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SPACE CENTER Roundup

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Inspection2000 features NASA technology available for real-world applications

From spacesuits to firesuits – NASA technology can be applied to almost any industry to help improve existing products, materials or processes. That’s the thinking behind Inspection, JSC’s annual open-door event for industry, researchers, scientists and businesspeople, which will be held November 1, 2 and 3.

To conquer and expand the frontier of space, NASA must continuously develop new technologies and overcome extreme challenges. This leads to breakthroughs in almost every field, from food and clothing to computer systems and communications. Yet, many of these solutions remain untapped for problems on Earth.

However, through Inspection, JSC is able to initiate partnerships with industries and people who might have never considered NASA as a counterpart before.

“We are trying to reach more of the non-aerospace-related markets,” explains Inspection2000 Chairperson Charlene Gilbert. “There are many markets that have little exposure to space research and on the surface, they don’t see any connection with NASA to the challenges they face. But once they have an opportunity to talk with NASA engineers, dig beneath the surface, and define the technical obstacles, they frequently find that there are many similarities between the two.”

With that in mind, the center will be open for three days for visitors from a wide range of sectors in the business, science and academic backgrounds to peruse the near-three hundred exhibits showcasing NASA technology and talk with JSC professionals. More than 2,500 guests are expected to attend the event, now in its fourth year.

Even fields that initially seem worlds away from space-related technology may find some parallel challenges. Such was the case with spacesuit technology that is now being used for firefighter suits.

Hot news for firefighters

The technology that protects space-walking astronauts may soon be available to firefighters on the ground through the development of an advanced suit that offers greater protection, endurance,



NASA JSC Photo s99-11669

Above: NASA spacesuit technology is helping to improve the efficiency and performance of this firefighter suit, worn by JSC Engineer Dom Del Rosso.

Right: Aerospace Engineer Tico Foley demonstrates the connection of the Super Critical Air Mobility Pack (SCAMP) to a traditional firefighter’s mask.

mobility and better communications.

JSC, working with the Houston Fire Department, KSC, Aerospace Design and Development, the Department of Defense, and Lockheed Martin, is developing a prototype suit that could double the time a firefighter can battle a blaze before having to rest and cool off.

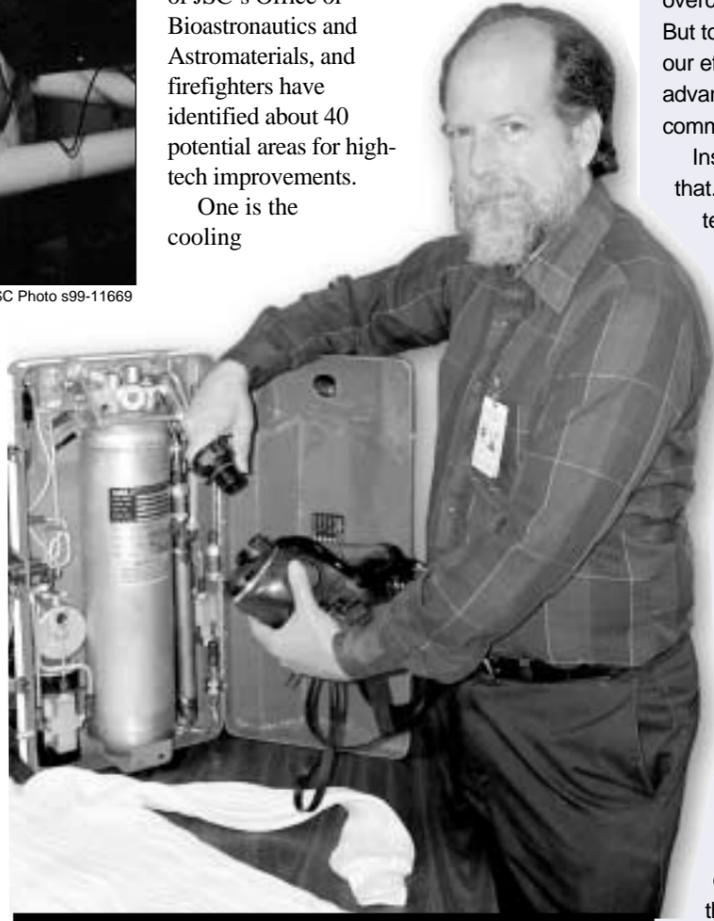
The advanced firefighter’s suit will use a number of state-of-the-art NASA technologies. Among them is active cooling, protecting the firefighter from metabolic heat trapped in the suit. Combined with new fabrics on the outer garment, the liquid cooling inner garment can allow more lengthy exposure to temperatures of up to 500 degrees Fahrenheit, compared to a maximum of

300 degrees for currently used suits. It will be double sealed, exposing no skin areas and providing protection against hazardous materials. The suit also will offer greater impact protection.

The design is still evolving. The suit ultimately could have an integrated modern helmet with duplex radio, infrared imaging to search for fire victims, biodata and temperature sensors, and readouts on the status of its life support system.

Dr. Kumar Krishen, chief technologist in the Technology Transfer and Commercialization Office, Tico Foley, an aerospace engineer in the Habitability and Environmental Factors Office of JSC’s Office of Bioastronautics and Astromaterials, and firefighters have identified about 40 potential areas for high-tech improvements.

One is the cooling



capability. “With protection from both internal and external heat sources, the firefighter will be able to extend the time available to perform the tasks of saving lives and property,” Foley said. ■

To register for Inspection2000 or for additional information visit the Web site at <http://inspection.jsc.nasa.gov/>, call (281) 244-1316 or E-mail inspection@jsc.nasa.gov.

Why Inspection?

Opening the door to NASA research and development so that the American economy and marketplace can take full advantage of its resources, and turn it into improved efficiency, jobs, technology and a stronger America is what Inspection2000 is all about.

Each day, tremendous work is done at NASA field centers, from missile research and defense systems to improvements in the aviation system and development of the safest vehicle ever, the space shuttle. But it is not enough to just do these things.

Most of us are well aware of the great strides made at NASA any given day, and the challenges we must overcome to reach those successes. But to get the absolute most value from our efforts we have to share those advancements and we have to communicate them.

Inspection is the venue to do just that. Inspection makes NASA technology available to those solving problems in our nation’s commercial marketplace. In turn, it affords the NASA team with an opportunity to investigate better approaches to our own challenges. Through Inspection, we can draw from the expertise and experience of the broader community as well as identify areas where collaborative work would be mutually advantageous.

Inspection is JSC’s opportunity to interface with the commercial counterparts in a wide range of markets. Every year, engineers, scientists, academics, researchers, doctors and hundreds of other professionals are invited to see our center’s developing technology that incorporate revolutionary processes to work.

JSC has emphasized commercial outreach and technology transfer as “our commitment to develop new ways of doing business.” We have been challenged to make significant changes in the way we do business – to be more efficient and deliver more benefits to the American people for less. Each of us can do our part by participating in events such as Inspection. ■



JSC staff and site poised for Inspection.

Page 2



Genesis payload ready for mission to collect solar dust.

Page 3



Clinic announces new approach to onsite care.

Page 7

Now showing...

2000 Inspection



Here's a preview of exhibits and buildings open to Inspection2000 visitors...

