Engineering and medicine: Partnering for success, **Page 5**

SPACE CENTER
Roundup

December 4, 1998

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Sun rises on station era

Station flight controllers begin mission operations

A Russian Proton rocket lifts off from Baikonur Cosmodrome in Kazakstan carrying Zarya. Station flight controllers and engineering teams in Houston and Moscow support operations.

By William P. Jeffs

All systems are performing as expected aboard Zarya, the first component of the International Space Station, launched at 12:40 a.m. CST on November 20 from Kazakstan. A Russian Proton rocket placed the control module into orbit where it will await the arrival of Unity, a connecting node to be delivered by the crew of space shuttle mission STS-88. With the launch of Zarya, ISS flight controllers and engineering support teams in Houston and Moscow began operations.

Delegates from many of the 16 nations participating in the assembly and eventual operation of the space station gathered in Central Asia for the launch of Zarya. The Russian Proton rocket lifted off flawlessly, carrying Zarya from the Baikonur Cosmodrome.

Ten minutes later, the module had attained its initial orbit, an elliptical course that took it to an elevation of 220 miles at its highest point and 115 miles at its lowest. Communications and guidance antennas and the spacecraft's pair of 35-foot-long solar arrays soon deployed as scheduled.

Zarya, a 42,600-pound, 41-foot-long spacecraft, will function as a sort of space tugboat, providing Unity with early power, propulsion and communications and the capability to dock via remote control with the third station component, the Russian-provided Service Module. The Service Module will enhance or replace many of Zarya's functions.

Now Zarya awaits its union with Unity, the second large component of the ISS to be delivered by the STS-88 crew. The crew has trained for more than two years to perform the linkup in space.

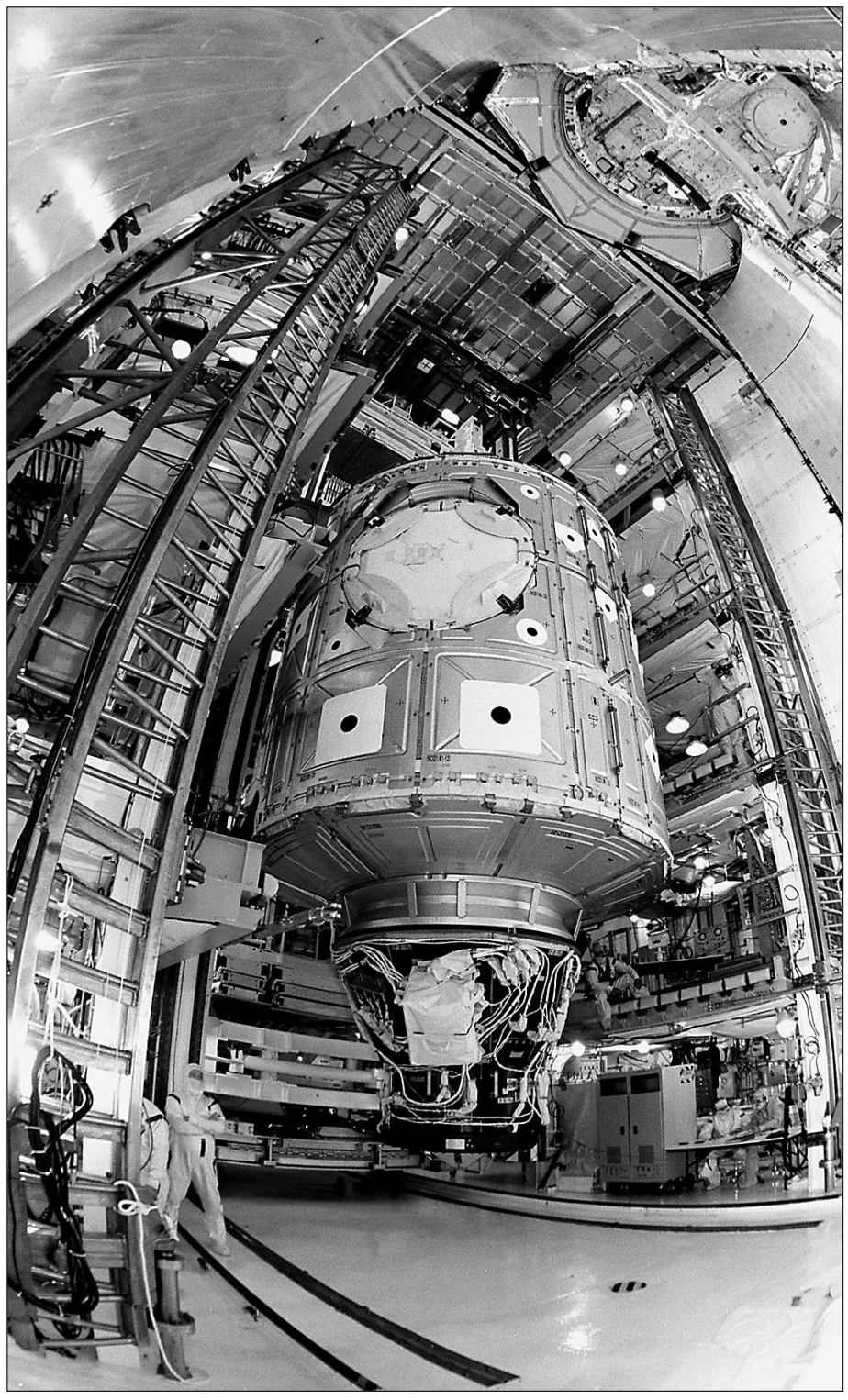
The 11-day mission will feature more than 30 hours of operations with *Endeavour*'s robot arm and at least three seven-hour space walks. When it is in a circular orbit about 240 statute miles above the surface of the Earth, *Endeavour*, with Unity upright in its cargo bay, will capture Zarya and attach the two initial elements to one another before releasing both elements to await subsequent space station components. Unity and Zarya will serve as a bridge between future Russian, American, European and Japanese segments.

The six-sided Unity connecting module, with two mating adapters attached, is 34 feet long and weighs about 25,600 pounds. It has six docking ports, one on each side, to which future modules will be attached.

ISS flight controllers and engineering support teams in Houston and Moscow began their monitoring duties with the launch of Zarya.

Since the launch of Zarya, the teams have completed all mandatory on-orbit preparations for the launch of STS-88 and Unity. These activities included five translational maneuvers which tested the capabilities of Zarya's orbital maneuvering systems and placed Zarya in the STS-88 rendezvous altitude.

Please see **ZARYA**, page 2

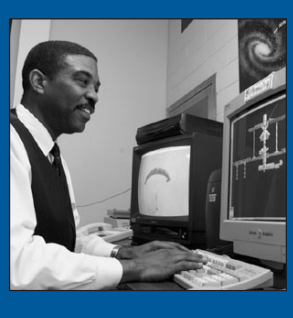


KSC Photo KSC-98EC-1650

Looking like a painting, this wide-angle view shows Unity connecting module being moved toward the payload bay of *Endeavour* at Launch Pad 39A. Part of the International Space Station, Unity is a connecting passageway to the station's living and working areas.

Flight Activity Officers receive high honor. **Page 2**

Guests view JSC technology at Inspection 98. **Page 4**



Team develops a new OUTLOOK. **Page 7**

Flight Activity Officers hang STS-95 plaque

Photo by Tracy Calhoun

JSC's Flight Activities Officers earned the honor of hanging the STS-95 plaque in the Flight Control Room following the recent mission. Attending the ceremony are (left to right) Flight Activities Officers Keith Lawson, Terri Schneider, Roger Smith and STS-95 Lead Flight Director Phil Engelauf.

