at (281) 244-5312. ■

Window of opportunity: *conducting Earth sciences in the International Space Station era*

When the U.S. Laboratory element of the International Space Station becomes operational, astronauts will be able to conduct long-term, global monitoring of the Earth by operating remote sensing experiments and by taking photographs through the highest quality optical window ever installed in a crewed spacecraft.

The U.S. Laboratory, with its nadir window facing Earth, coupled with other new equipment and facilities to be installed aboard the laboratory, will offer scientists an unprecedented platform from which to study the planet.

"The station will allow us to monitor the Earth's processes from a long-duration perspective," said Dr. Kamlesh Lulla, chief of JSC's Office of Earth Sciences. "That's one major advantage – the ability to do long-term monitoring using photographs. In addition, we will be able to use the other research facilities aboard the station to devise experiments to complement our photographic observations."

The 20-inch-diameter circular window will be the centerpiece of a continuous program of an Earth remote sensing program. And the crew will have an incredible vantage point from which to view the planet due to the 51.6-degree inclination of the ISS, which allows it to fly over more than 75 percent of the Earth's surface, an area containing 95 percent of the world's population.

Manufactured by Corning, Inc., the four-piece window assembly consists of a thin exterior "debris" pane, primary and secondary pressure panes, and an interior "scratch" pane. The assembly also has an external shutter to protect the glass from micrometeoroid and orbital debris impacts. Allowing better than 98 percent of the visible light that falls on the exterior side of window to pass through undistorted to the interior side as compared to less than 80 percent with significant distortion for the shuttle's windows, the U.S. Laboratory's window assembly can be considered more a highly polished camera or telescope lens than a window and will require the same kind of care by the astronauts that one uses for lens when it comes to maintenance and cleaning.

The interior and exterior panes are designed to be replaceable in orbit. The exterior pane, which is susceptible to impact damage and contamination, can be removed by space-walking astronauts, returned to Earth for refurbishment, and then reinstalled. The interior "scratch" pane is also removable for those occasions when precision remote sensing instrumentation is needed to make measurements through the window port. The entire window assembly could be removed and replaced if necessary, but this would only be necessary if orbital debris damaged the debris pane, which is a low-probability event in a nadir-facing window.

The Office of Earth Sciences has been involved in the development of the window and other window-related activities from the start and supported optical calibration tests that were performed on the window assembly in April at the Kennedy Space Center.

"There are two aspects to the project, the hardware fabrication of the glass for the window and its maintenance, and the scientific use of the window-based facility," said Dr. Lulla. "My role is to ensure that robust, careful science will be done from the window. As a result, my responsibility is to make sure that the window is calibrated and that it will be properly maintained and operated so that the science can be done."

Dr. Lulla's office has also supported development of the Window Observational Research Facility (WORF), a rack structure located behind the window that will provide support services including power and mounting points to help position and operate cameras, sensors, telescopes, and other equipment. The WORF, which will be installed in the U.S. Laboratory once it is in orbit, will also allow astronauts to use the window for hand-held Earth observation photography taken aboard the station as well as support payloads that will conduct highly detailed radiometric remote sensing of the Earth's surface.

"The WORF will supplement and complement what we do with astronaut-acquired hand-held imagery," said Dr. Lulla. "That does not diminish the value of hand-held imagery because it is very vital. The WORF will be used to conduct well-planned science using many types of remote sensing instruments – multi- and hyper-spectral sensors as well as cameras. There still will be times when the crew will have to take hand-held photos of vital, episodic events. So the former will not replace the latter. I view them as complementary."

In addition to remote sensing experiments and hand-held photography that will be conducted in the WORF, payloads attached to the outside of the pressurized volume of the ISS will also make observations of the Earth.

"We see a three-pronged approach to Earth science for International Space Station operations," said Dr. Lulla. "First, the crewmembers will conduct observations through any of the station windows using hand-held instruments. Secondly, we will have use of the optical quality window and the WORF for precision remote sensing observations. Thirdly, Earth science will occur from payloads attached to the outside of the modules.

"Moreover, these external instruments can be synchronized with instruments in the WORF and with hand-held cameras. For example, we could have an automated instrument on the outside of the station measuring air quality on Earth in a certain area. While that instrument is operating, we could have the crew take photos by hand and, in addition, have a different remote sensing instrument measuring a different wavelength range in the WORF observing the same area. That way, we'll be able to get simultaneous remote sensing measurements in several different wavelength bands and supporting hand-held photos."

NASA JSC Photo 2000-03141

Astronaut Mario Runco, Dr. Karen Scott of the Aerospace Corporation and Dr. Dean Eppler of Science Applications International Corporation look through the U.S. Laboratory nadir research window.