Building 2

Listen to daily presentations in the Teague Auditorium featuring keynote speakers such as Astronauts John Young, Dave Williams and Franklin Chang-Díaz. Additional exhibits will also be on display here.

Building 5

See how some of JSC's cutting-edge training technologies, such as robotics and virtual reality, are helping to prepare crews for the challenges of space flight. Also inside are the Shuttle Mission Simulator and Space Station Training Facility.

Building 9N

Building 9N showcases the shuttle and International Space Station mockups and trainers. Visitors can also see other JSC robotics and virtual reality technologies being developed to assist flight crew with space flight tasks. Guests can see human tissue growing in a bioreactor's rotating vessel, which mimics zero gravity. Or see the revolutionary new drug delivery system known as microencapsulation.

In this building, visitors can also see exhibits from other centers and field offices such as White Sands Test Facility's Micrometeoroid and Orbital Debris research exhibit.

Visitors can "refuel" in the Paris Café and then embark on guided tours to other JSC sites or catch a bus that will take them to Sonny Carter Training Facility and Ellington Field.

A reception will be held here each evening for Inspection2000 visitors.

Building 9S and 10

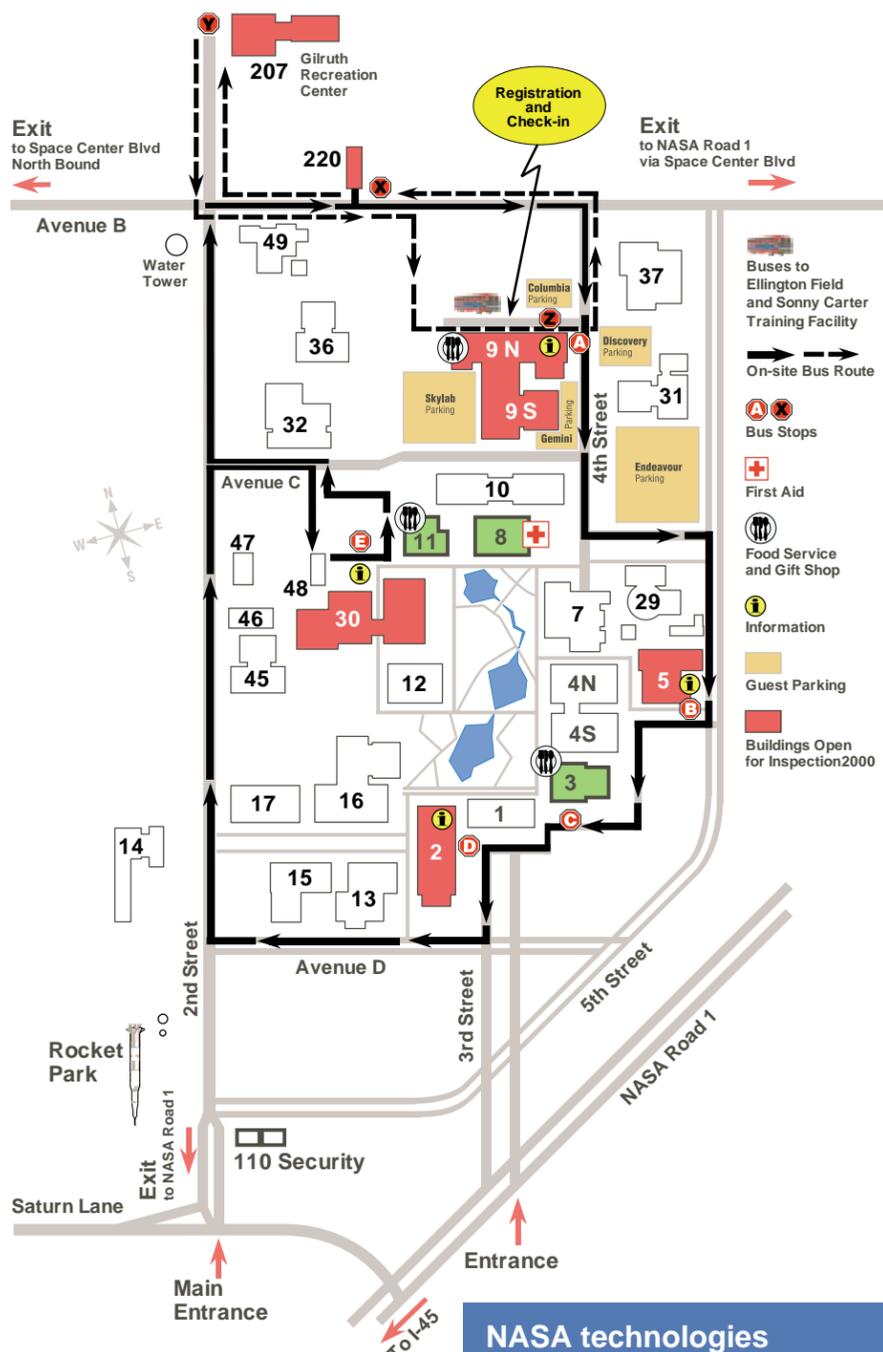
Here visitors can see one of JSC's manufacturing and material technologies including one of our most amazing emerging technologies – carbon nanotubes, which at only 1/16 the weight of steel, offer 10 times more strength.

Building 13

Guests can peruse through a wide range of engineering and technology exhibits highlighting NASA's developing research.

Building 30

Building 30 visitors will get to see JSC's historic landmark when they visit the Apollo Control Center. They also can see the advancements in mission control concepts in the new Mission Control Center and see the latest in our weather forecasting capabilities in the Weather Center. Building 30 also hosts our Telescience Support Center, the Emergency Operations Center and Space Operations Management Office exhibits.



Building 220

The X-38 Crew Return Vehicle, designed by JSC engineers, incorporates some of the most advanced concepts in flight vehicle aerodynamics. Here visitors can see the vehicle and learn more about some of its cutting-edge advancements such as electromechanical actuators. Visitors can also see the revolutionary Laser Tracker, used to develop 3-D surface imaging.

Gilruth Recreation Center

Visitors can walk through time and see just a few of the advancements that have improved our daily lives in the Benefits of Space trailer. Then, walking through the L-shaped International Space Station trailer, they can see what's in store from the orbiting station.

Ellington Field

View JSC's renowned aircraft operations at this on-airport site. Peek into the Super Guppy Aircraft, a one-of-a-kind plane specially designed to transport the extra-large components for the International Space Station. Take a look at the unique cockpit of the Shuttle Training Aircraft that has standard aircraft flight controls on the right and

NASA technologies on exhibit:

Propulsion, energy systems, human factors, product design and analysis, materials, instrumentation, workflow, networks, automation, environmental, medical, life support, business management, workforce, education, training, robotics, virtual reality, and manufacturing.

shuttle flight controls on the left side to help train shuttle pilots to land the orbiter. You'll also be able to see the pristine T-38 jets used by astronauts to maintain aviation proficiency and the WB-57 High Altitude Research Aircraft.

