

April 9, 1999

SPACE CENTER Roundup

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Employees share joy of engineering

THIS YEAR, JSC celebrated eight years of observing National Engineers Week when some 175 civil service and contractor employees visited elementary, middle and high school classrooms to encourage students to pursue careers in engineering, science, math and technology. The visits were part of a national outreach program called Discover "E" ("E" for Engineering). This year's activities continued into March.

To reach more students this year, JSC's Education and Community Support Branch partnered with Texas Education Agency's Education Service Centers last August to distribute brochures concerning JSC's JASON Project to about 3,000 Houston area teachers. "As a follow-on to that partnership, we developed a National Engineers Week invitation list that included some twenty school districts," said Mae Mangieri, JSC's National Engineers Week coordinator. "We were pleased that twenty-seven Houston Independent School District schools responded to our invitation to participate in this year's program. In 1998, only eight HISD schools responded to our invitation."

The volunteers shared their unique space-related knowledge with students and teachers as part of JSC's commitment to the local educational community. During their classroom presentations, they engaged students by using a variety of hands-on experiments and visual props like space-suit items, helmets and gloves.

Howard Hu of JSC's Guidance, Navigation and Control's Design and Analysis Branch and Tara Jochim of Boeing's International Space Station Communication and Tracking Group gave presentations on the International Space Station to several eighth grade classes at Webster Intermediate. Hu and Jochim presented a brief overview of the ISS including its mission, its design specification, the benefits of international partner participation, and the types of research planned on board the space station. The students were shown a video that provided additional information about the ISS and its research capabilities.

"I had a great experience talking about the space station at Webster Intermediate," said Hu. "The students asked good questions and at times surprised me with how much they knew about the International Space Station. Some of the students with whom we spoke were just beginning a mini-course on the station, and I think our presentation provided them with a great starting point."

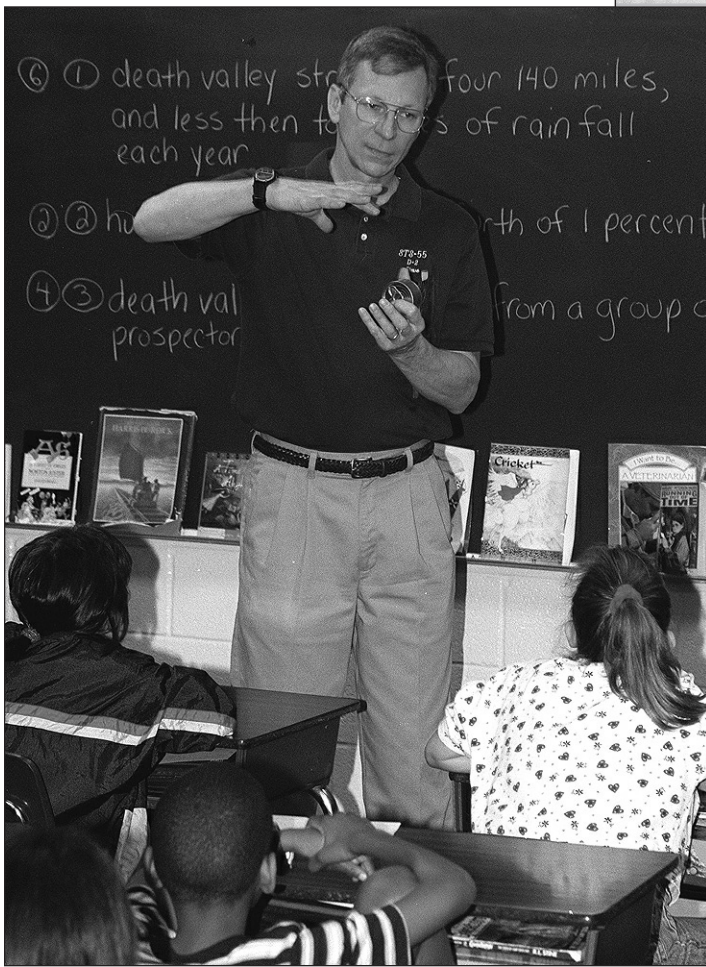
For the first time, astronauts visited local area high schools, and the response on the part of teachers and students was outstanding. "It was very interesting to hear how an average high school student grew up to be an astronaut," wrote Mark Stamp, chemistry teacher at Ball High School in Galveston about Astronaut Dan Tani's visit. "The kids were impressed with the possibilities."