Plans did not originally call for the use of optical glass for the Earth-oriented window on the U.S. Laboratory. According to Dr. Dean Eppler, senior scientist with Science Applications International Corporation, the initial plan was to use general viewing glass, which is basically shuttle glass, which was in turn originally derived from X-15 aircraft window requirements. Designed primarily to support pilots so they could land the shuttle, this glass does not allow photographers to capture high-resolution imagery or allow the operation of precision remote sensing instruments.

Dr. Eppler worked with a team of people across the government and contractor community, NASA centers, and JSC divisions to have the window upgraded. "It's been a real team effort. We've had a lot of cooperation from management, the Payloads Office and the Space Station Program Office. Nobody ever said, 'No – you can't do this.' It was always, 'Tell us what you think you can do.' This window is going to be a feather in the station's cap when it's up."

Dr. Karen Scott, senior project engineer with Aerospace Corporation, has been the primary optical scientist for the development of the science window and the WORF. Scott was instrumental in writing the optical requirements for the science window and in showing the feasibility of the upgrade by ensuring an analysis was performed to show that the on-orbit thermal gradients and pressure loads would not degrade the window's performance. This analysis and additional optical testing of the general quality U.S. Laboratory windows were the technical data required to explain to management the value of an upgrade.

"In 1989, I performed some optical tests on the shuttle windows, so we knew the optical quality of those windows," said Dr. Scott. "In 1995 and 1996, Dr. Eppler and I performed more optical tests on two sets of 20-inch general quality International Space Station windows. With that information, we knew what an upgrade could provide."

Dr. Eppler has pushed for the space station's superior quality window since 1995. He sealed a deal with station management that he would not ask to have the window upgraded if he could not raise the funds to pay for it. Getting the commitment of funds from NASA Headquarters, including the Office of Earth Sciences, and the Department of Defense – among others – he raised $700,000, the amount that it was estimated it would cost to do the upgrade.

Like Dr. Eppler and Dr. Scott, Astronaut Mario Runco, himself an Earth scientist, has been a strong supporter of the laboratory's high-quality Earth-facing window. In addition to his support of the upgrade of the pressure panes and debris pane, he has been instrumental in upgrading the internally mounted scratch pane.

"Initially there were virtually no requirements for optical performance for the windows, and existing design requirements at the time only considered such items as structural performance or condensation prevention rather than to ensure that light passed through undisturbed," said Runco. "As a result, the first set of scratch panes delivered, for example, were very poor in optical transmission and were even tinted a very dark yellow. Fortunately, this was discovered early enough to be able to correct the problem without significant cost impacts."

That was the catalyst that drove the need for optical performance criteria for all windows. For the past year, Runco and Dr. Scott have been involved in determining requirements for all station windows, including those intended for hatch, photographic or scientific purposes. "So now you can pick which category you need for your use rather than just having one set of requirements for all windows," said Dr. Scott.

Remote sensing entails the characterization of a remote object by measurement of sunlight reflected from that object. When observing objects in orbit, the effects of the atmosphere must be removed from measured data because it absorbs and scatters light. One of the keys to using the science window for remote sensing work is that, like the atmosphere, the absorption and scatter induced by the three high-quality panes must also be understood.

From April 4-7 of this year, a series of tests were performed on the flight Lab science window, before its installation in the lab module, to characterize the absorption and scatter characteristics as a function of look angle. Dr. Scott led a team from the University of Arizona Remote Sensing Group that made calibration

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WINDOW

measurements in the visible and short wave infrared portions of the spectrum with $500,000 worth of optical instrumentation. Dr. Stuart Biggar and Dr. Ed Zawleski, both research scientists at the U of A, had previously used this equipment to support calibration of sensors on the recently launched NASA Terra satellite. John Graves of Boeing KSC was the overall test conductor and arranged all the needed personnel to handle the glass and the ground support equipment critical to the success of the test. Dr. Eppler helped put the safety review package together and provided support for the test along with Runco and personnel from Boeing Houston and Huntsville. It was a real team effort!

When asked about the results of the test, Dr. Scott said, "The tests went really well and the support down at KSC was fantastic. So far we know that the transmittance of the window port is excellent with greater than 98 percent transmittance in some areas of the visible spectrum. We did find that the transmittance does change greatly in the blue end of the spectrum with changing view angle, but that other bands didn't show as much change. Overall the data looks really good, and it is just what the scientists need so that they can design payloads for the WORF."

There are several exciting Earth science research projects in conceptual stages. For example, the WORF will be an ideal setup for validating current land use and land cover maps that are being generated using satellite remote sensing measurements. To determine the accuracy of these satellite-derived land use map products, validation must occur with observations over a global suite of known test sites, and ISS WORF will be well suited for this research. This has the potential to revolutionize how these maps are made and could significantly enhance their applications.