JSC's Flight Activities Officers earned the honor of hanging the STS-95 plaque in the Flight Control Room following the recent mission. Roger Smith, lead FAO, Terri Schneider, lead timeliner, and Keith Lawson, lead pointer, hung the plaque.

The FAOs were selected for their preflight efforts in accommodating all conflicting payload requirements and for the unprecedented degree to which the preflight timeline survived unchanged during orbit operations. The well-designed timeline was credited with allowing the smooth execution of the mission and accomplishment of nearly 100 percent of all preflight payload objectives.

Also receiving mention were the Public Affairs Office team, which insulated the flight control team from the distraction of media attention while still conveying to the public the full story of space shuttle mission activities on STS-95, and the Flight Management team (including Michele Brekke and Greg Buoni) for their close coordination with the Flight Control team and their efforts in resisting payload requirements growth during the mission. ■

Teamwork made mission successful

By John Ira Petty

It's remarkable that a flight with as many scientific payloads as STS-95, experiments with sometimes conflicting demands on everything from crew time to energy to payload bay space, came together at all.

That it was as successful as it was is just a little short of amazing.

The success can be attributed to thousands, perhaps even tens of thousands, of people throughout the country, from the crew to principal investigators, from those who planned the flight, made the 80-plus experiments fit and work without negatively affecting one another to the Flight Control team – and countless others.

A lot of those people are at the Johnson Space Center.

Michele Brekke, STS-95 flight manager, said that while the crew was pivotal in making the mission work, "the whole team put forth their best effort. There were some real heroics."

It was, she said, a little like a lot of people being on a big boat. "We all had to row together if we were going to get anywhere."

The process of bringing everything together is a little like a general contractor building a house, she said. This process took more than a year. There are five key areas, each of which involved great effort and sacrifice by a lot of dedicated people:

• Negotiating requirements with payload customers and defining mission objectives came first. STS-95 experiments each had requirements and constraints. A lot consumed energy, and everyone's energy requirements had to be negotiated down. Everything had to fit. Then the Spartan solar research satellite was added to the manifest. It didn't fit into the payload bay, so one of the cross-bay carriers had to be removed and other space found for the experiments it was to have carried. The duration of the flight, originally 10 days, was reduced by a day.

• Analytical integration involved looking at those requirements and constraints of the experiments to make sure one didn't violate the constraints of another. It also included sometimes intense negotiations to bring about reductions of requirements – particularly for power and for space.

• The flight production process generates the flight software and the software used on the ground to support crew training, the Mission Control Center and integration testing at Kennedy Space Center. It also generates paper products. "This process had to absorb these hiccups as changes were introduced into the system," Brekke said.

Michele Brekke

• Operations integration "was probably the most challenging area of this flight," she said, largely because of the number of experiments aboard. Each had some level of involvement by the crew–from as simple as throwing a single switch to as complex as the Spartan deploy and retrieve.

"We knew last summer we had a very challenging timeline, and this was before Spartan was added," Brekke said. The mission had become challenging operationally, and they were still waiting for detailed requirements of the 30 or so experiments in the SpaceHab. "We realized in early summer that things just weren't all fitting" into the timeline, Brekke said. The call went out to streamline operations and reduce some lower-priority objectives. By the end of the summer, a workable plan had emerged.

During crew training, people with stop watches timed the crew carrying out tasks, to validate the timeline. A contingency plan of staying on the timeline, even in the face of trouble with one experiment, was developed. Any troubleshooting would be done later, at the expense of other experiments in the same group, to avoid impacting unrelated experiments.

• Physical integration and physical processing of the shuttle and the payloads also was challenging. Many of the experiments had to be installed late, on the pad, because of the nature of those experiments. One experiment had live fish and others used short-lived materials. The last was installed by about L-20 after more than 20 hours of intense effort by SpaceHab and Kennedy Space Center people.

Throughout that five-step process, "One of the important things we did on STS-95 was to make sure that all the team members' votes were heard in making decisions," Brekke said. "We tried to listen to everybody's concerns, and folks weren't afraid to bring up concerns."

A lot of the concerns were valid, and a lot of work went into resolving them.

"The timeliners in particular on this mission really earned their keep," she said, "not only in figuring out how to fit it all in, but having the courage to speak up when they didn't think it would fit."

Brekke is one of three flight managers at the Johnson Space Center, and has been in that job for almost two years. She was flight manager for STS-85 and STS-89. She also is flight manager for STS-93 (the AXAF mission), STS-92 and STS-99.

She has been at the center since mid-1977, when she started as an instructor in crew training. Subsequent assignments included stints as a payload officer, a flight director, payload integration manager and space station utilization manager. ■

Continued from Page 1

Zarya awaits union with Unity

The activities also included activating numerous systems and conducting many checkouts including tests of the power system, command and control system, and the attitude control system. An STS-88 rendezvous day dry run, where Zarya was put through the exact sequence of events that it will go through on rendezvous day, was also conducted.

All of these tests have been successfully completed, and Zarya is in excellent condition. A few minor anomalies have been identified and are being assessed by station flight controllers in Houston and Moscow. Preparations are being made to conduct further troubleshooting and/or recovery actions during STS-88.

> *'Flight controllers and the engineering support teams in both Moscow and Houston are performing well in conducting the planned activities and in trouble-shooting the anomalies.'*
>
> — Mark Kirasich
> Lead station flight director for 2A

"Flight controllers and the engineering support teams in both Moscow and Houston are performing well in conducting the planned activities and in troubleshooting the anomalies," said Mark Kirasich, lead station flight director for the early operations. "Everyone is also very excited about STS-88."

Using the Space Station Flight Control Room in Bldg. 30, ISS flight controllers in Houston will provide continuous around the clock staffing during the docked phase of STS-88, working in coordination with shuttle flight controllers in the Space Shuttle Flight Control Room. This mission will mark the first time that space shuttle and space station flight controllers have conducted joint operations.

After the shuttle undocks, the four space station teams in Houston will rotate, providing full support for several hours each day. During this time, the teams will verify that the on-orbit elements are healthy, conduct required maintenance activities and test objectives, and review and approve the flight plan generated by their counterparts in the Mission Control Center in Moscow.

Space station flight controllers include the Russian interface officer, thermal control officer, electrical power systems officer, attitude determination and control officer, ground controller, mechanical systems officer, trajectory officer, operations planner, communications track officer, and those individuals responsible for environmental control and life support systems, and command and data handling. In addition to managing the U.S. segment, each flight controller must also know how the Russians manage their equivalent system. ■

COMMUNITY NEWS

JSC, Team NASA participate in 'Expanding Your Horizon' conference

About 280 girls attended this year's "Expanding Your Horizon in Math & Science" conference held on November 14 at the University of Houston–Clear Lake. A biannual, one-day career conference for girls in the sixth through eighth grades, the event was developed to increase interest in math and science through positive, hands-on experience and the opportunity to meet and interact with positive female role models.

Women representing many professions conducted workshops during the conference. Attendees had the opportunity to attend four workshops. JSC and Team NASA women volunteered to conduct the workshops.

Stephanie Wells, JSC research pilot, discussed the dynamics of flight and the KC-135. The spacesuit was explained by Sharon McDougle of United Space Alliance and Gretchen Thomas of JSC. Arranging a work space was demonstrated by space planners Elizabeth Barbee and Kari Sawchak, both from USA. Jaclyn Allen, Lockheed Martin, highlighted a look at Mars and what it would take to inhabit its environment. High-powered microscopes were demonstrated by Carolyn Krumrey and Irene Verinder, both from JSC. Marguerite Sognier, USA, performed lab experiments and discussed her career as a research scientist. Karen Meyers, Lockheed Martin, examined the human aspects of confinement in space flight. Marybeth Edeen, JSC, demonstrated designing and construction of a life support system for Mars living. Cathi Butterfield, Boeing, explained computer hardware and circuit building. Astronaut Pam Melroy gave the closing speech.