Almost all of the evaluation forms received from teachers were highly positive about the JSC presenters. "Phillip Curell and Rich Mrozinski were excellent guest speakers," wrote



JSC Photo S99-02352

DISCOVER "E"— JSC engineer Howard Hu, above left, works with students from Webster Intermediate School as part of National Engineers Week activities. Hu and children from Rene DeLafuente's class built paper rockets powered by Alka-Seltzer and water. Fourth grade student Cedric Martin raises his hand to ask a question during Astronaut Steven Nagel's visit. Nagel, left, spoke to fourth and fifth grade classes at Rizzuto Elementary School in La Porte.



JSC Photo S99-03017

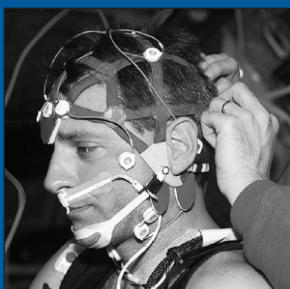
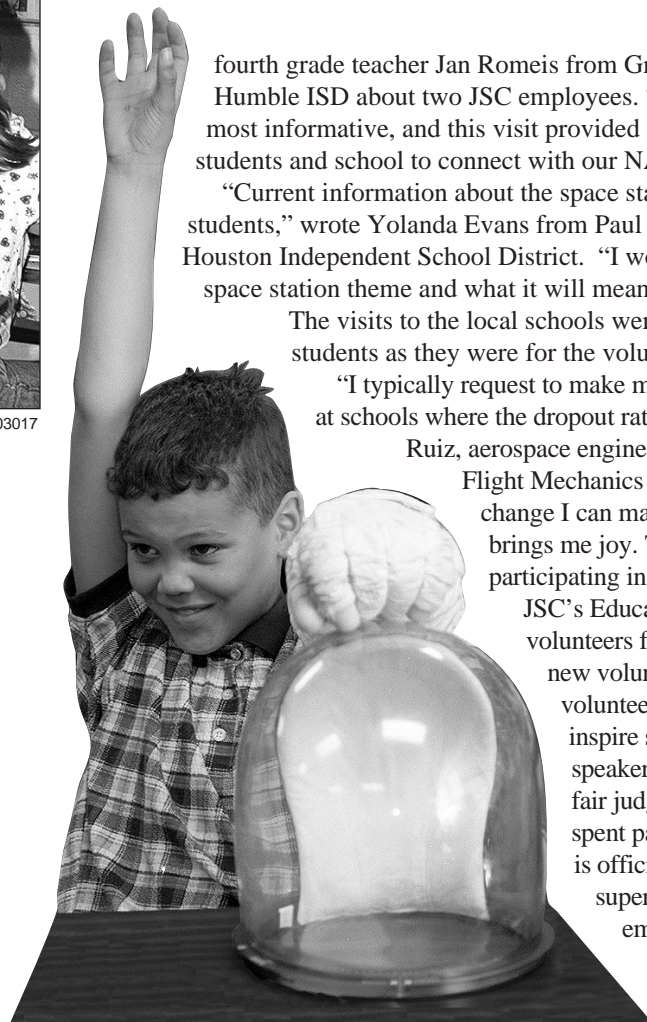
fourth grade teacher Jan Romeis from Greentree Elementary School in Humble ISD about two JSC employees. "Their 'team' presentation was most informative, and this visit provided an excellent opportunity for our students and school to connect with our NASA resources."

"Current information about the space station was very interesting for the students," wrote Yolanda Evans from Paul Revere Middle School in the Houston Independent School District. "I would like to continue with the space station theme and what it will mean to the students in the future."

The visits to the local schools were as exciting for the teachers and students as they were for the volunteers.

"I typically request to make my presentation to at-risk students at schools where the dropout rate is the highest," said Michael Ruiz, aerospace engineer in JSC's Aeroscience and Flight Mechanics Division. "Whatever positive change I can make in their lives, however slight, brings me joy. That's the satisfaction I get out of participating in National Engineers Week."

JSC's Education Outreach Program provides volunteers for local schools year round, and new volunteers are always needed. As a volunteer, employees can help educators inspire students by participating as guest speakers, career day speakers, science fair judges, tutors and mentors. Time spent participating in an approved event is official duty time, and with supervisory approval civil service employees may charge their volunteer time to a special education labor code. ■



NeuroLab marks
Brain Awareness
Week.