Sonny Carter Training Facility

See the world's largest indoor pool, the Neutral Buoyancy Laboratory, which is used to train astronaut crews how to maneuver in low gravity environments. And see the Magnetoplasma Propulsion Lab, where some of JSC's leading edge propulsion research is being conducted that might possibly bring humans to Mars and beyond. ■

Getting around Inspection2000

At Inspection2000 the exhibits will be organized in six centralized building locations, along with exhibits at Ellington Field and Sonny Carter Training Facility (SCTF). Also, new this year are guided bus tours ensuring guests have the opportunity to visit JSC's other unique facilities and labs. Each of the tours will run three times daily each day and will last approximately 90 minutes each. All bus tours will begin and end at Bldg. 9.

Visitors can participate in three different guided tours.

Human Factors Facilities

- ❖ B15 – Graphics Research and Analysis Facility and Anthropometry and Biomechanics Facility
- ❖ B17 – Food Systems Engineering Facility
- ❖ B29 – BioPlex

Testing Facilities Tour

- ❖ B14 – Radio Frequency Test Facilities (anechoic and EMI chambers)
- ❖ B49 – Vibration and Acoustic Test Facility
- ❖ B353 – Energy Systems Test Area (Resource Conversion Test Facility)

Unique Facilities Tour

- ❖ B16 – SES
- ❖ B32 – Vacuum Chamber and TransHab
- ❖ B31 – Lunar Sample Laboratory

Other guided tours (non-bus) are available in or near specific buildings, such as:

- ❖ B9NE – Robotics Laboratories (twice a day);
- ❖ B10 – Manufacturing Technologies (walking tour from 9S);
- ❖ B30 – Original Mission Control Center, Telescience Support Center and new Mission Control Center (every 20 minutes);
- ❖ B30 – Emergency Operations Center and Weather Center (every 20 min); and
- ❖ SCTF – Magnetoplasma Propulsion Research Lab (every half hour).

Visitors can visit the following sites at their own pace.

- ❖ B5 – Shuttle Mission Simulator, Space Station Training Facility
- ❖ B9 – International Space Station mockups and trainer facility, virtual reality for EVA, air-bearing floor, shuttle/space station hydraulic hardware arms.
- ❖ B9S – Composites Manufacturing
- ❖ B220 – X-38, Laser Tracker
- ❖ SCTF – Neutral Buoyancy Laboratory
- ❖ Ellington Field – Shuttle Training Aircraft, T-38s, WB-57, Shuttle Carrier Aircraft.

Individual tours can be arranged, as warranted from booths in core buildings for the following sites:

- ❖ B12 – JSC Language Education Center
- ❖ B15 – Receiving Inspection and Testing Laboratory
- ❖ B17 – Integrated Design Center
- ❖ B222 – Atmospheric Reentry Materials and Structures Evaluation Facility

JSC readies Genesis for space flight

Experiment will bring back first extraterrestrial samples since Apollo

For the first time since Apollo, JSC scientists are preparing to once again receive extraterrestrial samples from space. Genesis, a satellite that will capture solar wind particles and return them to the Earth for analysis, was recently shipped from JSC to Lockheed Martin in Denver for spacecraft installation and from there will be headed to Kennedy Space Center for a February launch.

The Genesis payload, a 32-inch diameter cylindrical canister, was manufactured by NASA's Jet Propulsion Laboratory and shipped to JSC in early July for precision cleaning. JSC is responsible for the contamination control and sample curation of the Genesis mission. As part of the contamination control process, JSC completely disassembled, cleaned and reassembled the canister. After some final functionality tests and purging the canister of nitrogen, Genesis was sent to Denver and is now one step closer to its on-orbit mission.

Genesis will be launched on a Delta II in February 2001. It will take nearly three



NASA JSC Photo 2000e22254 by Judy Allton

months for the device to reach its solar orbit entry site, roughly 1.5 million kilometers sunward where the Earth and Sun's gravity balance each other. Genesis

will orbit the Sun for two years, collecting solar wind samples on ultrapure collectors, such as silicon wafers used in the semiconductor industry. Its return,

estimated for 2003, should help researchers resolve many unanswered questions about the origination of the solar system.

"The main objective of the Genesis mission is to understand the materials and processes involved in the origin and evolution of the solar system," said Eileen Stansbery, Ph.D., and JSC assistant chief, Planetary Science. "At JSC, we already have samples of a variety of solar system objects, including rocks from the Moon, several asteroid classes, several igneous rocks from Mars, even interplanetary dust grains. In the coming decade we will receive documented samples from a comet, an asteroid, and the surface of Mars. What is missing are samples of the starting material itself – the solar nebula. Genesis will collect solar wind samples of all elements in the periodic table and therefore the average chemical and isotopic composition of the solar system." ■

Researchers in JSC's planetary science department ready Genesis for its mission to collect solar dust.

Planetary Science. "At JSC, we already have samples of a variety of solar system objects, including rocks

Flight controllers host visitors for EVA simulation

During a recent EVA simulation for the STS-92 mission, flight controllers opened the Mission Control Center to simulation facilitators from Challenger Center organizations, providing them with a chance to see how real NASA flight controllers conduct actual, integrated mission simulations.

Challenger Centers, located all across the country, host training sessions similar to NASA integrated simulations.

"The simulations conducted at Challenger Centers have proven to be a very effective way of familiarizing the public with manned space flight operations," said NASA Flight Director Chuck Shaw. "The idea is to let them see how we conduct an integrated simulation so they can apply what they see where it makes sense for their simulations."

Numerous flight controllers in both the White Flight Control Room (Shuttle operations) and Blue Flight Control Room (International Space Station operations) volunteered to allow a Challenger Center visitors to join them at the console to see and hear the process as it works during integrated

simulations. In addition, after the simulation several Flight Controllers volunteered to take the Challenger Center folks on personal tours of other activities at JSC.

The STS-92 crew was tied-in for the simulation from the Shuttle simulator as well as from in the water in the Neutral Buoyancy Laboratory as the team practiced the Extravehicular Activities that will be conducted on Flight Day 5 of the next shuttle mission. The activity encompassed connecting hardware for the Z1 Truss element.

"It was positively fascinating," said Nancy Thompson, a teacher/flight director for the Challenger Center of the Rio Grande Valley. "I was able to sit next to the Cap com and listen to her as she communicated with the astronauts in the pool. It was amazing."

Challenger Center representatives came from as far as Brownsville and Beaumont/Port Arthur for a chance to sit in with controllers.

Thompson, like many of the other Challenger Center attendees, participated in the



NASA JSC Photo 2000-06143 by Benny Benavides

event hoping to return to their centers, and classroom, with a more accurate perspective of how Mission Control Centers operate.

"I certainly understand a lot better," added Thompson. "It made me aware of how much I don't know. This was truly an out of this world experience for me!" ■

Flight Director Chuck Shaw talks through his role during the simulation as Challenger Center Instructors Betty Glass and Barbara Wilson listen intently to the real-time communications with the STS-92 crew. Capcom Ellen Ochoa, far left, looks on.

Dreamtime hardware to provide high-definition video from space

Only a few months after announcing the first-of-its-kind partnership, JSC has officially received its first piece of video hardware as part of the Dreamtime venture.

A high-definition, digital encoder, developed by NTT and NHK, was delivered to JSC engineers September 5. The encoder represents the first Detailed Test Objective of the Dreamtime public-private partnership. It will be flown aboard an upcoming shuttle mission and operate with a decoder on the ground to provide live high-definition video downlink from space for the first time. Currently, NASA uses standard analog transmission for its downlink video.