Because of its high optical quality, the nadir window on Destiny will allow the use of large aperture telescopes without having the light captured for the image blurred by the windows. That capability, plus the WORF, will make for some excellent high-resolution images.

"The station was advertised as a laboratory for science," said Runco. "One of the particular scientific fields advertised was remote sensing and Earth science. We could have done remote sensing with only external sensors located on the station's truss, but that would not have taken advantage of having the intelligent sensor, the human being, on orbit. It made sense to have an optical window on the world, if you will, beyond what has been previously available – the side hatch window on the shuttle. So the synergistic effect of the optical quality of the window and the intelligent user will make for a very strong platform for Earth science."

Dr. Lulla sees robotic spin-offs resulting from this Earth science platform aboard the ISS. There is a connection between what transpires during a human space flight program and what results in the development of robotic satellites, he says. He points to the Landsat concept, which grew out of the Apollo Program.

"I view the International Space Station as an exciting Earth science platform and an engineering and technology test bed. Before we launch an automated satellite to make measurements of some part or process of the Earth, we will be able to test that on station with a prototype. We will be able to validate that it works and then take that and use it as a free-flying satellite. That is the story and that is the contribution that human space flight has always made to Earth science activities that are now done robotically."

Who knows what robotic spin-offs will result from Earth observations made aboard the station. ■

NASA JSC Photo 2000e15241 by Robert Markowitz

Kamlesh Lulla, Ph.D, chief of JSC's Office of Earth Sciences

> ***I view the International Space Station as an exciting Earth science platform and an engineering and technology test bed. Before we launch an automated satellite to make measurements of some part or process of the Earth, we will be able to test that on station with a prototype. We will be able to validate that it works and then take that and use it as a free-flying satellite. That is the story and that is the contribution that human space flight has always made to Earth science activities that are now done robotically.***
>
> –Kamlesh Lulla

Ripped from the ROUNDUP

Ripped straight from the pages of old Space News Roundups, here's what happened at JSC on this date:

1965

Vice President Hubert Humphrey was in Houston for a quick tour of the Manned Spacecraft Center July 13 and was briefed on the current manned space programs.

The Vice President took a "ride" in the Gemini docking trainer with astronaut Walter M. Schirra and then he and his party observed a simulated Gemini liftoff at the Mission Control Center and a portion of a mission.

While at the Center, the Vice President greeted and shook hands with many of the people as he made the rounds during the tour of the facility.

1980

Another step toward the first launch of the space shuttle was taken this month with the successful completion of an Orbiter Integrated Test.

The test at Kennedy Space Center, which began on July 7 and was completed on July 14, was designed to check the way in which various systems on board *Columbia* operate together with computers, avionics, and ground systems. Principal among the systems being tested were the Orbiter's secondary propulsion system – the Orbital Maneuvering System – and its Reaction Control System, which will be used for attitude control.

1985

A manned mission to Mars in the next century could "redirect creative human brains from the prospects of dealing with armed conflict to the prospects of planning and carrying out a peaceful …program of unprecedented scope and magnitude," NASA Administrator James. M. Beggs said July 16.

Speaking at a panel discussion, "Humans to Mars – Why?" at the National Air and Space Museum in Washington, Beggs predicted that "we could be en route to Mars before the middle of the next century."

By that time, he said, "using as our springboard the space station and its infrastructure, we may very well have established a human presence at a lunar base. Mars would be the next logical niche for human expansion in the universe."

Bring Our Children to Work 2000

By Eric Raub

Hundreds of children and their parents spent the day at Johnson Space Center on June 9 for Bring Our Children to Work 2000. Students and parents attended BOCTW, which was held in the Gilruth Center ballroom and gymnasium where two concurrent presentations were held.

There were two identical sessions, one in the morning and one in the afternoon, to accommodate those registered to attend. The audience viewed one presentation first, then rotated to the other shortly afterwards which kept the presentations fresh and interesting for both the children and their parents.

In the Alamo Ballroom, the children, ages 9-15, and their parents were treated to a slide-show presentation with mounds of information on microbes, Martian meteorites, and the Red Planet itself. Before the presentation, the children were given plastic bags with a small amount of Martian soil simulant. Many were disappointed to find out that it was not real Martian dirt. However, that did not stop almost all of the children, and many adults, from taking little bags of volcanic ash home with them. The children were instructed to draw what they thought was the most common form of life on the planet on a card they were given. Answers were almost as diverse as the real spectrum of life. Of course, they were quickly told that the real answer was microbes and were then told all about their world and the possible life that may have been on Mars. They then learned about how we may one day be able to visit Mars in the future and were encouraged to try and participate in the effort. The presentation ran four times and was given by Kathie Thomas-Keptra, Everett Gibson, Simon Clemett, and Carlton Allen. Jackie Allen led in the design of the presentation.