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Watch out for
construction
ahead.

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Dressing to suit
the next
millennium.

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Shuttle veterans complete Hubble servicing crew

NASA HAS NAMED two veteran astronauts and a first-time flyer to the crew that will pay an early visit to the Hubble Space Telescope this October. Four experienced space walkers already have been training for the mission, designated STS-103, a nine-day flight to service and maintain the Hubble Space Telescope.

Commander Curtis Brown, Pilot Scott Kelly and European Space Agency Astronaut Jean-François Clervoy will join space walkers Steven Smith, Michael Foale, John Grunsfeld and ESA Astronaut Claude Nicollier.

Part of the servicing mission that had been scheduled for June 2000 was moved up after three of the telescope's six gyroscopes failed. Three gyroscopes must be working to meet the telescope's very precise pointing requirements, and the telescope's flight rules dictated that NASA consider a "call-up" mission before a fourth gyroscope failed. Having fewer than three working gyroscopes would preclude science observations.

STS-103 will be Brown's sixth shuttle mission, his third as commander. Brown, a lieutenant colonel in the U.S. Air Force, commanded last year's STS-95 mission and STS-85 in 1997. He also served as pilot on STS-77 in 1996, STS-66 in 1994, and STS-47 in 1992.

Kelly, a member of the 1996 Astronaut Candidate class, will be a first-time space traveler. A lieutenant commander in the U.S. Navy, he reported to NASA in April 1996, completing two years of training to qualify for assignment as a shuttle pilot.

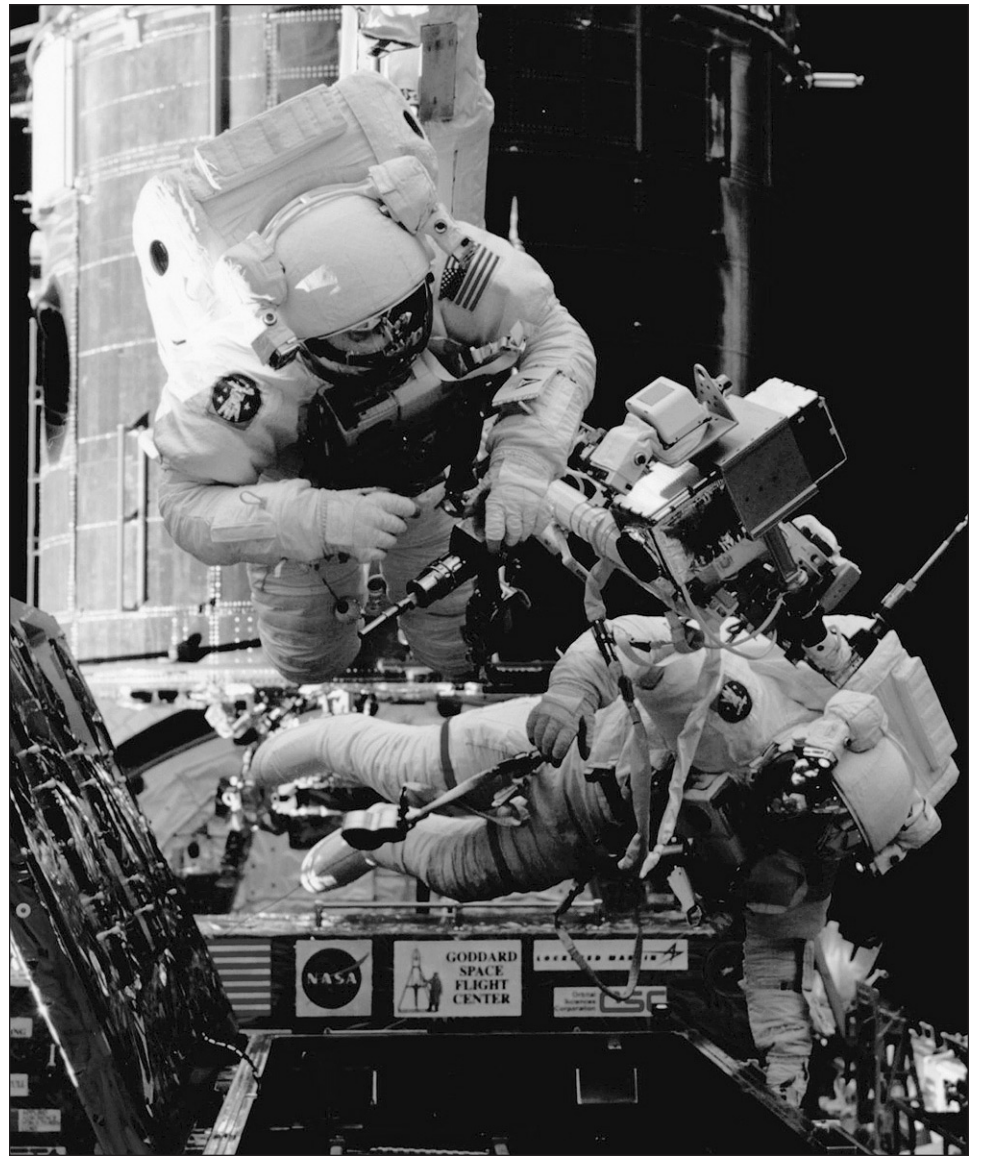
Clervoy will be making his third flight. As a mission specialist on STS-66, he used the shuttle's robot arm to deploy the CRISTA-SPAS atmospheric satellite. On STS-84 in 1997, he visited the Russian Mir Space Station.