"This is a very important step in the NASA and Dreamtime collaboration," said Brian Kelly, NASA collaboration manager for the partnership at JSC. "It puts NASA on the cutting-edge of digital technology and is tangible proof of what can happen when NASA and industry work together toward a common goal."

JSC's shuttle and engineering teams will spend the next few months identifying any necessary modifications to the encoder to make it compatible for space flight operations.



NASA JSC photo 2000-06090 by Benny Benavides

JSC received a digital, high-definition encoder that will be used to download live video from space. Shown here, left to right, are Randy Richards, NASA; Johnnie Reid, Lockheed Martin; Ken Fisher, NASA; Ben Mason, Dreamtime; Yanagawa Koji, NASDA; John Kennedy, NASA; and Doug Holland, NASA with the encoder, forefront.

NASA announced in June its groundbreaking partnership with Dreamtime. The partnership represents a unique association bridging nation's space agency with the power of the Internet. By using the most advanced technology tools available, such as digital media, leading-edge Web design

and HDTV, the public will have easier, more complete access to space exploration and imagery.

This unique partnership will provide a gateway to NASA's incredible collection of imagery, audio and film documenting more than 80 years of aeronautical and

space history by:

- Digitizing NASA's photo, audio and video archives from each center and making it available globally via the Web;
- Upgrading NASA's multimedia equipment, at each center as well as on each shuttle and the International Space Station, with next generation HDTV technology; and
- Creating world-class film, documentary and television programming that will preserve and share the legend of America's space program with the world.

The partnership with Dreamtime provides NASA with the tools and capability to share the agency's exclusive work and imagery with audiences it otherwise could not reach. In fact, by mid-October, Dreamtime will have delivered more than 2 million dollars worth of digital technology equipment to the agency.

"Dreamtime has also provided NASA with two high-definition television cameras to document the launch of *Discovery* from Kennedy Space Center October 5," said Kelly. "Following that launch, technicians from Marshall Space Flight Center, Kennedy Space Center and JSC will carry the cameras to Russia and prepare coverage for Expedition One." ■

NASA names STS-92 Space Flight Awareness Launch Honoree Award recipients

NASA recently named 15 JSC civil servants recipients of its prestigious Space Flight Awareness Launch Honoree Award for the STS-92 mission.

Keith Albyn

Albyn, an aerospace technologist, has sustained a high level of performance in support of space station and space shuttle hardware contamination testing and assessment, providing both testing and analysis of materials for use in space environments. This data and analysis is essential for successful application of materials on critical optical or thermal surfaces exposed to space.



Ronald Baccus

Baccus, an aerospace engineer, has contributed to the development of the X-38 Crew Return Vehicle both as a structural designer and as a stress analyst. He is responsible for the detailed design of the vehicle's carbon-fiber composite aeroshell panels, which form the outer shape of the spacecraft when combined with the thermal protection tiles and blankets. His efforts have led to the implementation of a stiffened laminate construction for all the panels, resulting in a significant reduction in development costs.



Robert Durkin

Durkin is a program manager who has been instrumental in the engineering and management of the design through manufacturing of EVA and IVA mockups for the space shuttle and the International Space Station. These mockups are being used in the Neutral Buoyancy Laboratory and Space Vehicle Mockup Facility for astronaut training in techniques in space shuttle and International Space Station activities. Durkin started at JSC designing mockups at the Weightless Environment Training Facility and has taken that experience to manage and engineer multiple mockup projects.



Vince Fogt

Fogt, an aerospace engineer, assesses finite element models for adequacy in predicting structural dynamic response of payloads during shuttle flight and to support International Space Station Program on-orbit loads validation. His expertise is essential in ensuring that the models used to predict dynamic response behavior are the best that can be provided. He was recently called upon to provide expert loads and dynamics consultation to the Jet Propulsion Laboratory to develop high-quality models to protect the Orbiter during the



Shuttle Radar Topography Mission. His knowledge of the dynamic loads coupling phenomenon between the Orbiter and its constantly changing payloads allowed him to provide the insight required to validate necessary flight guidance parameters to ensure mission safety.

John Hoover

Currently a flight manager in the Mission Operations Directorate, Hoover, an electrical engineer, has contributed to NASA in a wide variety of roles during his more than 35-year career with the agency. Early in his career at JSC, he supported every flight from Gemini 4 to Apollo 15 either for the Recovery Operations Control Center or deployed as an advisor to the Department of Defense recovery forces. He served as a senior electronics data manager in Aircraft Operations during the Skylab Program. Following that assignment, he took on the challenge of learning shuttle payload operations and became one of the first certified payload officers, making pioneering contributions to payload operations on the early shuttle flights. In 1986, he joined the Mission Integration & Schedule Management Office as a shuttle flight manager, serving in this capacity for ten years. He then became a member of the initial flight manager team to pioneer development of the flight and increment preparation processes for the International Space Station.



Bradley Irlbeck

Irlbeck, an aerospace engineer, is the design engineer responsible for the Space Shuttle Auxiliary Power Unit. His efforts have been instrumental in the safe and successful flight operation of this critical subsystem. He has helped resolve numerous flight anomalies and has been the driving force behind many subsystem improvements. In his role as project manager for the Electric Auxiliary Power Unit, he has initiated and is leading a major upgrade of this subsystem to achieve major improvements in flight and ground safety. To date, he has justified initial funding to start the advanced development for this project and has assembled a team of multiple NASA centers and industrial partners.



Glenda Johnson

Johnson, a program analyst, recognized the need for a more efficient means to communicate and manage the flight projects budget. This recognition led to the development of a share drive internal budget database for the Flight Projects Division. This database tool, which has become the backbone of the division's performance status, enables technical and resources personnel to manage and communicate budget matters on a real-time basis, resulting in early detection of cost issues and numerous cost savings to the space station and space shuttle programs.



Joe Kosmo

Kosmo, a spacesuit engineer, is responsible for managing and directing the advancement of technologies applicable to extravehicular

activity. He has continually focused spacesuit technology to be consistent with NASA's goals for the exploration of space. One of his leading contributions has been providing leadership in the advancement of spacesuit glove assemblies. Glove advancements made under his leadership have included innovative design modifications that increase hand dexterity and tactile feedback while reducing hand fatigue. In addition, he recently led the effort to establish a Mars surface simulator at JSC, which allows for inexpensive evaluation of EVA systems requirements for Mars exploration.



Ronald Lee

Lee, lead director of training operations in Russia, has made significant contributions to International Space Station crew training over the past two years. As director of training operations in Russia, he led a team of managers and engineers assigned to represent the Mission Operations Directorate and Space Flight Training Division management with respect to crew training operations in Star City, Russia. He set high standards for the information flow between Star City and JSC, worked training issues to resolution, and strengthened the Director Training Ops in Russia links with the other NASA offices in Moscow.



Kathy Lueders

Lueders is the lead of the International Space Station Logistics and Maintenance Ground Operations Support Team. She has successfully managed the Post-Production Support portion of the prime contract including overseeing development of the PPS operating plan, performing contractor evaluations, and managing the budget. In addition, she has established all required documentation to support long-term maintenance and repair of station hardware.