In the gymnasium, a spacesuit demonstration was held. First the audience watched a video on spacesuits and the possible models that could be used on Mars. Then they saw the real thing in action. In the morning, a launch and entry suit was modeled by Sabrina Singh, who was joined by Peggy Halford and Jean Alexander. At both sessions, Jason Poffenberger, a JSC employee, greeted the audience wearing the necessary undergarments for the extravehicular suit and before long was suited up, pressurized, and independently mobile. He demonstrated the range and limitations of mobility of the current spacesuit as well as some of the equipment and features. Fortunately for the children, he walked right in front of them, encouraging them to feel the suit's material and pressure. Toward the end of the presentation, the crew turned an infrared camera on Poffenberger to show how they could monitor where the areas of highest temperature were in the suit. Before Poffenberger shed the almost 200 pounds of equipment, he could not resist the opportunity to try to shoot a few baskets into the overhanging basketball goal to cheers from the audience – he actually succeeded in one of his shots.

Tom Etheridge, Rook Dailey, Gary Chilson, and Karl Hamelmann provided engineering knowledge and technical support for the suit. The presenters were Amy Ross and Timothy Brady, with an introduction provided by Gretchen Thomas. They were joined by John Sanders who led the effort in preparing the demonstration.

"It's important that children are exposed to some of the projects here at JSC," said Jessie Hendrick, Federal Women's Program manager for the Equal Opportunity Programs Office. "It gives them an excellent opportunity to learn about the working environment and the wide range of fun and interesting careers here at JSC."

As the audience left the final presentation of the session for them, the children were treated to NASA bags that contained items donated by JSC, Cimarron, Averstar, Boeing, Hamilton Sundstrand, United Space Alliance, Boeing, and Honeywell. ■

GILRUTH CENTER NEWS

Sign up policy:
All classes and athletic activities are on a first-come, first-served basis. Sign up in person at the Gilruth Center and show a yellow Gilruth or weight room badge. Classes tend to fill up two weeks in advance. Payment must be made in full, cash or by check, at the time of registration. No registration will be taken by telephone. For more information, call x33345

Gilruth badges:
Required for use of the Gilruth Center. Employees, spouses, eligible dependents, NASA retirees and spouses may apply for photo identification badges from 7:30 a.m.-9 p.m. Monday-Friday and 9 a.m.-2 p.m. Saturdays. Cost is $12. Dependents must be between 16 and 23 years old.

Open from 6:30 a.m.-10 p.m. Monday-Thursday, 6:30 a.m.-9 p.m. Friday, and 9 a.m.-2 p.m. Saturday. Contact the Gilruth Center at (281) 483-3345.
http://www4.jsc.nasa.gov/ah/exceaa/Gilruth/Gilruth.htm

Nutrition intervention program: Six-week program includes lectures, a private consultation with the dietitian and blood analysis to chart your progress. Program is open to all employees, contractors and spouses. For details call Tammie Shaw at x32980.

Defensive driving: One-day course is offered once a month at the Gilruth Center. Pre-registration required. Cost is $25. Call for next available class.

Stamp club: Meets every second and fourth Monday at 7 p.m. in Rm. 216.

Weight safety: Required course for employees wishing to use the Gilruth weight room. Pre-registration is required. Cost is $5. Annual weight room use fee is $105. The cost for additional family members is $58.

Exercise: Low-impact class meets from 5:15-6:15 p.m. Mondays and Wednesdays. Cost is $24 for eight weeks.

Step/bench aerobics: Low-impact cardiovascular workout. Classes meet from 5:25-6:25 p.m. Tuesdays and Thursdays. Cost is $40 for eight weeks. Kristen Taraszewski, instructor.

Yoga stretching: Stretching class of low-impact exercises designed for people of all ages and abilities in a Westernized format. Meets Thursdays 5-6 p.m. Cost is $40 for eight weeks. Call Darrell Matula, instructor, at x38520 for more information.

Ballroom dancing: Classes meet Thursdays from 6:30-7:30 p.m. for beginner, 8:30-9:30 p.m. for intermediate and 7:30-8:30 p.m. for advanced. Cost is $60 per couple.

Country and western dancing: Beginner class meets 7-8:30 p.m. Monday. Advanced class (must know basic steps to all dances) meets 8:30-10 p.m. Monday. Cost is $20 per couple.

Fitness program: Health-related fitness program includes a medical screening examination and a 12-week individually prescribed exercise program. For more information call Larry Wier at x30301.