JSC provided in-kind support for this conference. The Equal Opportunity Programs Office coordinated JSC's support.

"This conference is a wonderful method to encourage girls to study math and science and allow them an opportunity to interact with female mentors," said Jessie Hendrick, JSC's Federal Women's Program manager. ■

JSC Photo S98-14610

Women representing many professions conducted workshops during this year's "Expanding Your Horizon in Math & Science" conference held recently at the University of Houston–Clear Lake. Volunteers included (left to right) Carolyn Krumrey, JSC; Marguerite Sognier, United Space Alliance; Irene Verinder, JSC; and Stephanie Wells, JSC.

Cintron receives Albert V. Baez Award

JSC Medical Officer Dr. Nitza Margarita Cintron received the Albert V. Baez Award during the Hispanic Engineer National Achievement Awards Conference held recently in Houston.

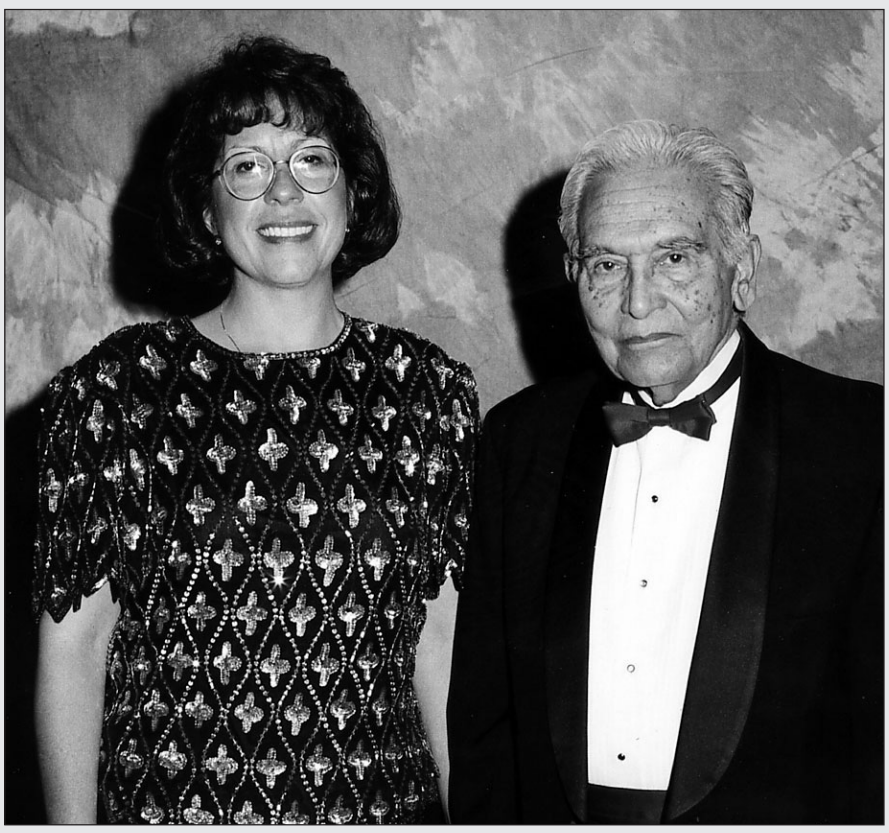
The award is presented to an individual who has made a significant technical/scientific contribution in his/her area of expertise. The award is presented for the person's technical achievement which ultimately benefits humankind.

Cintron earned her bachelor's degree in chemistry and biology from the University of Puerto Rico and her doctorate in biochemistry and molecular biology from The Johns Hopkins University.

Cintron began her career at JSC in 1978 as a research biochemist. She was promoted to chief of the Biomedical Laboratories Branch in the Medical Sciences Division in 1989, making her one of the highest ranking women in her field at NASA.

In 1991 Cintron enrolled at the University of Texas Medical School, graduating with high honors in 1995 as a medical doctor. Appointed to her current position in 1997, she manages the medical operations and activities of the International Space Station.

A member of JSC's speakers bureau, Cintron makes frequent appearances and has supported many of the educational outreach programs sponsored by the Equal Opportunity Programs Office. Her scientific work has been the subject of a series of publications and also has been presented at various scientific symposia. ■



Dr. Nitza Margarita Cintron (left), JSC medical officer, received the Albert V. Baez Award during the Hispanic Engineer National Achievement Awards Conference. Dr. Albert Baez (right) presented the award.

GILRUTH CENTER NEWS

Hours: The Gilruth Center is 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 x33345.

Gilruth badges: **R**equired 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 from 9 a.m.-2 p.m. Saturdays. Cost is $10. Dependents must be between 16 and 23 years old.

Nutrition intervention program: Six-week program includes lectures, a private consultation with the dietitian and blood analysis to chart your progress. 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. Preregistration is required. Cost is $5. Annual weight room use fee is $90. The cost for additional family members is $50.

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 5:15-6:15 p.m. Tuesdays and Thursdays. Cost is $32 for eight weeks. Call Kristen Taragzewski, instructor, at x36891.

Yoga: 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 $32 for eight weeks. Call Darrell Matula, instructor, at x38520 for more information.

Ballroom dancing: Classes meet from 7-8:15 p.m. Thursdays for beginner advanced classes and from 8:15-9:30 p.m. for beginner-intermediate and intermediate students. 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.

Gilruth Home Page: Check out all activities at the Gilruth online at: http://www4.jsc.nasa.gov/ah/exceaa/Gilruth/Gilruth.htm.

TICKET WINDOW

Bldg. 3 Exchange Store hours are 7 a.m.-4 p.m. Monday-Friday.

Bldg. 11 Exchange Store hours are 9 a.m.-3 p.m. Monday-Friday.

For more information, please call x35350.

Avoid mall traffic and parking by shopping at the Exchange Store.

Receive a free gift on purchases of $75.00 or more on souvenirs.

The following discount tickets are available at the Exchange Stores:

General Cinema Theaters	$5.50
Sony Loew's Theaters	$5.00
AMC Theaters	$4.75
Moody Gardens (2 of 6 events)	$9.75
Space Center Houston . . . .adult $10.25 . . . .child (4-11)	$7.00

(JSC civil service employees free.)

All tickets are non-refundable.

Metro tokens and value cards are available.