Nancy Muir

Program Analyst Muir's efforts were instrumental in the effective reorganization of the Institutional Resources Management Office in the Office of the Chief Financial Officer. Immediately following the creation of the IRMO, a key person resigned as the resources integrator for a major JSC organization. Muir volunteered to continue performing her function as JSC's architect for the development of the center's full-cost budgeting and management processes, assume other functions as needed, and be the primary trainer for the new replacement integrator when one was named. Her can-do attitude allowed a number of personnel moves to be accomplished in a timely manner for the good of the organization.



Edward Robertson

Robertson, an aerospace engineer, led the recent effort to build and test the latest atmospheric prototype of the Crew Return Vehicle. This fiberglass vehicle recently completed its first captive flight aboard a B-52 bomber and is being readied for its first flight. He was instrumental in identifying the requirements for this vehicle, monitoring the construction of the fiberglass structure, and planning and supervising the systems installation and integrated checkout. As a result of his efforts, this prototype of a vehicle crucial to crew safety aboard the space station is proceeding very aggressively to flight test.



Denise Romero

As the division chief engineer for the Avionic System Division, Romero serves as the focal point for all interactions with the Space Shuttle Program and as the representative to the Engineering Directorate's chief engineer for the space shuttle.



She led the effort to resolve government furnished equipment loads issues that were a constraint to the STS-106 mission. It had been determined that the certification of GFE items more than 15 years old was inadequate. After finding as much of the historical data for each hardware element that was available, Romero led the activities between ASD and the Structures and Mechanics Division personnel to assure that the required loads analysis was completed.

Damon Shaffer

Shaffer, the Z1 Truss element manager in the International Space Station Vehicle Office for the past two years, has been instrumental in completing the design, manufacture, and testing of the truss as well as in ensuring its final acceptance by NASA. His efforts have helped resolve several critical technical issues that have arisen during the development of the truss. Most recently, he has worked to ensure final closure of the issues and actions required for final flight readiness and successful integration of the Z1 into the shuttle.



Anne White

A division secretary, White supports Operations Division civil service and contractor employees working in the Houston Support Group in Moscow. She coordinates and arranges travel to and from Moscow for all Operations Division civil service employees who average a minimum of four trips per year for periods of six to nine months. She is recognized as a vital link between HSG personnel in Moscow and their coworkers and families in Houston. ■



Sixteen JSC employees earn award; see breathtaking STS-106 launch



Seated, from left: Judy Willhoite, Adele Leighton, Liz Kalla and Jessie Hendrick. Second row, from left: Eric Darcy, William Powers, Greg Blackburn, Jay Hoover, Keith Brown and Ray Torrez. Third row, from left: Kathy Rauch, Fred Ouellette, Frank Alanis, Clifford Madrid, John Graf and Cecilia de la Garza.

Sixteen Space Flight Awareness launch honorees from JSC were recognized at Kennedy Space Center where they viewed the launch of *Atlantis* on space shuttle mission STS-106.

The STS-106 honorees included: Frank Alanis, Greg Blackburn, Eric Darcy, John Graf and Judy Willhoite, Engineering Directorate; Keith Brown, Information Systems Directorate; Cecilia de la Garza, Safety, Reliability and Quality Assurance Office; Jessie Hendrick, Equal Opportunity Programs Office; Jay Hoover, Center Operations Directorate; Liz Kalla and Kathy Rauch, International Space Station Program Office; Adele Leighton, Office of the Chief Financial Officer; Clifford Madrid, White Sands Test Facility; Fred Ouellette, Space Shuttle Program Office; William Powers, Mission Operations Directorate; and Roy Torrez, Flight Crew Operations Directorate.

Alanis was cited for his outstanding contributions and expertise in resolving the shuttle's wiring damage issues and his leadership and tenacity in adapting the Russian Docking System for the Orbiter and International Space Station interface.

Blackburn was recognized for leadership and dedication as project manager for the Space Integrated Global Positioning System/Inertial Navigation System Project, otherwise known as SIGI. The SIGI will be used to support three programs and will increase performance while maximizing savings to the government.

Brown was cited for his project leadership, engineering and software design skills, all critical in the design and development of software tools that continuously extend the margin of safety for the space shuttle vehicles as well as NASA's fleet of aircraft.

Darcy has led a number of battery projects in support of several NASA programs. These include the adaptation of commercial batteries for flight applications, resulting in consistency, commonality, effective use of manpower and reduced costs.

De la Garza consistently demonstrates outstanding administrative skills, professionalism and attention to detail that support the SR&QA organization in assuring accomplishment of its mission and the safety of each space flight mission.

Graf was cited for the technical leadership and expertise he has displayed in the development, fabrication and certification of the back-up oxygen candle system for the International Space Station Program.

Hendrick was recognized for her continued dedication to the JSC Disabilities Program by her many contributions to the various committees to accommodate the disabled, both internal and external to JSC, and for her involvement in recruiting summer interns with disabilities.

Hoover was cited for the outstanding support he has provided to NASA's space programs, specifically his effective management of the rehabilitation project for the Mission Control Center power and control system, a \$5.7-million-dollar project.

Kalla led the Stowage Working Group in the development of innovative and comprehensive solutions to the stowage issues on the International Space Station, which required extensive negotiations with the Russians as well as numerous groups within JSC and the contractor community.

Vehicle Engineering Office, all of which will greatly improve the overall safety of the shuttle fleet.

Powers was recognized for his sustained outstanding performance, technical competence and personal dedication in support of nearly 50 space shuttle flights as a certified flight controller.

Rauch was honored for her significant contributions to the successful integration of Russian hardware into the International Space Station Program by creating and documenting a new process for developing, qualifying, certifying and shipping Russian flight hardware labels.

Torrez was cited for his outstanding achievements and dedication to duty by demonstrating critical quality assurance accomplishments in support of aircraft corrosion programs and the T-38N ejection seat replacement program.

Willhoite was honored for her significant personal contributions and outstanding support in managing administrative functions for the Crew and Thermal Systems Division in the role of supporting the space shuttle, International Space Station and advanced programs.

The recipients received a VIP tour of KSC and were guests of honor at a reception where astronauts and members of NASA and contractor management applauded their work and dedication to the space program.

Astronaut Greg H. Johnson presented each honoree with a framed certificate and a lapel pin at JSC's awards breakfast held during the event.

The Space Flight Awareness Launch Honoree Award is the highest tribute paid to government and industry workers to recognize their work on flight systems and other critical mission support tasks that contribute to astronaut safety and mission success. ■

For more information concerning the SFA Program, contact Barbara Zelon at x38782.



The crew of STS-106, clockwise from the top, Richard Mastracchio, Boris Morukov, Edward Lu, Scott Altman, Terrence Wilcutt, Yuri Malenchenko, and Daniel Burbank

Leighton was cited for her support of the Engineering Directorate's engineering technical base budget and her performance as the Lockheed Martin Science & Engineering analysis and test contract business manager.

Madrid has managed many construction-related projects and office budgets and has effectively transitioned into managing technical service functions such as the White Sands Test Facility calibration and cleaning facilities.

Ouellette was cited for his outstanding leadership and technical contributions in managing several Orbiter upgrade projects and numerous flight production projects for the Space Shuttle

Ripped from the ROUNDUP

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

1 9 7 0

During their exploration of the lunar hill country next February, the Apollo 14 astronauts will set off 21 small explosions on the surface and arm a mortar to launch four grenades after they leave.