Aikido: Martial arts class for men and women meets 5-6 p.m. Tuesdays and Wednesdays. No special equipment or knowledge is needed to participate. Aikido teaches balance and control to defend against an opponent without using strength or force. Beginning and advanced classes start each month. Cost is $35 per month.

TICKET WINDOW

The following discount tickets are available at the Exchange Stores

General Cinema Theaters				$5.50
Sony Loew's Theaters				$5.50
AMC Theaters				$5.00
Fiesta Texas	adult	$20.50.	child (under 48 inches)	$17.25
Astroworld	1 day	$21.00	2 day	$31.00
WaterWorld				$12.00
Moody Gardens (2 events) (does not include Aquarium Pyramid)				$10.75
Moody Gardens (Aquarium only)				$9.25
Sea World	adult	$29.00	child (3-11 years)	$19.25
Schlitterbahn	adult	$21.50	child (3-11 years)	$18.00
Space Center Houston	adult	$11.00	child (age 4-11)	$7.25
(JSC civil service employees free.)				
Space Center Houston annual pass				$18.75
Splash Town	1 day	$13.00	Season Pass	$37.50
Postage Stamps (book of 20)				$6.60

Exchange Store hours

Monday-Friday
Bldg. 3 7 a.m.-4 p.m.
Bldg. 11 9 a.m.-3 p.m.

- All tickets are nonrefundable.
- Metro tokens and value cards are available.

For additional information, please call x35350.

Please bring your driver's license to pay by personal check.

NASA competition means business for students

NASA JSC Photo 2000-04497 by James Blair

The University of Illinois at Urbana-Champaign, Office of Strategic Business Initiatives' student team came up with plans for a Mars Republic that won top honors in the NASA Means Business student competition. Shown above, left to right are Lee Steffen, Caroline Blanchard, Patrick Elder, Team Leader Albert Burgos, Carlos Herrera, Team Mentor Normand Paquin, Shannon Taylor, and Jennifer Cox. Not shown are Wyoma vanDuinkerken, Jill Hjertstedt, Nancy Jeckel, Kristen Mattingly, Brian Schwartz, Marianne Steadley, and Jayganesh Venkat.

They've got ball caps and T-shirts, a list of related books, movies and links to other Web sites and they're even looking for corporate sponsors. Sounds like any of a million different Web sites where fans or hobbyists gather to share, trade, motivate and inform each other, right? But this site isn't for any earthly endeavors – this is a site designed to drive exploration to Mars.

Mars Republic is an online community designed to attract and unify Mars enthusiasts and essentially to create a virtual Mars community as a stepping-stone to a real Mars colony. As ambitious as that sounds, you may be further impressed to know that the site, and the business plan behind it, is created by students.

The plan described above is the Grand Prize-winning product of the University of Illinois' team in this year's NASA Means Business student competition. One of five finalist university teams, they presented their honed and refined "Customer Engagement" proposal for Mars exploration at the Lunar and Planetary Institute last month. NMB is an annual student competition founded by the Texas Space Grant Consortium designed to involve students from the non-traditional academic fields into the space industry.

"Typically, fields of study such as marketing, communications and public administration and those types are missed in NASA outreach activities, so we are missing 80 percent of most universities in the programs that we conduct here," said Hum Mandell, outreach assistant, Advanced Development Office. "The NASA Means Business program is an opportunity to attract some of those types of fields in a real NASA project."

The teams are encouraged to combine various disciplines and may enlist the private sector. This year, teams were asked to develop a Customer Engagement plan for Mars exploration, a program to generate interest and elicit commitment and support from space program customers.

Ten universities sent in initial proposals to NMB organizers but only five proceeded to the finalist stage where they presented to a panel of judges as well as team members from the competing schools. The five universities represented were: Georgia Tech, Stanford, University of Colorado, University of Illinois and University of Texas. A sixth team from the Massachusetts Institute of Technology and the Harvard Business School participated as a non-competing legacy team from last year's NMB program.

Throughout the spring semester, the students partner with NASA mentors (scientists, engineers and administrators) who help guide their progress. The teams also execute an outreach program outlined in their proposal. The University of Colorado's proposal strongly focused on building customer engagement through education, therefore their outreach program geared toward schools.

"I thought personally that if we have an educated base of constituents then that's going to force the media coverage, which then is going to force the Senators," said Danica Reno, freshman aerospace engineering major. "So we should start with public education, education in the schools. By definition, children are going to educate the parents because they are forced to deal with whatever the kids are learning."

With that in mind, the team visited Boulder-area schools and presented the "Clean Energy Experiment," a model that demonstrates the conversion of electricity and water into hydrogen and oxygen and then back to water and energy.

The outreach was a big success with the schools involved.