The four mission specialists already in training include Payload Commander Steve Smith, a veteran of two space flights. Smith brings extensive Hubble servicing experience to the crew, having performed three space walks on Hubble servicing mission STS-82 in 1997.

Foale is a veteran of four space flights, including a long-term stay aboard Mir, and 10.5 hours of space walking. He also serves as the assistant director, technical, of JSC.

A veteran of two flights, Grunsfeld served on STS-67 in 1995, the second shuttle flight of the Astro observatory, and STS-81 in 1997, the fifth mission to Mir.

Nicollier is another veteran of Hubble servicing, having flown on STS-61 in 1993, the first servicing mission. He flew two other shuttle missions in 1992 and 1996. ■



STS082-717-026

Astronauts Steve Smith, center, and Mark Lee, on the shuttle's robotic arm, conduct a survey of the hand rails on the Hubble Space Telescope during the STS-82 servicing mission.

Neurolab mission highlights Brain Awareness Week activities

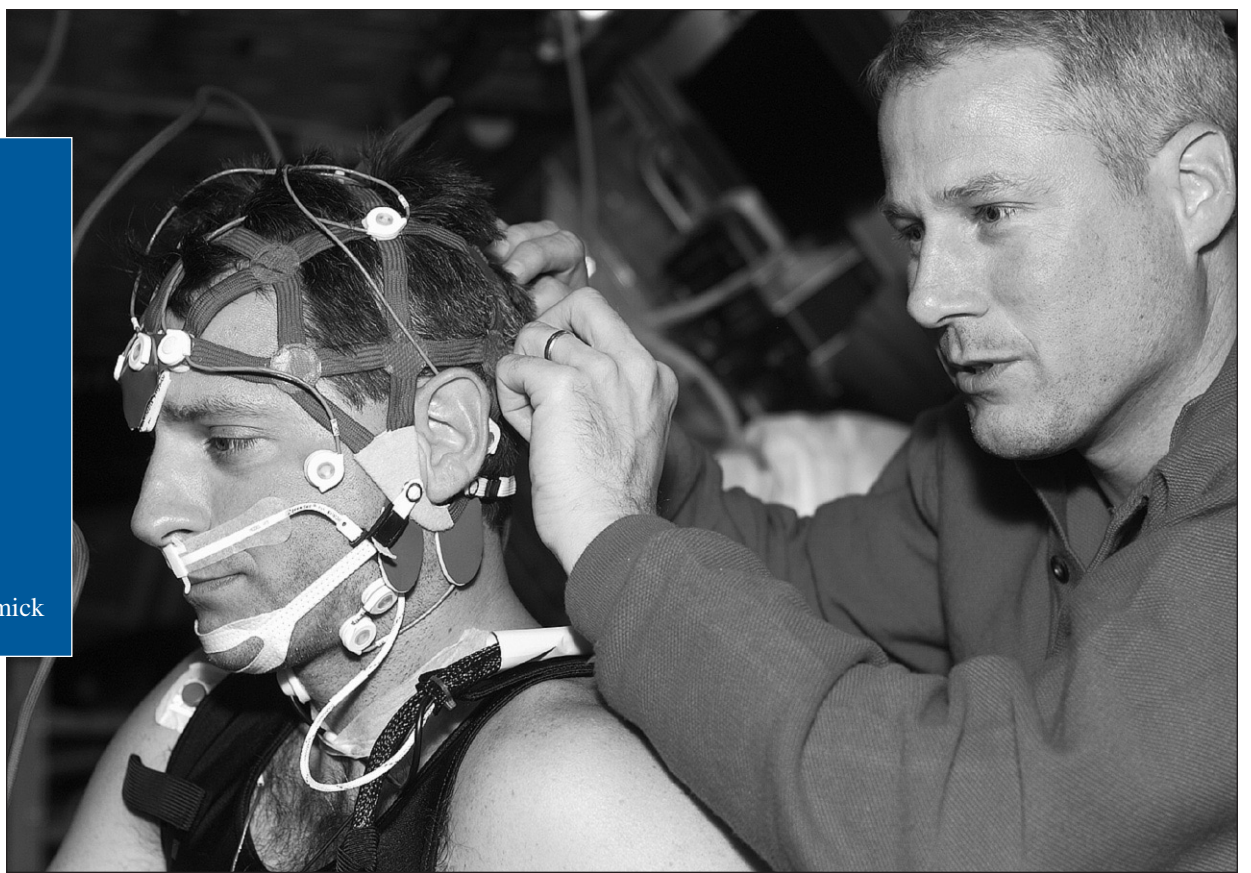
FOR 16 DAYS LAST YEAR, a crew of seven astronauts dedicated themselves to furthering our knowledge of the nervous system in an ambitious space shuttle mission called "Neurolab."