Measurements of the resulting vibrations of the Moon, radioed to Earth, will give scientists new information on the shape, structure and thickness of the outer crust.

The Active Seismic Experiment, as it is called, will be set out by Lunar Module Pilot Edgar D. Mitchell during the first of two four-to-five hour ventures outside the LM with Mission Commander Alan B. Shepherd Jr., during their day-and-a-half on the Moon.

1 9 8 0

JSC engineers have created a supermetal, lighter, stronger and stiffer than aluminum and carries a lifetime guarantee in space. It is made of aluminum or magnesium laced with thousands of hair-thin strands of graphite fibers. Technically named, "metal matrix composites."

Sandwiched between aluminum or magnesium, the feather-light graphite makes the finished materials stronger, about four times more rigid and up to 35 percent lighter.

Unlike other materials in space, the composite also provides thermal stability – remaining unaffected by heat or cold since graphite metal matrix composites will not expand or contract significantly.

1 9 9 0

The words most commonly used to describe the STS-41 launch, landing and on-orbit operations were "near perfect."

Discovery and its five-person crew left launch pad 39B at 6:47 a.m. CDT Saturday and, after achieving its 160 nautical mile orbit, proceeded to deploy the Ulysses spacecraft on schedule six hours later.

At last report, Ulysses was performing extremely well, speeding toward Jupiter at the fastest ever Earth-orbit escape velocity. During the remainder of the STS-41 mission, Commander Dick Richards and his crew exercised the secondary experiments, all of which, again, were "near perfect."

Aranda, Ellington earn Secretarial Excellence Awards



Margarita Aranda



Brenda Ellington

Margarita Aranda of the Mission Operations Directorate and Brenda Ellington of the Office of the Chief Financial Officer each recently received the Marilyn J. Bocking Secretarial Excellence Award in recognition of their exceptional contributions, professional competence, and personal dedication.

Margarita Aranda was recognized in August for her contributions as the secretary in the Mechanical, Booster and Maintenance Systems Branch. She supports a large, diverse organization of civil service and contractor personnel in two different buildings. This job is one in which timetables are short, changes frequent, and branch personnel sometimes short-tempered and demanding.

Aranda has been entrusted with several division-level tasks. She is responsible for gathering quality metrics for the 15 shuttle and station flight control groups in the division and consolidating the data. These metrics attain high visibility throughout JSC.

Aranda is extraordinarily proactive in that she has offered to assist in meeting deadlines with database and word processing tasks to offload engineers under deadline pressure. In addition to the standard branch responsibilities, Aranda successfully coordinated the relocation of all the branch personnel. The planning and execution of the move was done flawlessly and was critical to the branch's ability to perform its technical duties without pause.

Brenda Ellington was recognized in September for her contributions as secretary to the Space and Life Sciences Directorate Resources Management Office. She has demonstrated her capabilities for excellence in her area of coordination of the SLSD Technical Cost Review. She updates the TCR "call" and its numerous attachments, including Excel spreadsheets, CFO format, TCR PowerPoint charts, memorandum, work breakdown structure, distribution list, and word attachments, which make her the backbone of this

bimonthly activity. In addition, as she is the focal point for SLSD TCR data gathering, the entire SLSD directorate senior management provides the inputs directly to Ellington, and she reformats and edits the presentation and prepares an integrated 200-page set of charts that are viewed electronically for the TCR meeting. This saves the presenters' time and makes for smooth speaker transitions at this two-day meeting. The quality and quantity of work of this TCR assignment including the numerous interfaces greatly exceed normal secretarial duties.

Ellington also does an excellent job on a number of routine but key assignments such as compiling the weekly activity report, preparing presentation material, preparing and processing personnel actions, planning and coordinating travel arrangements, coordinating numerous moves, and maintaining current and accurate timecards via the Time and Labor Collection System and assuring their timely submittal. ■

JSC's new time and labor collection system coming to a Web browser near you

TLC is JSC's new electronic, Web-based, time and labor collection system. It will replace the old system of timecards and labor distribution records. The system was successfully piloted and interfaces to the NASA personnel/payroll system and the labor distribution system were tested over the summer. The centerwide, phased implementation of the system begins October 8. The entire center is expected to be using the new system by March 2001.

Users will access TLC through the Internet from a link on the TLC homepage. This will be especially convenient for remote users who are detailed to another

center or are on TDY. These users can access the system as long as they have dial-in access to the JSC network. The TLC implementation team asks that no employees attempt to access the system before their organization's go-live date.

Links to the TLC homepage can be found on the JSC and CFO homepages. In addition to providing access to the TLC system, the homepage contains news, information and helpful hints concerning TLC. The TLC homepage address is: <http://www4.jsc.nasa.gov/org/la/cfo/NewTandL/NewTandLSys.htm>.

A TLC Lab has been established. The lab opens October 10 in Bldg. T-585, Rm.

129. The lab will be open on a limited basis by appointment to provide one-on-one assistance to employees whose organizations have implemented TLC.

Users guides and quick reference guides have been developed for user assistance. The training guides can also be accessed electronically from the TLC homepage.

The TLC Help Desk is available to help users with questions and problems they may have using the TLC application. The Help Desk is open Monday through Friday, 8 a.m. to 5 p.m. The Help Desk can be reached by calling 281-483-2029 or via email, tlchd@ems.jsc.nasa.gov. ■

NASA awards new travel management contract

Recent airline commission reductions are causing historically "free" booking services to be eliminated and replaced with "fee-for-service" contracts. The existing NASA agency-wide travel services contract is a no-cost contract where income is obtained through commissions. Over the last year, airlines have dropped commission rates considerably.

Since the existing contract with American Express expired on September 30, NASA elected to award an agency-wide, fee-for-service contract for travel management services to CI Travel. Contract effective date was October 1. This contract provides agency-wide travel services to NASA centers using a central reservation call center located in Norfolk, Virginia. The scope of this effort includes the following types of travel support:

- ❖ Official travel for all NASA personnel
- ❖ Official travel for other government personnel
- ❖ Official travel for on-site and near-site NASA contractors
- ❖ Leisure travel

Under a call-center environment, travelers will make official travel reservations by calling a 1-800 toll free number. The traveler will receive a reservation itinerary via E-mail or fax. As an additional value-added service, on-line booking will be available within 120 days of contract start date.

A temporary help desk will be located in the Bldg. 1 Travel Office to ensure a smooth transition to the new contract.



JSC Clinic rolls out new Case Management Program

To ensure appropriate medical attention, proper follow-up and successful return to work for any injured or ill JSC employee, the center's Occupational Health and Test Support Office has established a Case Management Program. The program has been in effect for approximately six months, although the official rollout began with the June presentation of the program to the JSC Executive Safety Committee.

As part of the new program, a nurse case manager has been added to augment the JSC workers compensation claim officer. The nurse tracks each case from the time the injury or illness is initially reported, until the employee successfully returns to work.

According to JSC Nurse Case Manager Connie Hesselgesser, the Occupational Safety and Health Administration, OSHA, reports that the average lost time injury case costs an employer about \$40,000. "At JSC we have done an excellent job of abating and controlling workplace hazards, but found we needed to improve upon our process to meet the needs of the employee in the event an injury or illness," said Hesselgesser. "Proper management, clinically and administratively, can restore the productivity of the injured worker and possibly prevent the mishap from becoming a lost time incident."