"It's difficult to interest kids so we started with hands-on activities" said Amy Earley, a freshman sociology student also on the UC team. "We learned from the beginning to get them involved and let them learn on their own. The teacher told us later, she was surprised herself how much they learned in such a little time and invited us back to teach every year until we graduate."

Similarly to UC's team, the UI team was interdisciplinary, including students from the Masters of Business Administration program as well as Industrial Design, Political Science and History.

"The diversity was a challenge but it gave us the luxury to draw from other people's rich experiences to help build up the concept," said Albert Burgos, team leader and MBA student. "Once we were able to facilitate people's ideas in an effective manner, our diversity became our strength to help create Mars Republic."

As winners of the competition, the team receives a five-day trip for two members to go to Washington D.C. to present their proposal to legislative leaders and NASA Headquarters. But according to the students, the real reward is the contacts they make and the experience gained from putting their education into practice.

"You learn a lot from this event because it is designed to be interdisciplinary," said Troy Hudson, a member of last year's MIT/Harvard winning team. Now, as a material science/engineering and planetary science graduate, Hudson will be going to work at Ames Research Center. "You learn how NASA works and the procedures for communication, as well as learning about how venture capitalism and the public and government interact. Overall, it's a good chance for students to apply what they've learned in the academic setting."

Competition Guidelines for NMB 2001 are to be released in September 2000. ■

More information on NASA Means Business Student Competition and the 2000 teams can be found at http://www .tsgc.utexas.edu/nmb/.

Plaque hanging tradition continues…

No mission is complete without the customary "hanging of the mission plaque" ceremony. STS-101 was no exception, and as our space program expands, each mission's success is attributed to many teams, in many places.

Representing the ISS flight control operations, two plaques were added to the walls in the Blue Flight Control Room – one for the increment operations between STS-96 and STS-101 and a second for joint operations during STS-101. ISS Lead Flight Director Paul Hill selected the honorees to hang the plaques in the BFCR before a capacity crowd of flight controllers, managers and the STS-101 crew.

The ISS increment plaque was hung by the lead ISS EPS Flight Controller Dave Crook representing the Power, Heating and Articulation Control (PHALCON) team. As recognized in their citation, the team received the honor for their "rapid failure analysis and quick, effective resolution of electrical system failures. This team's critical contribution to ISS operations serves as a model for all other disciplines."

The ISS Station Duty Officer team, represented by Mark Martin, received honorable mention for their service, specifically "providing continuous, effective ISS control and monitoring and their instrumental role in long term, safe ISS operations through Increment-0."

In recognition of her contributions during STS-101, ISS Program Launch Package Engineer Karen Engelauf hung the mission plaque. As noted in her citation, Engelauf was recognized for her "unsurpassed knowledge of the entire mission, from manifesting and ground processing, to the orbit operations, resulting in her indispensable role in planning shuttle flights to ISS."

Lead ISS Thermal Flight Controller Brent Rowland received honorable mention during the ceremony for his "initiative assessing numerous ISS configurations, developing thermal control strategies to support internal operations pre-flight and in real-time, as well as outstanding real-time flight control" also during STS-101.

For space shuttle operations, Flight Dynamics Officer Dan Adamo hung the plaque.

"Dan did a great deal of preflight work to devise an altitude management plan," said Phil Engelauf, lead flight director for STS-101. "This helped maximize launch opportunities for the shuttle while minimizing propellant use by the station."

Our current success wouldn't be possible without the work of the Houston Support Group in Moscow. The team there recently hung three plaques recognizing key players in the support operations in Russia.

"It's very difficult to pick who gets the honor when you feel everyone did a great job," said Patricia Moore, operations lead. "I was very pleased with the support from every team member here in Moscow before and during the flight."

> ***FGB Flight Director Yuri Kolchin and Deputy FGB Flight Director Yuri Budnki attended our ceremony at the HSG Control Room and were very complimentary of everyone. They send the MCC-Houston flight directors and flight controllers their best regards and congratulations on a very successful mission.***
>
> –Patricia Moore, NASA, Operations Lead

Kimberly Goerig, Russian segment specialist, who has been in Moscow for the last three missions, was asked to hang the 2A.1 ISS plaque.

"In addition to doing a great job on console, Kimberly has improved the efficiency and working procedures of the HSG," said Moore.

Carla Haroz, Environmental Control and Life Support Systems, (ECLSS), hung the 2A.2a ISS mission plaque.

"Carla came in just before the flight and has done a lot of good work in a very short time," explained Moore. "With all of the smoke detector problems, Carla proved she had established a solid working relationship with her Russian counterparts and greatly contributed to resolving the situation."

Tricia Mack, EVA officer assigned to the HSG, assisted Haroz with the 2A.2a ISS plaque in recognition of her poise while surrounded by "12 concerned Russians during the EVA when the OTD conflict occurred," said Moore. "She was key in resolving this situation."