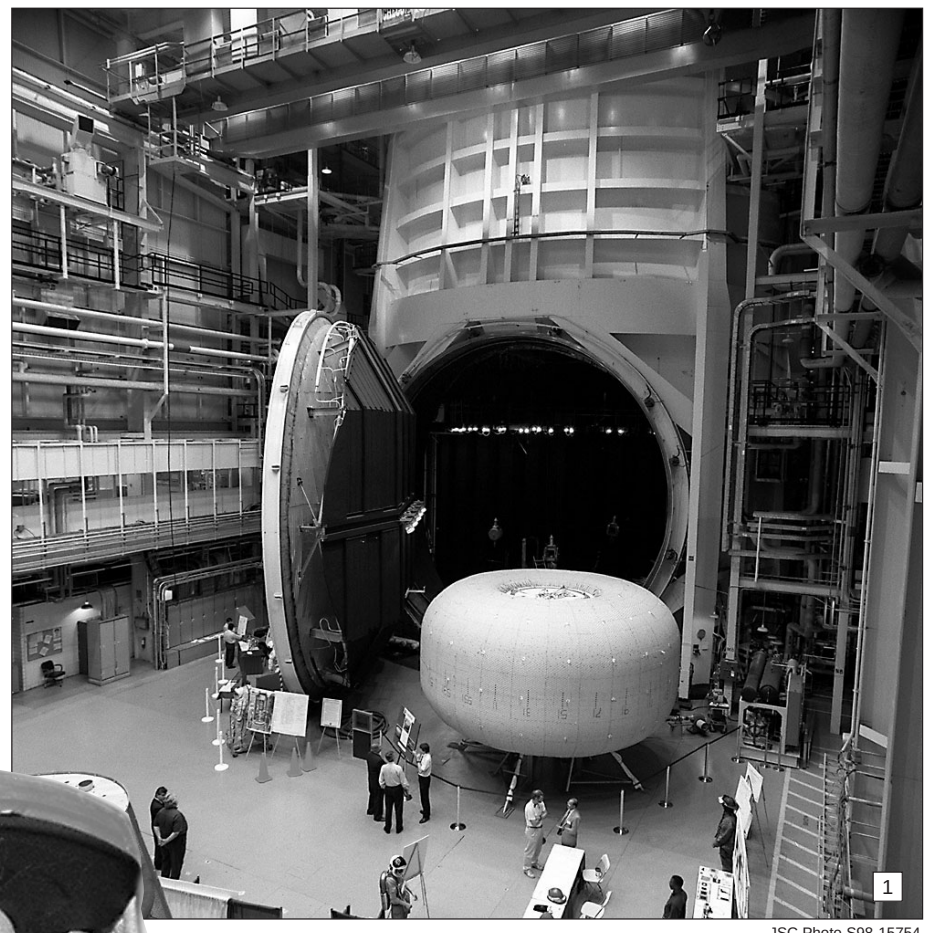
Sweetwater pecans are on sale for $6.00 while supplies last.

Photo processing: 3-inch single prints, $2.99; 3-inch double or 4-inch single prints, $3.99; 4-inch double prints, $5.99.

1999 Franklin Planner refills are now available at the Building 11 Exchange Store.

Inspection 98 attracts record crowd

- *Carbon nanotubes*
- *Shape memory alloy actuators*
- *Microencapsulated drugs*
- *Printed circuit board rapid prototyping*



JSC Photo S98-15754

These were just a few of the technologies on display during Inspection 98. During the three-day event, JSC exhibited its facilities, technologies and expertise to approximately 2,700 industry, community and academic leaders from 41 states, the District of Columbia and 21 foreign countries and, in their view, it was a huge success.

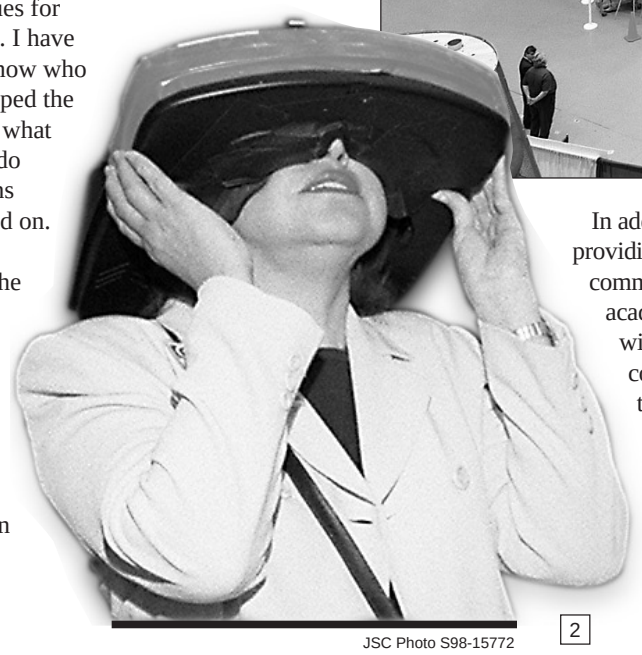
"I'm very impressed by Inspection 98," said Dave Isaacs, news director for radio station KLBJ-AM in Austin. "I attended your Open House, and it's fascinating to see some of the same exhibits but with a far greater depth of technical explanation and background. It was fun to skim the surface with the public, but this event offers a chance to look much deeper."

William Garwood, associate administrator of Angleton Danbury General Hospital, said he came to Inspection 98 primarily to learn more about medical technologies but that other exhibits attracted his attention as well.

"I'm interested in the medical technologies area, but I have a personal interest in virtually every aspect of the exhibits that I've seen," said Garwood. "For example, I talked to some exhibitors from White Sands about fire protection as it relates to similar concerns that we have in hospitals with oxygen systems."

Although JSC technologies and capabilities greatly impressed the guests, it was the I98 volunteers who made the event successful. Repeatedly, visitors indicated they found the one-on-one communication with JSC employees of particular value.

Brett Williams, a science teacher at Fredericksburg High School, commented, "I have an aeroscience program that could be considered progressive, and I've needed a lot of assistance in many ways. I would say the most wonderful thing I found would be the technical assistants. I met several people here at JSC who introduced me to others and broadened my avenues for resources. I have students now who have grasped the reality of what they can do when reins aren't held on. They are pushing the envelope so fast and so hard that I'm having trouble keeping in front of them."



JSC Photo S98-15772

In addition to providing business, community and academic leaders with one-on-one contact with the technology and projects at JSC, the success of I98 also may be measured by the creation of new opportunities for visitors and for NASA.

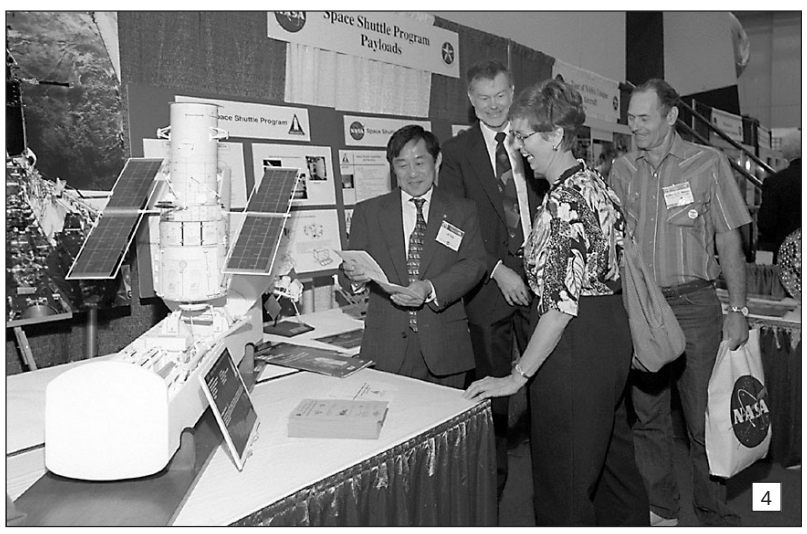
Dr. Bob Rice, from the Institute of Somatic Sciences, said he attended Inspection 96 as a visitor and was invited as an exhibitor last year and again this year.

"This year attendees who visited our exhibit not only viewed the technology but also visualized how it could apply to their fields," said Rice. "For example, a doctor from M.D. Anderson who is in radiology and is associated with cardiac catheterization, a procedure that is very difficult to teach to residents, saw in the interface between virtual reality and haptic technology a perfect model system to simulate the experience of spreading a catheter in, knowing when a junction of an artery has been penetrated, and knowing when the heart has been reached."

Inspection attendees were able to submit requests for further information on exhibits of particular interest. Six hundred such requests were received from 328 organizations, an impressive 40 percent of which indicated a strong interest in licensing, commercializing, applying or utilizing a JSC technology or in establishing a collaborative partnership or agreement with JSC. Advanced materials, telecommunications, manufacturing, software and medicine were among the areas of greatest interest.