A key element of this program is the Clinic First policy. To ensure early medical treatment and proper incident investigation, employees must report all injuries and illnesses as soon as possible to the JSC Clinic.

"We found that if the employee reported to the JSC Clinic immediately after the mishap and was logged into the



NASA JSC Photo 2000E22982 by James Blair

Clinic First

Nurse Case Manager Connie Hesselgesser, left, and Workers' Compensation Specialist Pam Daley play key roles in implementing the Johnson Space Center Case Management Program designed to ensure proper medical care and successful return to work for any injured or ill JSC employee.

system, we were less likely to have complications later that could lead to further aggravation of the injury or result in unnecessary lost time," said Hesselgesser. "Through additional education and promotion, we want every JSC team member to know that in the event of an injury or illness, they should report to the Clinic First. In an emergency situation, call the five threes for JSC and SCTF or the five fours for Ellington Field. This will summon medical and emergency responders to the scene of the mishap."

Active management involvement in the case management process from beginning to end is also critical. The manager of the employee should report to the JSC Clinic or the hospital with the ill or

injured employee to provide support and compassionate care. Once the proper diagnosis and treatment is provided, management can work with the medical team to determine the employee's work status (return to work, return to work with restricted duty, or referral out for additional diagnosis and treatment). Management is also responsible for overseeing the mishap investigation and filing the necessary paperwork (Mishap Form 1627) to record the mishap.

Returning employees to work as soon as they are medically able will pay benefits in the long term, even if the employee returns to work under restricted duty. "Although this process benefits our mishap rates, the real gain is in the assurance our employees

will gain knowing that management is genuinely concerned about their well-being," said Hesselgesser.

For NASA employees, the JSC workers compensation claim officer, Pam Daley, works with the employee to file claims and receive any necessary outside medical treatment. For contractor team members, Hesselgesser contacts appropriate officials and assists with additional care through the employee's designated claims officer. It is a team effort involving medical, management, human resources and other safety and health professionals.

Response to this program has been overwhelmingly positive. Employees, managers and contractor representatives have expressed gratitude for prompt attention, notification and follow-through of cases presented by employees at JSC.

"Several employees we contacted after being seen in our clinic were very surprised, but pleased, to have someone call them for a follow-up," says Daley. "Most of the time the purpose of the call is just to ask how the patient is doing and to ask if we can do anything else to help, but people really appreciate the personal touch."

JSC's Occupational Health and Test Support Office will soon provide additional information and details on the case management process on the Total Health portion of the S&TH homepage on the JSC internal Web site. In addition, an educational presentation about the process is available to be given at safety meetings, all hands and other functions by request. ■

For more information contact the JSC Clinic at x34111 or the nurse case manager at x31132.

Aviation, a gift to the community for JSC volunteer



Everett Gibson

It's fun to bring together this collection of modern and World War II aircraft.. The airshow is a living history event.

– Everett Gibson, Wings Over Houston Airshow Festival volunteer

NASA aircraft, such as the Super Guppy transport aircraft, the WB-57 high-altitude weather aircraft, the Shuttle

Training Aircraft and astronaut T-38 trainers will be featured at the Wings Over Houston Airshow Festival October 21 and 22 at Ellington Field. The show is a tribute to aviation's past and future, but it wouldn't be possible without volunteers such as JSC's Everett Gibson.

Gibson, well known throughout the JSC and space community for his work in planetary materials, has been a volunteer with the Wings Over Houston Airshow since it began 16 years ago. For the last 10 years, he has served on the airshow's executive committee.

"It began as a way to give something back to the community at a time when they did not have a major airshow," explained Gibson. Gibson concedes he holds a special place in his heart for Ellington Field where three generations of his immediate family

have flown from in B-17 Flying Fortresses.

"Ellington Field is just a fascinating place, with its role as one of the early aviation sites for the armed forces," said Gibson. "From the early bi-planes based there, to the first night landings that were practiced there and its role in the history of the second World War – all the way to the crews training to go to the moon and now Shuttle crews."

Gibson's involvement with the Airshow has given him many memories as well as the opportunity to meet many of aviation's legendary figures.

"I've gotten to meet so many fascinating people, such as the Tuskegee Airmen, Bob Hoover, Generals Tex Hill and Joe Foss who have been honored guests at the airshows," said Gibson. "I also get to meet many current pilots and have even gotten to

fly with the Royal Air Force's Nimrod Display Team."

Those are exciting perks but due reward for the hard work that goes into the event. Gibson says the executive committee is usually working on the airshow two years in advance to coordinate with international performers and military demonstration teams. The airshow is an all-volunteer effort, requiring the time and dedication of more than 400 people to bring the show together for the crowd on the ground. Proceeds from the ticket sales go to various aviation-related scholarship programs, helping to introduce our area youth to the excitement and science of flight. Profits from the airshow also go to help restore the historic World War Two aircraft such as the B-17G Flying Fortress *Texas Raiders* which is based at Ellington. Gibson has worked on two complete

restorations on the bomber and has completed 120 missions in the aircraft.

"It's all worth it," said Gibson. "We work on it for the benefits of the community. It's a unique opportunity to put something back into the community. It's fun, interesting, and exciting to see the excitement on the faces of our youth along with the tears in the eyes of our senior citizens and veterans. To know that we are helping people that have special needs to be able to come to a barrier free airshow and to see something that is otherwise difficult for them to do is rewarding."

So what is his favorite part? Without hesitation, Gibson says the Tora! Tora! Tora! reenactment of the attack on Pearl Harbor is his favorite component of the airshow. He also enjoys serving as a B-17 crew member for *Texas Raiders* flying in the show – when time permits. ■

For more information on the airshow, visit www.wingsoverhouston.com or call (713) 266-4492.

PEOPLE on the **MOVE****Human Resources reports the following personnel changes:****Key Personnel Assignments**

Richard Whitlock was selected as manager, Engineering Cost/Resource Analysis Office, Systems Management Office.

Michael Hess was selected as chief, Neutral Buoyancy Laboratory Office, Mission Operations Directorate.

Irene Verinder was named chief, Manufacturing, Materials, and Process Technology Division, Engineering Directorate.

Elena Huffstetler was named deputy chief, Avionics Systems Division, Engineering Directorate.

Additions to the Workforce

Lee Berlin joins the Legal Office as a law clerk.

Jessica Verduzco joins the Projects Procurement Office, Office of Procurement, as a contract specialist.

Christopher Schad joins the Robotics Operations Branch, EVA, Robotics, and Crew Systems Operations Division, Mission Operations Directorate, as a space station mechanical and robotics systems instructor.

Kerry Fleiger-Holmes joins the Laptop Production and Development Branch, Flight Avionics Division, Mission Operations Directorate, as a computer engineer.

Aaron Brown and *Nicholas Richardson* join the Orbit Dynamics Branch, Flight Design and Dynamics Division, Mission Operations Directorate, as mission design and analysis engineers.

Angela Braun joins the Ascent/Descent Dynamics Branch, Flight Design and Dynamics Division, Mission Operations Directorate, as a mission design and analysis engineer.

Gregory Smith joins the Operations Division, Mission Operations Directorate, as a lead flight controller.