And last, but not least, in recognition of their "close vigil over the FGB batteries for the past months," Eugene Schwanbeck, PHALCON, and Sergei Sverdlin, Russian segment specialist, were bestowed the honor of hanging the 2A.2a crew plaque.

"These two flight controllers dug out tons of information and helped keep the MCC-H flight control team appraised of the situation for months preceding the flight," said Moore. "They were also key in resolving situations which arose after the battery removal and replacement during the flight." ■

PEOPLE on the MOVE

Human Resources reports the following personnel changes:

Key Management Assignments

Frank Benz was named director, Engineering Directorate.

Charlene Gilbert was named acting director, Technology Transfer and Commercialization.

Hank Davis was named manager, HEDS Independent Assurance Office.

Gary Morse was named manager, Operations Services Office, Space Operations Management Office.

Edgar Castro was named manager, GFE Flight Projects Office, International Space Station Program Office.

LaDonna Miller was named manager, Customer Integration Office, Space Shuttle Customer and Flight Integration Office, Space Shuttle Program Office.

Additions to the Workforce

Morris Collie joins the Legal Office as an attorney.

Carol Devany joins the Space Station Procurement Office, Office of Procurement, as a contract specialist.

Paul Gaston and *Jimmie Mizell* join the Aircraft Systems Quality Assurance Branch, Aircraft Operations Division, Flight Crew Operations Directorate, as quality assurance specialists.

George Chi and *Matthew Schottel* join the Flight Ascent/Descent Dynamics Branch, Flight Design and Dynamics Division, Mission Operations Directorate, as ascent/descent analysis engineers.

Troy LeBlanc joins the Flight Planning Branch, Operations Division, Mission Operations Directorate, as a mission operations project engineer.

Gerald Perryman joins the Cargo Integration and Operations Branch, Operations Division, Mission Operations Directorate, as a flight controller trainee.

Timothy Finkel and *Whitney Knudson* join the Environmental Systems Branch, Systems Division, Mission Operations Directorate, as flight controller trainees.

Edward Van Cise joins the Mechanical, Booster, and Maintenance Systems Branch, Systems Division, Mission Operations Directorate, as a flight controller trainee.

Jeremy Hart joins the Guidance, Navigation, and Control Design and Analysis Branch, Aeroscience and Flight Mechanics Division, Engineering Directorate, as an X-38 design engineer.

William Verdeyen joins the Robotic Systems Technology Branch, Automation, Robotics, and Simulation Division, Engineering Directorate, as a flight systems engineer.

Robert Scully joins the Avionics Test and Analysis Branch, Avionic Systems Division, Engineering Directorate, as technical manager, avionics electromagnetic effects.

Patrick O'Rear joins the Systems Test Branch, Crew and Thermal Systems Division, Engineering Directorate, as a flight systems test engineer.

David Westheimer joins the Thermal Systems and Engineering Support Branch, Crew and Thermal Systems Division, Engineering Directorate, as an environmental control systems engineer.

Alana Whitaker joins the Life Support and Habitability Systems Branch, Crew and Thermal Systems Division, Engineering Directorate, as an advanced life support project engineer.

Donald Cybulski and *Ronald Galvez* join the Power Systems Branch, Energy Systems Division, Engineering Directorate, as electrical power systems engineers.

Dennis Kroeger joins the Propulsion and Fluids Systems Branch, Energy Systems Division, Engineering Directorate, as a liquid propulsion systems engineer.

Kerri Lind joins the Power Systems Branch, Energy Systems Division, Engineering Directorate, as a propulsion and power engineer.

Erica Sullivan joins the Materials and Processes Technology Branch, Manufacturing, Materials, and Process Technology Division, Engineering Directorate, as a materials research engineer.

Alison Dinsel joins the Structural Mechanics Design/Analysis Branch, Structures and Mechanics Division, Engineering Directorate, as a materials and structures engineer.

Gary Spexarth joins the Structural Mechanics Design/Analysis Branch, Structures and Mechanics Division, Engineering Directorate, as a flight systems design engineer.

Joseph Gessler joins the Structures and Dynamics Branch, Structures and Mechanics Division, Engineering Directorate, as a structural mechanics engineer.

Humberto Becerra joins the Cost Accounting, Reporting, and Property Branch, Financial Management Division, Office of the Chief Financial Officer, as an accountant.

John Coggeshall joins the Space Shuttle Customer and Flight Integration Division, Space Shuttle Program Office, as the flight schedule manager.

Richard Grant joins the Space Shuttle Division, Safety, Reliability, and Quality Assurance Office, as a payload safety engineer.

Steve Mai joins the U.S. Elements Assurance Branch, Space Station Division, Safety, Reliability, and Quality Assurance Office, as a software safety engineer.