The STS-90 crew supported 26 experiments in eight disciplines, focusing on basic research in neuroscience. Crewmembers served as both subjects and operators as they carried out the experiments using a wide array of biomedical instrumentation, including some developed especially for the mission. Crewmembers included Commander Rick Searfoss, Pilot Scott Altman, Mission Specialists Kay Hire, Dr. Rick Linnehan and Dr. Dave Williams, and Payload Specialists Dr. Jay Buckley and Dr. Jim Pawelczyk.

"Neurolab, which was NASA's hallmark contribution to the 'Decade of the Brain,' has been recognized as the most scientifically sophisticated and technically complex life sciences mission ever undertaken by NASA," said mission scientist Dr. Jerry Homick of JSC. "As the result of a dedicated effort by

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—Dr. Jerry Homick



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Payload Specialists Jim Pawelczyk, above left, and Jay Buckley conduct sleep studies in the shuttle's middeck as part of the Neurolab experiments on STS-90. The Neurolab sleep studies are expected to increase understanding of the physiological effects of melatonin or the causes of sleep disruption. The studies will be applicable to many groups of individuals with a high incidence of insomnia, such as shift workers, the elderly, and people traveling across time zones. Pictured at left, Astronaut Dafydd Williams, mission specialist, serves as a test subject in the Lower Body Negative Pressure device. Also taking part in this run are Jim Pawelczyk, left, payload specialist, and Richard Linnehan, payload commander.

the entire science support team and the crew, all of the scientific objectives of the mission were met, and in some cases exceeded. The data from Neurolab will significantly increase our understanding of how the nervous system and brain develop in and adapt to microgravity spaceflight, and will provide new insights regarding the diagnosis and treatment of neurological disorders experienced by people on Earth."

Scientists will present preliminary results of the research conducted on Neurolab at a symposium in Washington, D.C. April 14-16.