Antonio DeVera joins the Systems Training Branch, Space Flight Training Division, Mission Operations Directorate, as a space station systems engineer.

Leena Joshi joins the Environmental Systems Branch, Systems Division, Mission Operations Directorate, as a space systems operations engineer.

Brian Derkowski joins the Advanced Development Office, Engineering Directorate, as an aerospace flight systems engineer.

Nathan Howard joins the Dynamic Systems Test Branch, Automation, Robotics, and Simulation Division, Engineering Directorate, as an experimental facilities development engineer.

Brian Daniel and *Matthew McCurdy* join the Life Support and Habitability Systems Branch, Crew and Thermal Systems Division, Engineering Directorate, as aerospace engineers.

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

Candice Howard and *Kristopher Lee* join the Propulsion and Fluids Systems Branch, Energy Systems Division, Engineering Directorate, as aerospace engineers.

Keith Beckman joins the Materials and Processes Technology Branch, Manufacturing, Materials, and Process Technology Division, Engineering Directorate, as a materials engineer.

Kevin Dries joins the Manufacturing Integration and Technology Branch, Manufacturing, Materials, and Process Technology Division, Engineering Directorate, as a materials engineer.

Chris Lamoreaux and *Benjamin Quasius* join the Structural Mechanics Design/Analysis Branch, Structures and Mechanics Division, Engineering Directorate, as aerospace engineers.

Daniel Newswander joins the Thermal Branch, Structures and Mechanics Division, Engineering Directorate, as an aerospace engineer.

Deneen Taylor joins the Structures and Dynamics Branch, Structures and Mechanics Division, Engineering Directorate, as an aerospace engineer.

Greg Dorth joins the RSA Integration Office, Program Integration Office, International Space Station Program, as an aerospace engineer.

Mary Burke and *Samuel Russell* join the Propulsion Test Office, White Sands Test Facility, as aerospace engineers.

Lindsay Keller joins the Planetary Science Branch, Earth Science and Solar Systems Exploration Division, Space and Life Sciences Directorate, as a space scientist.

James Logan joins the Medical Sciences Division, Space and Life Sciences Directorate, as an aerospace medical officer.

Lara Kearney joins the EVA Project Office, as an EVA hardware project manager.

Promotions

Rose Herrera was selected as a contract specialist in the Procurement Policy and Systems Office, Office of Procurement.

Dahlia Coy was selected as lead secretary in the Institutional Resources Management Office, Office of the Chief Financial Officer.

Karen Black was selected as senior secretary in the Space Operations Management Office.

Lisa Wilson was selected as the supply group lead in the Supply and Support Services Branch, Logistics Division, Center Operations Directorate.

Reassignments to Other Centers

David Samuels moves to Dryden Flight Research Center.

Jim Graves moves to Marshall Space Flight Center.

Todd May moves to Marshall Space Flight Center.

Lisa Roberts moves to Marshall Space Flight Center.

Brian Mitchell moves to Marshall Space Flight Center.

Dave Herbek moves to NASA Headquarters.

Reassignments to Other Directorates

Al Conde moves from the ISO 9000 Office to the Engineering Directorate.

Sam Daugherty moves from the Engineering Office, White Sands Test Facility to the International Space Station Program.

Phil Dempsey moves from the Engineering Directorate to the International Space Station Program.

Kelle Pido moves from the Technology Transfer and Commercialization Office to the International Space Station Program.

Ted Ro moves from the Mission Operations Directorate to the International Space Station Program.

Joe Aquino moves from the Mission Operations Directorate to the Space Operations Management Office.

Retirements

Albert Crews of the Flight Crew Operations Directorate

Aldo Bordano of the Engineering Directorate

Dallas Ives of the Engineering Directorate

Resignations

Camille Wilson of the Public Affairs Office

Michael Janas of the Flight Crew Operations Directorate

Mark Gibb of the Mission Operations Directorate

Don Allison of the Engineering Directorate

Scott Lazaroff of the Engineering Directorate

Richard Malecki of the Space Shuttle Program

Mary Kincaid of the Office of Procurement

Judy Parnell of the International Space Station Program

Karen Lucht of the White Sands Test Facility

NASA BRIEFS**AGREEMENT GIVES BIOTECH RESEARCH A NEW DIMENSION**

NASA has entered into a groundbreaking agreement with the private sector to explore a new frontier in biotechnology, focusing on infectious disease research and developing a liver-assist device for patients in need of transplant surgery.

Inspired by a news article on NASA's efforts to commercialize space activities, H. Fisk Johnson, Ph.D., president of Wisconsin-based, private venture capital company Fisk Ventures, Inc., approached the Agency about a partnership which culminated in an agreement to develop commercial medical products using NASA's Bioreactor technology.

"This is a great deal for the American people," said NASA Administrator Daniel S. Goldin. "It's a symbol of the success that can be achieved when government, private industry and academia work together on the exploration of new frontiers for scientific, technological and economic growth."

Goldin and Johnson signed the agreement on September 14 in a ceremony at the U.S. Capitol.

"Some of the best minds from NASA and our group collaborated over three years, conducting an extensive analysis to determine what was technically possible and the most likely to succeed in the market," Johnson explained. "This led us to NASA's ability to conduct research on cell cultures in the microgravity environment of space, and its unique cell-culture technology on the ground, that bridges the gap between what you can do in the traditional lab and what you can do in a space-based lab."

NASA invented the rotating Bioreactor as a way to study the impact of microgravity on cellular growth both here on Earth and in space. Traditional cell-growth research often produces single-cell, pancake-like cultures. The Bioreactor works by spinning a fluid medium filled with cells. The spinning motion neutralizes most of gravity's effects, creating a near-weightless environment that allows cells to grow more freely, in a three-dimensional manner.

FVI and In Vitro Technologies, Inc. of Maryland have formed a joint venture to turn this market-driven model into a scientific and commercial success. The new venture — StelSys, based in Baltimore, MD — will focus on commercializing microgravity research specifically in areas related to biological systems.

"NASA's Bioreactor technology is simply a tool box, and if you give a tool box to the right people, they can build a house," said Goldin. "We believe we've put this tool box in the right hands of the right people."

CHANDRA VERIFIES UNEXPECTED BLACK HOLE DISCOVERY

There's new evidence the universe is home to a type of black hole that's not too large and not too small. As black holes go, it's a middleweight that may represent the missing link between its flyweight relatives and the super-heavyweight variety found at the center of most galaxies.

Using NASA's Chandra X-ray Observatory, several groups of scientists have zeroed in on a mid-mass black hole located about 600 light years from the center of galaxy M82. "This opens a whole new field of research," said Martin Ward of the University of Leicester, England, a lead author involved with the observations. "No one was sure that such black holes existed, especially outside the centers of galaxies."

The M82 galaxy got its name nearly 220 years ago when it became the 82nd entry in a systematic catalog of nebulae and star clusters compiled by French astronomer Charles Messier.

The black hole found in M82 packs the mass of at least 500 suns into a region about the size of the Moon. Such a black hole would require extreme conditions for its creation, such as the collapse of a "hyperstar" or the merger of scores of black holes.

Images associated with this story are available at:

<http://chandra.harvard.edu>
<http://chandra.nasa.gov>

SPACE CENTER Roundup

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