JSC's Technology Transfer and Commercialization Office is coordinating responses to these requests. Thus the potential exists for an unprecedented number of technology transfer success stories to develop over the upcoming months and years. ■

JSC Photo S98-15758



JSC Photo S98-15759

JSC Photo S98-15769 Benny Benavides

1. Inspection 98 guests were able to catch a glimpse of the TransHab, the large-volume, inflatable space vehicle under development at JSC. The TransHab is a new design for a habitation element for lengthy space missions. The concept could be developed as a habitation or even a laboratory module for the International Space Station.

2. Eva Ponce, assistant principal of Reagan High School in Houston, takes a virtual reality tour.

3. Allen Flynt (right) of the EVA Project Office discusses Russian spacesuit technology with Manuel Salazar and Roxana Calzada, students at Northrop Rice Aviation.

4. Al Ong, payload integration manager in the Space Shuttle Program Office, discusses space shuttle payloads with Hazel Fipps-Mann, J. E. Conner Museum educator from Kingsville, Texas.

5. Engineering and manufacturing employees in Bldg. 220 assemble the X-38 V-201 structure as Space Center Houston tour visitors look on during Inspection 98.

Engineering and medicine: *Partnering for success*

Lab's 'mission control' looks like the real thing

Some of the physicians who work there call the echocardiography laboratory at Texas Children's Hospital "mission control" because of its appearance and operations style. The new laboratory will certainly look even more like the Mission Control Center.

Texas Children's Hospital, a non-profit facility, has for some time operated this laboratory, providing diagnosis and surgical support to pediatric heart patients. This lab is a high volume, multi-physician and multi-patient support facility. Working with a number of architects, the hospital's management team is designing an enlarged, upgraded laboratory to be located in a building now under construction.

This opportunity prompted the management of TCH to contact JSC for collaborative support of facility redesign and revision of operations techniques. JSC's Mission Operations Directorate took up the challenge as a unique opportunity to share its experience and know-how in the operations arena with the local community. Many of the technologies JSC is sharing with TCH were featured in exhibits at Inspection 98.

A team of JSC operations technologists visited TCH to gain an understanding of the current operations paradigm and facilities. The team then talked at length with the physicians in the lab and members of the technical staff about their requirements and how they envision their future workplace.

TCH's echocardiography physicians and technical staff then visited JSC's facilities. Their tour consisted of briefings by JSC telemedicine experts and a visit to the MCC. The TCH staff was presented with informational briefings on the MCC's operations techniques and data architectures.

The tour culminated with a visit to JSC's Emergency Operations Center. The JSC EOC, which uses many of the same technologies and data architectures installed in the MCC, was an excellent match to the style and size of the envisioned laboratory. The hospital staff also expressed interest in the EOC as the basis for an emergency response operations center for the hospital. Follow-up discussions are anticipated.

The TCH staff members and representatives from the MOD then discussed the potential use of the represented JSC technologies and operations concepts.

The MOD operations technologists – Bruce Hilty/DD, James Ortiz/DD, and Tony Griffith/DD – then went to work reengineering the TCH operations technique, currently a very linear and manual operations process. The MOD team suggested a highly distributed and interchangeable operations concept centered on techniques established within the current MCC operation paradigm and encompassing networked data architectures, remote file servers, digital voice systems, remote data services, digital video servers, archiving and the use of commercial-off-the-shelf software and equipment.

MOD presented the TCH staff a proposed operations vision targeted toward a multiplexed and multitasked environment providing enhanced situational awareness, enhanced connectivity and computer-based physician and facility scheduling in a facility designed for operations. The envisioned facility architecture would also enable integrated patient and exam evaluation data and easy and seamless access to information locally and remotely. It will also allow for integrated training and operations, expandability, operating cost reduction, and better patient diagnosis and care. Integrated training and operations is an important aspect of the suggested operations concept as the TCH is a teaching hospital.

MOD's cross-cultural training expertise, developed from work on the International Space Station, is a valuable asset that TCH is planning to tap into in the future. MOD's comments and suggested operations concept were openly received by the TCH staff. Many of the suggestions were incorporated into the design of the new lab.

Any NASA-owned technology the hospital uses will be coordinated through JSC's Technology Transfer and Commercialization Office. ■

JSC Photo S98-17373 by Mark Sowa

JSC Director George Abbey and University of Texas Medical Branch President John D. Stobo shake hands after signing an agreement to develop specialized doctoral training in the space life sciences.

JSC and University of Texas Medical Branch to develop doctoral program

JSC Director George Abbey and University of Texas Medical Branch President John D. Stobo, M.D., have signed an agreement expressing their mutual intent to develop specialized doctoral training in the space life sciences.

Doctoral candidates will participate in class work, laboratory studies and other learning experiences at both institutions. NASA and UTMB will commit the necessary faculty and staff to develop the program, and both parties will seek internal and external sources to provide funding for operations and student stipends.

"This will be a very good partnership for both JSC and UTMB," said Abbey. "We will all benefit from it. There are a number of areas in medicine and the life sciences that we need to pursue and develop together."

The immediate objectives of the cooperative venture are to recruit and train one or more students each year in a mutually agreeable curriculum in the space life sciences; seek external support (including federal and state) for the development, operations and evolution of the program; develop a detailed program agreement by March 1999; and enter the first student in the program by next fall. ■

Cardiac device co-developed by NASA implanted in human

A tiny heart-assist pump developed in part by NASA received approval to begin clinical trials in Europe in October. Berlin heart surgeons implanted the device in a human for the first time in mid-November under the watchful eye of its principal developer, Dr. Michael DeBakey.

The pump, called the DeBakey VAD™ (ventricular assist device), is no bigger than two AA batteries, one-tenth the size of portable heart-assist devices now on the market.

MicroMed Technology, Inc., based in The Woodlands, Texas, the company which holds the license to develop and manufacture the device, received European approval to use it in humans in October. The purpose of these trials, conducted at multiple sites, is to document the performance of the miniaturized DeBakey VAD™ for bridge-to-transplant patients with end-stage heart failure.

Development of the DeBakey VAD™ began as a collaboration with NASA engineer David Saucier, who was a heart transplant patient. He and DeBakey had discussed the idea of developing a heart pump so simple that it could not fail and so tiny that it could fit into a child's chest. Eventually, work on the heart pump became an official program at NASA. Saucier has since died.

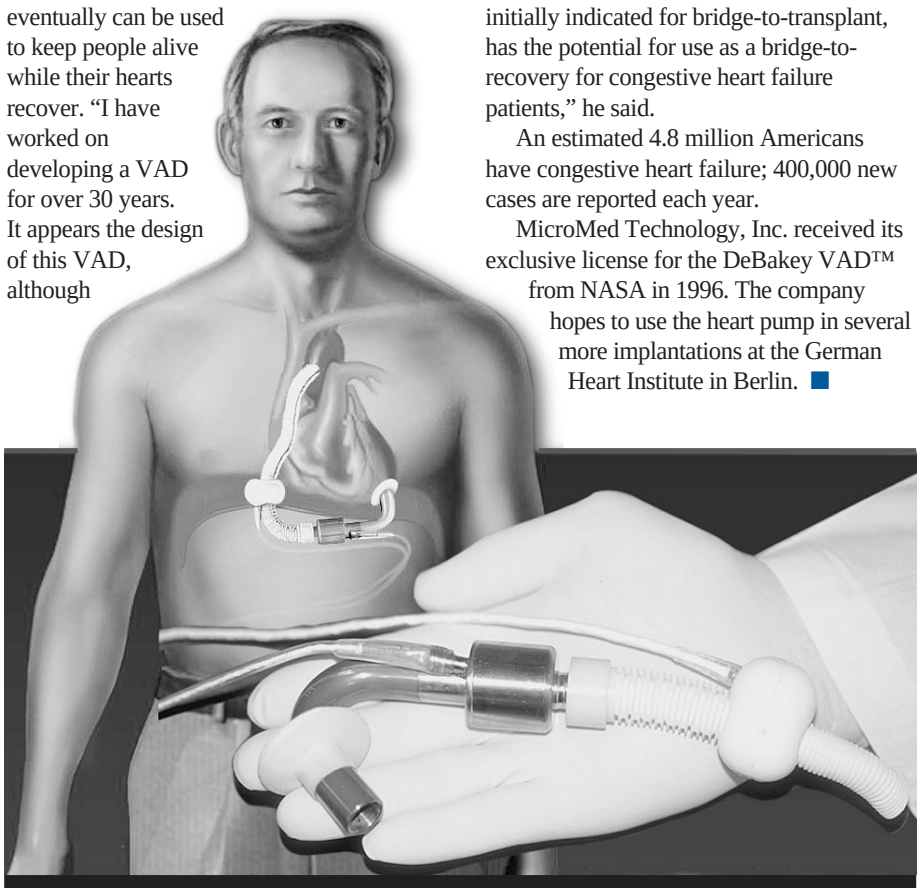
Co-developed by NASA with DeBakey and Dr. George Noon, the DeBakey VAD™ is an investigational heart-assist device designed to provide increased blood flow, up to 10 liters per minute, to patients suffering from congestive heart failure. The VAD is 30 mm × 76 mm and weighs 93 grams.