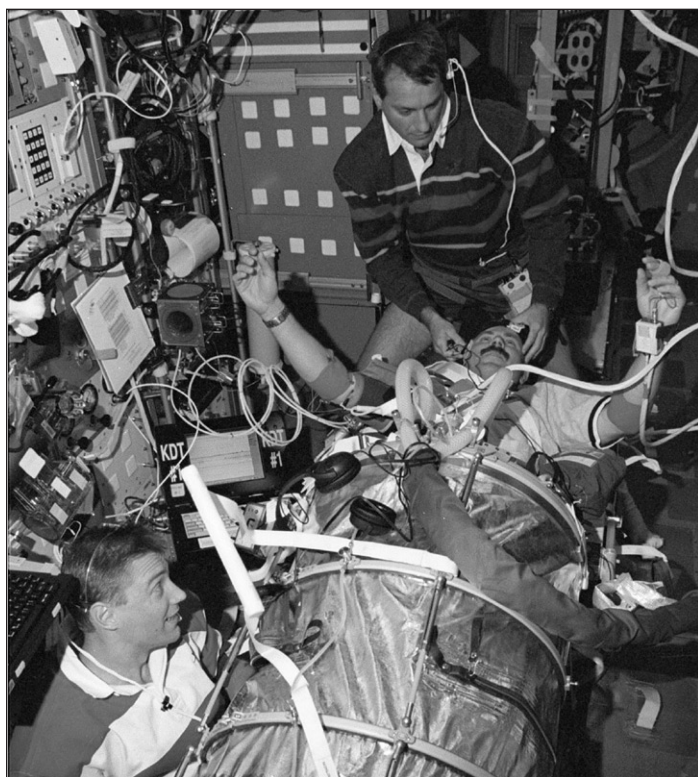
Earlier this month, to commemorate NASA's support of neuroscience research, and as the one-year anniversary of Neurolab approaches, Dr. Joan Vernikos, director of the Life Sciences Division at NASA headquarters, presented a banner flown on the STS-90 Neurolab mission to David Mahoney, chair of The Dana Alliance for Brain

Initiatives. She made the presentation March 17 at a luncheon in the Russell Senate Office Building in Washington, D.C., to mark Brain Awareness Week (March 15-21).

Now in its fourth year, Brain Awareness Week unites the Society for Neuroscience with The Dana Alliance and a coalition of more than 440 science, advocacy and other health organizations that share an interest in elevating public awareness of brain and nervous system research.

Society members sponsored a variety of educational activities for the general public, including lectures, lab tours, classroom visits and exhibits to demonstrate the importance of basic neuroscience research to the health and well-being of the American public.

Also making remarks at the luncheon were several members of Congress: Senators Bill Frist and Ted Stevens, and Representatives Vernon Ehlers, Steny Hoyer and James Moran. ■



STS090-330-006

C O M M U N I T Y N E W S**JSC donors' blood put to good use at St. Luke's Hospital**

Blood makes life possible. And this miraculous fluid enables hospitals to function.

These were the primary messages about a dozen JSC employees were given during their recent tour of St. Luke's Episcopal Hospital. They got a firsthand look at how blood donated to St. Luke's during JSC's annual blood drives is put to use saving lives. Attendees toured the cardiac catheterization laboratory, the Texas Heart Institute and the blood lab and viewed a cardiovascular operation in progress.

"About fifty times each year, we implant something known as a left ventricular assist device," said Dr. Arthur Brace, medical director, Blood Bank and Transfusion Service, St. Luke's Episcopal Hospital. "These devices take the place of the normal heart function. We wouldn't be able to perform these surgeries without blood donations. Ten to twenty units of red blood cells are needed to do this surgery."

Since 1992, there has been a continued increase in the use of blood. More than 100 units of blood are transfused at the hospital on peak days. Cardiovascular surgical patients receive more than 50 percent of all blood donations. Coupled with this increasing demand for blood, the existing donor base has been declining due to more stringent testing that potential donors must undergo.

"The bottom line is that we see a continued need for blood," said Brace. "For this reason, we really appreciate your efforts."

Modern medicine has developed numerous new procedures to save lives. These include bone marrow and liver transplants, new cardiovascular procedures and a range of other



Viewing a catheter used for cardiac operations are, from left, Rothe Joint Venture employee Rudy Marent and JSC civil servants Joe Rogers and Pam McCraw.

JSC Photo S99-03624

aggressive therapies. But none of this progress would be possible without blood products. In addition, according to Brace, "we wouldn't be able to make advances in treating sickle cell anemia, immune deficiency, cancer and other diseases without blood donors."

Given the additional testing that blood donors must now undergo, maintaining an adequate blood supply is a challenge for the hospital. And donors who give on a consistent basis – such as many JSC employees – are rare finds.

"Many of you have donated blood many times," said Stephanie Logsdon,

manager of the Blood Donor Program, St. Luke's Episcopal Hospital. "That's really an advantage for us when we have to talk to patients and their families about the safety of our blood supply. I can point out groups such as yours. Not only do I have years of testing on many of you, but we have many patients who have been transfused and done well with your blood."

St. Luke's personnel have learned how to increase the blood donor base from their association with JSC. "I want to thank you all for what you do for us," said Linda Wesley, administrative director, Department of Pathology, St. Luke's

Episcopal Hospital. "When we talk about how we might increase our donor base, we try to learn from you because you do a terrific job of bringing in new donors year after year."