Jim Cochrane joins the Hardware and Software Engineering Integration Branch, Space Station Payloads Office, International Space Station Program Office, as a payload avionics engineer.

Brenda Eliason joins the Vehicle Systems Integration Office, Vehicle Office, International Space Station Program Office, as a systems integration engineer.

Michelle Fiala joins the Propulsion Test Office, White Sands Test Facility, as a project test engineer.

Susan Ramsey joins the Space Human Factors Branch, Flight Projects Division, Space and Life Sciences Directorate, as an aerospace engineer.

Mihriban Whitmore joins the Space Human Factors Branch, Flight Projects Division, Space and Life Sciences Directorate, as a life sciences technical resources manager.

Bill Seitz joins the Program Integration Office, Space and Life Sciences Directorate, as a manager for program requirements, planning, and integration.

Amy Heartsill joins the EVA Project Office as a project manager.

Promotions

Ginger Milligan was selected as a security specialist in the Center Operations Directorate.

Earlene Green was selected as a program analyst in the Space and Life Sciences Resources Management Office, Office of the Chief Financial Officer.

Reassignments to Other Centers

Dan Mangieri moves to Kennedy Space Center.

Oma Cross moves to Marshall Space Flight Center.

Linda Garcia moves to the White Sands Test Facility.

Reassignments Between Directorates

Pat Kidwell moves from the Office of the Chief Financial Officer to the Systems Management Office.

Scott Brown moves from the Administration Office, White Sands Test Facility, to the Office of Procurement.

Penney Stanch moves from the International Space Station Program Office to the Engineering Directorate.

Dave Williams moves from the International Space Station Program Office to the Engineering Directorate.

Terry Lambing moves from the Engineering Directorate to the Office of the Chief Financial Officer.

Tom Logan and *Tom Perantie* move from the Office of the Chief Financial Officer to the Space Shuttle Program Office.

Robert Hudson moves from the Mission Operations Directorate to the Safety, Reliability, and Quality Assurance Office.

Jack Bacon, *Floyd Booker*, *Hubert Brasseaux*, *Shelby Lawson*, *Glen Nakayama*, and *Mike Thomas* move from the Engineering Directorate to the International Space Station Program Office.

Retirements

Marianne Bachstein of the Office of Procurement.

Tom Davies and *Bob Wren* of the Engineering Directorate.

Dom Apisa, *Charlie Call*, and *Betsy Hodges* of the Center Operations Directorate.

Pat Ashmore of the Space and Life Sciences Directorate.

Resignations

Richard Jackson of the Mission Operations Directorate.

Todd Yao of the Engineering Directorate.

Shayla Taylor of the Information Systems Directorate.

Jeff Evans of the Safety, Reliability, and Quality Assurance Office.

Rob Shields of the International Space Station Program Office.

DATES & DATA

August 2

Astronomy seminar: The JSC Astronomy Seminar Club will meet at noon August 2, 9, 16 and 23 in Bldg. 31 Rm. 248A. For details contact Al Jackson at x35037.

Spaceteam Toastmasters meet: The Spaceteam Toastmasters meet at 11:30 a.m. at United Space Alliance, 600 Gemini. For details contact Patricia Blackwell at (281) 280-6863.

August 3

Communicators meet: The Clear Lake Communicators, a Toastmasters International club, meet at 11:30 a.m. August 3, 10 and 17 at Wyle Laboratories, 1100 Hercules, Suite 305. Contact Allen Prescott at (281) 282-3281.

Warning System Test: The site-wide Employee Warning System performs its monthly audio test at noon. For more information contact Bob Gaffney at x34249.

August 7

NSS meets: The Clear Lake area chapter of the National Space Society meets at 6:30 p.m. at the Parker Williams Branch of the Harris Co. Library at 10851 Scarsdale Blvd. For details contact Murray Clark at (281) 367-2227.

August 8

Aero Club meets: The Bay Area Aero Club meets at 7 p.m. at the Houston Gulf Airport clubhouse at 2750 FM 1266 in League City. For more information contact Larry Hendrickson at x32050.

NPMA meets: The National Property Management Association meets at 11:30 a.m. at the Gilruth Center. For details contact Ray Whitaker at (281) 212-6130.

August 9

IAAP meets: The Clear Lake/NASA chapter of the International Association of Administrative Professionals meets, at 5:30 p.m. at Bay Oaks Country Club. Cost is $16. For more information and reservations contact Tami Barbour at (281) 488-0055, x238.

August 10

Airplane club meets: The Radio Control Airplane Club meets at 7 p.m. at the Clear Lake Park Building. For more information contact Bill Langdoc at x35970.

SPACE CENTER Roundup

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