DeBakey, chancellor emeritus of the Baylor College of Medicine and director of the DeBakey Heart Center at Baylor and the Methodist Hospital, implanted the first successful VAD in 1966. Noon is a clinical professor of surgery at Baylor College of Medicine and the Methodist Hospital.

DeBakey, the primary investigator of the DeBakey VAD™, hopes the VAD eventually can be used to keep people alive while their hearts recover. "I have worked on developing a VAD for over 30 years. It appears the design of this VAD, although initially indicated for bridge-to-transplant, has the potential for use as a bridge-to-recovery for congestive heart failure patients," he said.

An estimated 4.8 million Americans have congestive heart failure; 400,000 new cases are reported each year.

MicroMed Technology, Inc. received its exclusive license for the DeBakey VAD™ from NASA in 1996. The company hopes to use the heart pump in several more implantations at the German Heart Institute in Berlin. ■



Photos courtesy MicroMed Technology, Inc.

The DeBakey ventricular assist device is no bigger than two AA batteries, one-tenth the size of portable heart-assist devices now on the market.

Ripped from the ROUNDUP

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

1968

Apollo VIII, a six-day lunar orbit mission in the step-by-step buildup to a manned U.S. lunar landing, is scheduled for launch tomorrow at 6:51 a.m. from Cape Kennedy, Fla. The mission will fly the identical profile that will be flown on lunar landing missions with the exception of actual descent and landing on the lunar surface.

The prime objective of the Apollo VIII mission is to prove the capability of the Apollo command and service modules in the type of mission for which they were designed – operations at lunar distance. Earlier developmental Apollo earth-orbital manned and unmanned flights have qualified all the spacecraft systems – including the command module heatshield at lunar return speeds – and the Apollo VII 10-day failure-free mission in October demonstrated that the spacecraft can operate for the lunar mission duration.

1978

Flight controllers will continue tracking Skylab at Mission Control Center, but efforts to reboost the space station or control its re-entry will be discontinued, John Yardley, associate administrator for STS, said in a December 19 press conference on the Skylab mission termination.

The past months' effort has been "a rather spectacular technological melodrama," Yardley said, and he commended the people who have been able to "keep it operating as long as we have."

1988

After a scrub one day earlier due to uncooperative weather, *Atlantis* thundered aloft Friday morning, less than 90 seconds before the end of its designated launch period.

Atlantis lifted off from Kennedy Space Center's Launch Pad 39B at 8:30:34 a.m. CST in what many called one of the most spectacular launches of the Shuttle Program to date due to clear, crisp autumn weather.

After four days, nine hours and five minutes in flight, Commander Hoot Gibson made perfect marks as he brought *Atlantis* to a smooth landing at Edwards Air Force Base Tuesday afternoon.

JSC implements Goal Performance Evaluation System

JSC Photo 98-14544 by Benny Benavides

Marcus Friske, Information Systems Directorate, was a key player in implementing the Goal Performance Evaluation System at JSC within a tight three-month schedule.

The Goal Performance Evaluation System, JSC's new tool for employee performance planning and appraisal, was effectively implemented in just a little more than three months.

"Generally, we expect a change of this magnitude to take a while to set in, but managers have embraced this system," reports Harvey Hartman, director of Human Resources at JSC. Perhaps that's because the system is not only easy to use, but it helps bridge the gap from the NASA Strategic Plan to employee performance plans.

Tying employee performance objectives to the NASA Strategic Plan in a user-friendly way was a primary objective of system developers at the Kennedy Space Center. Lesa Roe, Jennifer Kunz and Chris Carlson – engineers in KSC's Space Station Hardware Integration Office – point to NASA Administrator Daniel Goldin's March 1998 statement as the theme for GPES: "All NASA employee plans address the goals that are stated in the NASA Strategic Plan and reflect and address metrics as stated in the cognizant strategic enterprise plans and center implementation plans." After using the system for one year at KSC, Roe, Kunz and Carlson showcased their tool to the Office of Space Flight Management Board in May and then to Goldin and the center directors at the Headquarters Senior Management Council in June.

After learning about the system, JSC Director George Abbey invited Kunz to JSC for the June 29 senior staff meeting, where she presented a history of GPES, project lessons learned and a demo of the system. Shortly thereafter, a small implementation team was convened to plan and see through the implementation of KSC's GPES at JSC.

"We wanted to mirror KSC's grassroots approach and implement this system using a team of employees from across the center," explained Greg Hayes, deputy director of Human Resources, who oversaw implementation along with Jim Jaax (Engineering Directorate), Jon Harpold (Mission Operations Directorate), and Lyn-Gordon Winkler (International Space Station Program). "That approach worked well. The implementation team developed a good project plan and an effective marketing strategy. With a 'champion' from every organization, it was easier to get the word out about the system."

In September, these "champions" briefed their managers about the system, explaining what GPES is, why it is being used and how it works. Then, in an effort to spread the word to employees, tri-fold brochures were delivered to all JSC civil servants in October. The brochures provided information about GPES along with points of contact for each organization.

"Since supervisors were asked to build all of their performance plans in the month of October, we wanted to give employees some information about GPES," explained Sally Branson, the GPES Implementation Team's marketing lead. "To take that a step further, briefings were held in November for employees who were interested in learning more about the system and its features."

"I really like the new system," said Estella Gillette, director of Equal Opportunity Programs. "I think it's designed to be short and to the point, with room for elaboration, and I like it because we helped design our own pieces. The new system will help me develop plans quickly, and I'll be able to include measurables that are very relative to the objectives and goals that are directly related to our piece of the strategic plan."

The positive reception of GPES is due, in large part, to the work of the GPES Implementation Team and the organizational champions. "Thanks to the efforts of a great number of folks, we've taken a good first step in implementing GPES. But our work is not done. We must sustain the positive momentum we've generated and improve the system over time. We're going to seek feedback from employees and managers alike to make sure we stay on track," promised Hartman

GPES performance plans for all employees should now be in place. Midterm discussions are scheduled for January 1999, while final appraisals will be due in August of 1999.

Comments or suggestions on GPES may be submitted to organization champions or to Brady Pyle of the Human Resources Office at x32012.

For more information about GPES, check out the GPES homepage at http://gpes.jsc.nasa.gov. ■

JSC holiday events set for December

JSC's celebration of the holiday season begins at 11:15 a.m. December 1 with a "Toys for Tots" ceremony taking place in the Building 3 cafeteria when JSC Director George W. S. Abbey and Astronaut Captain Charles Hobaugh join the U.S. Marine Corps in kickoff festivities for 1998.