St. Luke's cardiac catheterization laboratories are the largest and most fully equipped catheterization labs in the world. More than 10,500 diagnostic and cardiac catheterization procedures are performed in the cath labs annually.

In cardiac catheterization, a thin catheter is inserted through an artery or vein and advanced into the major vessels and heart chambers. Depending on the type, catheters can be used to measure pressure, view the inside of blood vessels, widen a narrowed heart valve, or clear a blocked artery.

Located in St. Luke's Hospital, the Texas Heart Institute is a nonprofit organization devoted to advancing the understanding and treatment of cardiovascular disease through programs in research, education and patient care. Its work is made possible by a combination of philanthropy, government grants and research contracts.

According to Mike McGee, vice president of research administration, Texas Heart Institute, researchers are currently developing new heart pumps and new artificial hearts. Promising new work in gene therapy – releasing genetically engineered materials into the heart to cause cells to behave properly – has also begun.

Attendees ended their visit with a tour of the blood lab and a demonstration of how blood is tested, centrifuged to break it down into its cellular components, packaged and stored. ■

Clear Creek, JSC team prepares for pillow fight in Orlando

By Norm Chaffee

THE PHILLIPS GYMNASIUM in Pasadena was the site of a practice "pillow fight" on February 21 as JSC's robot sparred with a robot from Pasadena to train for this year's robotic competition.

For the third year, JSC and contractor engineers and machinists are teaming with students and teachers from the Clear Creek Independent School District to enter the annual national robotic competition sponsored by FIRST (For Inspiration and Recognition of Science and Technology), to be held in late April for the fifth consecutive year at Disney's Epcot Center in Orlando, Fla.

FIRST, a nonprofit educational organization, promotes the excitement of engineering, science and technology among high school students by sponsoring annual robotics competitions across the country. This is the eighth year that the organization has sponsored a national contest.

A series of seven regional competitions were held throughout the country in February and March, prior to the nationals. A total of 281 teams will be competing this year, regionally or nationally. NASA Headquarters and field centers are sponsoring several teams again this year, and regional competitions are being hosted at Ames Research Center and at the Kennedy Space Center.

Teams are comprised of high school students and teachers working in collaboration with engineers and machinists from sponsoring organizations.

The competition simulates a real-world project in that the teams have only a seven-week period to conceive, design, build, test, modify and train with their robot prior to shipping it to the competition site. This year the teams received the competition requirements and rules on January 9 and were required to ship the completed robot by February 24.

"We've got an awesome robot this year," said Terry Brandhorst, the K-12 science coordinator for CCISD, who organized the student and teacher involvement this year. "And we wrapped it up with plenty of time to spare," boasted Scott Askew of JSC's Automation, Robotics and Simulation Division, who was JSC's team leader, as he watched the robot depart from the practice area in Bldg. 9 on February 24.

The JSC/CCISD team includes students and teachers from Clear Creek, Clear Brook, and Clear Lake high schools, and engineers and machinists from several JSC divisions and contractor organizations. Other teams in the Houston area include Pasadena ISD/Houston Lighting and Power Co.; Friendswood ISD/Oceanering Space Systems; Houston ISD (Booker T. Washington Engineering Magnet High School)/Brown and Root/Exxon; and Conroe ISD (Oak Ridge High School)/Hitachi.

This year's unique competition game, devised by the mechanical engineering faculty and students at the Massachusetts Institute of Technology, requires two teams of two robots each to compete with one another during a series of two-minute rounds in a 24-foot by 27-foot rectangular arena. Within the arena is a movable six-foot-wide octagonal platform called the "puck." It is five inches high and mounted on casters so that it can be moved.

The game requires the robot to pick up thin circular items, called "floppies," that are 30 inches in diameter. Each floppy has a central Velcro button and a strip of Velcro around its periphery, which can be used to pick it up. Each robot scores one point for each floppy it can pick up. The score increases to

three points per floppy if the robot can raise it at least eight feet in the air. In addition, if the robot can use the "puck" to lift itself at least two inches off the ground, the floppy score is tripled. The robot may elevate itself by grabbing the "puck" or by climbing up on it. And finally, if the puck can be shoved into the opponent's side of the arena when the match time expires, all other scores are doubled.