The program has received tremendous support from JSC employees in the past, and it is anticipated that the response to this year's campaign will be even greater. A barrel will be placed in the cafeteria to receive toy donations, so please take the opportunity to support this worthwhile endeavor.

JSC's "Holiday Extravaganza" event will also begin on December 1 and run through December 23, with daily entertainment during the lunch hours from 11:30 a.m. to 12:30 p.m. in the Building 3 cafeteria. Music and entertainment for the holiday season will be performed each day by such groups as Aldersgate Praise, South Houston High School's chamber choir, Madison High School's concert choir, San Jacinto College's Department of Music, Clear Brook High School's "Company B," and J. Frank Dobie High School's "JFD Chamber Choir."

In addition, JSC or contractor employees interested in sharing their particular musical talents with the NASA family are invited to contact the Equal Opportunity Programs Office at x30601 concerning details of the event. All employees are encouraged to attend these performances. ■

Employee Assistance Program announces new seminar

The Employee Assistance Program is offering a brown bag luncheon seminar titled "Tools for Preserving Your Relationship" from 11:30 a.m. – 12:30 p.m. December 16 in the Building 30 auditorium. Peggy Halyard will conduct the seminar.

This one-hour seminar will discuss the latest studies on successful skills for enriching and maintaining long-term relationships. Tools to help you communicate more effectively, manage conflict and enhance fun and friendship in your relationship will be presented. Warning signs in relationships and ways to avoid unhealthy patterns will also be discussed.

The EAP is also offering three support groups: one for partners of traveling employees, another on behavioral modification for those who are experiencing difficulty in weight control and a third one for caregivers who are dealing with aging parents or an older parent.

Contact the EAP at x36130 to participate or to obtain details. ■

JSC Photo 98E07632 by Mark Sowa

A team of JSC employees from the Aeroscience & Flight Mechanics Division, working in coordination with employees from LinCom Corp., has developed a new software tool to analyze space flight trajectories for rendezvous and proximity operations. Team members are (left to right) Jada Davidson, Zack Cruz, David Strack, Eric V. Mitchell, Scott Cryan and Allan DuPont.

JSC team develops new 'OUTLOOK' for rendezvous analysis

A team consisting of members of JSC's Aeroscience & Flight Mechanics Division in the Engineering Directorate and employees from LinCom Corp. has developed a newly integrated software simulation called OUTLOOK. The team is excited to have this newly integrated capability to analyze space flight trajectories for rendezvous and proximity operations scenarios with either the Earth, Moon, or Mars as a central body; develop necessary requirements and budgets for either targeted or piloted maneuvers and timelines, and display simulation results using state-of-the-art, high-speed realistic wall screen graphics – like "Star Wars" only in slow motion.

OUTLOOK was created using a software development environment called TRICK developed by the Automation and Robotics Division. This environment allows engineers to create models for a new vehicle in a very short period of time. The main portion of the simulation came from development work previously done for the Automated Transfer Vehicle rendezvous predevelopment task, a NASA/ European Space Agency task to compare simulations of the European space vehicle, and more recently from work performed for the International Space Station Rendezvous/Proximity Operations and Capture (RPOC) support task. This latter task provides the ISS Program with oversight into the RPOC aspects of vehicles that will fly to or about the ISS (excluding the shuttle). Vehicles such as the European Automated Transfer Vehicle, the Japanese H-II Transfer Vehicle and the Crew Return Vehicle are currently being evaluated.

"The extra feature of OUTLOOK is its ability to allow a user to create a large-screen visualization of the rendezvous and proximity operations trajectories for actual or proposed vehicles," said Eric Von Mitchell, an engineer in NASA's Advanced Mission Design Branch. In addition, OUTLOOK allows users to create a customized basic simulation in a short period of time.

When members of the Aeroscience and Flight Mechanics Division were asked to design reference missions for the Autonomous Extravehicular Robotic Camera (AERCam), the RPOC task manager in the Advanced Mission Design Branch, Al DuPont, stated that the "basic trajectory simulation already existed, and it was a reasonable effort to provide the simulation software with minimal modifications for the AERCam work."

LinCom employees Scott Cryan, Zack Cruz and David Strack were able to spend a portion of their time to ensure that a useable simulation was ported to the Aeroscience and Flight Mechanics Division's Flight Mechanics Lab. Advanced Mission Design Branch engineers Robert Merriam and Mitchell used the simulation to develop early reference missions and maneuver budgets for AERCam. Mitchell had the vision to link many software capabilities into one simulation. The integrated result is a realistic 3-D visualization of the analysis scenarios on a large screen in the Flight Mechanics Lab.

Cooperation and Teamwork

The need to have a simulation to conduct a recent task in support of AERCam and the knowledge that segments of an existing TRICK-based simulation could be used blended well with the realization that this new simulation capability would provide support to several branch and division goals. Although Mitchell provided the vision of linking several software capabilities into one simulation, "actually several people were involved in ensuring that the simulation integration was satisfactory," he said.

Three employees in the Simulation and Graphics Branch in the Automation, Robotics, and Simulation Division were involved in the project. Charles Gott gave his permission for a copy of the TRICK software development environment to be available in the Flight Mechanics Laboratory. Next, because the appropriate visual graphics of the ISS were needed to interact with OUTLOOK, Sharon Goza obtained permission for the graphics software package called ENIGMA and the appropriate vehicle models to be available in the laboratory. ENIGMA's compatibility with the TRICK software development environment was also aided by Duane Johnson and his previous work to convert the Tree Display Manager to be TRICK compatible as well as his work with a software development effort called Replay. Replay allows OUTLOOK users to save analysis data into a file and "replay" the trajectory scenario with visual models. The Replay visualization of analysis scenarios may be played at actual speed or faster.

Merriam and Pete Cuthbert, engineers in the Advanced Mission Design Branch, provided assistance to enable the full display of simulation results. Merriam was involved in setting up simulation runs, developing ISS/AERCam targeting output data, and creating new plotting formats. Cuthbert assisted in obtaining the capability to show simulation results on the wall screen.

Jada Davidson and Rick Rohan of Lockheed Martin created user accounts and kept the laboratory and all of its computers up and running.

Products and Results

"Having this capability to perform analyses across a broad spectrum of projects and vehicles is very much needed and welcomed," said Aldo Bordano, chief of the Aeroscience & Flight Mechanics Division.

This new simulation provides engineers with the capability to set up analysis cases, make analysis runs via batch mode or by using a pilot-in-the-loop, and produce some preliminary results in a day or two. Some of the products expected from this simulation will be vehicle total delta-velocity, vehicle propellant consumption, chaser trajectory relative to target, target and chaser vehicle inertial position and velocity vectors, relative navigation data, and a host of other variables that can be plotted for specific analysis needs.

Since the simulation easily accommodates new vehicles, it may be applied to the ISS Program and to JSC's role in the Human Exploration and Development of Space missions. The capability of the simulation to use high-energy, elliptical Earth orbits is much needed as is its appropriateness for lunar or Mars applications.

JSC Photo 98E07682 by Mark Sowa

Eric V. Mitchell, an analysis pilot, performs proximity operations for the International Space Station and AERCam.

Additional Simulation Use

Created as an engineering tool, OUTLOOK may also be useful as a rendezvous and proximity operations tool for other areas within JSC. Since scenarios can be "flown" by analysis pilots or even by members of the crew, the simulation may be used by any JSC area interested in obtaining analysis results early in a program. Future applications could include automated rendezvous and proximity operations planning for unpiloted vehicles.

Close

"It's true that other simulations were previously created for rendezvous and proximity operations." said Mitchell, who was task manager and helped develop a similar simulation called the GenEric Vehicle Simulator a few years ago. Since that time, he has pressed for an update of that capability. "The real selling point of OUTLOOK is its ability to allow a user to conduct analysis and create an analytical and visual depiction of the results as they apply to rendezvous and proximity operations trajectories for the development of space."

The creation of OUTLOOK demonstrates what can be achieved though hard work and cooperation.

"A number of people have influenced and inspired me throughout my career, including Sam Wilson of TRW and NASA, the late Ed Lineberry of NASA and Blair Nader, also with NASA in the Cargo Integration and Operations Branch – to name just a few," said Mitchell. "But I think that the most important lesson that I've learned here is to try to keep good relationships with all the folks who I meet and work with and never burn any bridges." ■

PEOPLE on the MOVE

Human Resources reports the following personnel changes as of November 7, 1998:

Key Management Assignments

Bill Parsons was selected as deputy director, Center Operations Directorate.

Larry Kenyon was named deputy manager, Space Operations Business Management Office.

Jim Ruzkowski was selected as manager, Emergency Operations Center, Mission Operations Directorate.

Alan Lindenmoyer was named manager, Configuration Management Office, International Space Station Program Office.

Reassignments Between Organizations

Bill Sheegog moves from the Space and Life Sciences Directorate to the Engineering Directorate.

Doug Whitehead moves from the Space Shuttle Program Office to the Engineering Directorate.

Shayla Taylor moves from the Space Operations Management Office to the Information Systems Directorate.

Jim Wade moves from the Safety, Reliability, and Quality Assurance Office to the International Space Station Program.

Retirements

G*race Germany* of the Business Management Directorate.

David Camp of the Space Shuttle Program Office.

Resignations

Kenneth Adams of the Business Management Directorate.

Mary Mueller of the Center Operations Directorate.

Kevin Klein and *Sherry Molnar* of the International Space Station Program Office.

DATES & DATA

December 16

Scuba club meets: The Lunarfins will meet at 7:30 p.m. Dec. 16 at Pot Pie Pizzeria at Watergate Marina. For details, call Mike Manering at x32618.

Astronomy seminar: The JSC Astronomy Seminar will meet at noon Dec. 16, 23 and 30 in Bldg. 31, Rm. 129. For more information, call Al Jackson at x35037.

December 17

Directors meet: The Space Family Education board of directors will meet at 11:30 a.m. Dec. 17 in Bldg. 45, Rm. 712D. For more information on this open meeting, call Gretchen Thomas at x37664.

December 23

Spaceland Toastmasters meet: The Spaceland Toastmasters will meet at 7 a.m. Dec. 23, 30 and Jan. 6 at the House of Prayer Lutheran Church. For more information, call George Salazar at x30162.

Communicators meet: The Clear Lake Communicators, a Toastmasters club, will meet at 11:30 a.m. Dec. 23, 30 and Jan. 6 at Lockheed Martin, 555 Forge River Rd. For details, call Allen Prescott at 282-3281 or Mark Caronna at 282-4306.

Spaceteam Toastmasters meet: The Spaceteam Toastmasters will meet at 11:30 a.m. Dec. 23, 30 and Jan. 6 at United Space Alliance, 600 Gemini. For details, call Patricia Blackwell at (281) 282-4302 or Brian Collins at x35190.

December 31

New Year's dinner: The New Year's Day dinner/dance will begin at 7 p.m. Dec. 31 at the Gilruth Center. Cost is $25 per person. Tickets are on sale through Dec. 29 at the Bldg. 11 Exchange Store.

January 4

NSBE meets: The National Society of Black Engineers will meet at 6:30 p.m. Jan. 4 at Texas Southern University, School of Technology, Rm. 316. For details, call Kimberly Topps at (281) 280-2917.

January 7

Warning System Test: The site-wide Employee Warning System will perform its monthly audio test at noon Jan. 7. For additional information, call Bob Gaffney at x34249.

January 8

Astronomers meet: The JSC Astronomical Society will meet at 7:30 p.m. Jan. 8 at the Center for Advanced Space Studies, 3600 Bay Area Blvd. For more information, call Chuck Shaw at x35416.

January 12

Aero club meets: The Bay Area Aero Club will meet at 7 p.m. Jan. 12 at the Houston Gulf Airport clubhouse at 2750 FM 1266 in League City. For more information, call Larry Hendrickson at x32050.

NPMA meets: The National Property Management Association will meet at 5 p.m. Jan. 12 at Robinette and Doyle Caterers, 216 Kirby in Seabrook. Dinner costs $14. For more information, call Sina Hawsey at x36582.

January 14

MAES meets: The Society of Mexican-American Engineers and Scientists will meet at 11:30 a.m. Jan. 14 in Bldg. 16, Rm. 111. For details, call George Salazar at x30162.

Airplane club meets: The MSC Radio Control Airplane Club will meet at 7:30 p.m. Jan. 14 at the Clear Lake Park pavilion. For more information, call Bill Langdoc at x35970.

January 19

NCMA meets: The National Contract Management Association will hold its annual conference Jan. 19-20. For details, contact Christine Mack at x31244 or Mara Savely at 286-5751.

Space station conference set for February

NASA will cosponsor a conference on International Space Station utilization scheduled for February 1-4, 1999, in Albuquerque, N.M.

More than 20 sessions will cover all of the major research areas to be explored on the ISS including biotechnology, biomedicine, gravitational biology, materials science, fluids and combustion research, space science, Earth science and engineering research. Sessions on commercial research and service activities and technical presentations on ISS capabilities will also be included.

The complete list of planned papers, as well as registration and logistics information, may be found on the web at http://www-chne.unm.edu/isnps. ■

NASA BRIEFS

NASA TECHNOLOGY HELPS PRESERVE OLD GLORY

A NASA infrared camera developed to explore Mars will assist the Smithsonian Institution in its three-year project to preserve the Star-Spangled Banner. The camera, built at NASA's Goddard Space Flight Center, Greenbelt, MD, is taking images of the historic flag in infrared light to help preservationists identify deteriorated and soiled areas not obvious to the human eye.

The camera, called the Acousto-Optic Imaging Spectrometer, was developed by Dr. David Glenar at Goddard. Considered a national treasure, the Star-Spangled Banner flew over Fort McHenry in Baltimore, MD, during the War of 1812 and inspired the words that became the U.S. national anthem. Despite receiving special care at the Smithsonian's National Museum of American History, the flag is deteriorating from decades of exposure to light, air pollution and temperature fluctuations.

AIR-BREATHING ROCKET ENGINE TESTS SUCCESSFULLY COMPLETED

NASA has successfully completed two years of testing radical, new rocket engines that could change the future of space travel. NASA and its industry partners have ground tested rocket engines that "breathe" oxygen from the air.

"Air-breathing rocket engine technologies have the potential of opening the space frontier to ordinary folks," said Uwe Hueter of NASA's Marshall Space Flight Center in Huntsville, Ala.

Air-breathing rocket engines could make future space travel like today's air travel, said Hueter, manager of NASA's Advanced Reusable Technologies project. The spacecraft would be completely reusable, take off and land at airport runways, and be ready to fly again within days. An air-breathing rocket engine inhales oxygen from the air for about half the flight, so it doesn't have to store the gas on board. So at take-off, an air-breathing rocket weighs much less than a conventional rocket, which carries all of its fuel and oxygen on board. Getting off the ground is the most expensive part of any mission to low-Earth orbit, and reducing a vehicle's weight decreases cost significantly.

WEILER TO HEAD SPACE SCIENCE OFFICE

NASA Administrator Daniel S. Goldin has named Dr. Edward J. Weiler as associate administrator for NASA's Office of Space Science.

Weiler had served as acting associate administrator since Sept. 28, following the departure of Dr. Wesley T. Huntress Jr.

Space News ROUNDUP!

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