Each team has ten floppies, and the floppies can be loaded onto the robot by a lifting device on the machine or can be placed or thrown onto the robot by a human player who must stand in a

pre-designated location. The robots are driven by radio control by the student members who can control the functions of locomotion, steering, picking up floppies, lifting the floppies above eight feet, lifting the entire robot off the floor, and controlling the puck.

In each competition two robots are randomly paired just prior to the match. The teams must devise a cooperative strategy to jointly acquire and control the floppies and the puck, while attempting to foil the efforts of their two opponents. This is the first year in which the game involved an alliance among robots.

To prepare for this year's national competition, the local area teams arranged for a mini-competition at Pasadena ISD's Phillips gymnasium on February 21. The CCISD and Pasadena ISD robots were able to participate in the competition and successfully demonstrate their capabilities, viewed by a crowd of interested spectators, parents, teachers and students.

The enthusiasm and spirit of the JSC/CCISD team at the Pasadena mini-competition was high, and great results are expected in Orlando. But the students themselves demonstrate the best results of the competition. "Several kids who didn't know much about engineering are now planning to study engineering in college," said Josh Mehling, a Clear Creek High School senior and one of the student leaders of the team. And privately he admitted that the last two years' work on the team has helped him gain admission to several fine universities and receive substantial scholarship offers. That's the kind of result that really counts. ■

"Several kids who didn't know much about engineering are now planning to study engineering in college."

—Josh Mehling,
Clear Creek High School
senior

Please Pardon Our Dust

The Construction Projects Roundup at JSC

By Robert P. Kehoe

A lot of construction is happening around Johnson Space Center. More projects are planned.

"We are proud to be doing what it takes to keep the center operating day-to-day," said newly appointed Center Operations Director Bill Parsons. Construction projects are part of that effort. "We are committed to having a robust construction program by doing more with the resources we have," he said. "A robust construction program fits in well with the Center Operations Directorate goal of providing products and services that make JSC a dynamic and vital center for manned space flight."

COD functions include logistics, environmental compliance, security, facility engineering, and maintenance and operations. The directorate and the Base Operations Support Services contractor, Brown & Root Services/Pioneer, form a strategic team for meeting JSC's infrastructure needs.

The Construction Office, part of the Plant Engineering Division, manages construction projects at JSC. Five civil servants manage construction activity at the center. They team with Gilbane Building Co. which provides independent construction inspection and management services.

"Most of our recent construction activity that you have been seeing is either repair, modification, or rehabilitation work," said Bill Roeh, chief of the Plant Engineering Division. "We have not had the thrust of large, new construction projects like there were seven or eight years ago in support of the International Space Station."

A number of construction projects are either in progress or just being completed:

- ◆ A \$300,000 Genesis project in Bldg. 31 will involve construction by BSRP of a world-class clean room to meet JSC's contamination and curatorial responsibilities for the upcoming Genesis solar wind sample return mission, the first extraterrestrial sample return mission since the Apollo era.

- ◆ A \$4 million upgrade to the JSC site electrical substation begun two years ago will be completed this year by Gardner-Zemke Construction Co. It includes replacement of some of the components installed when the site was first built. It is the last of a series of projects that have revitalized the substation.

- ◆ A \$5 million second phase of upgrades to the 3.5-mile tunnel system under JSC is just being completed. In this phase C. L. Vick Construction Co. added lights and emergency backup power for them, ventilation fans and sump pumps, additional fire suppression, new structural crossovers and exit structures. Old communications cables were removed and groundwater seep areas were dried. A third phase could begin as early as Christmas.

- ◆ BSRP is building a 31- by 54-foot, \$300,000 welding shop at Ellington Field. It will enable employees to work on much larger aircraft parts in a much safer environment.

- ◆ The \$5 million phase of major upgrades to the Central Heating and Cooling Plant, Bldg. 24, is half finished. Five of the huge 2,000-ton capacity cooling towers behind Bldg. 24 are being replaced by C. L. Vick Construction Co., Inc. Two of the new towers have to be finished before Houston's warm weather. The three others will be replaced next winter.

- ◆ The mile-long trench on the south side of Avenue B is part of the installation of 12 new fiber optic links between Bldg. 44 and the Sonny Carter Training Facility for ISS communications system testing. Contractor TCI Network Solutions should complete the work in early April.

- ◆ Major modifications at Bldg. 29 will accommodate the new Bio-Plex complex. This \$2-million project in the building's old "WETF" includes four new 15- by 30-foot steel cylinders and backup utilities for closed cycle, controlled growth environmental experiments.

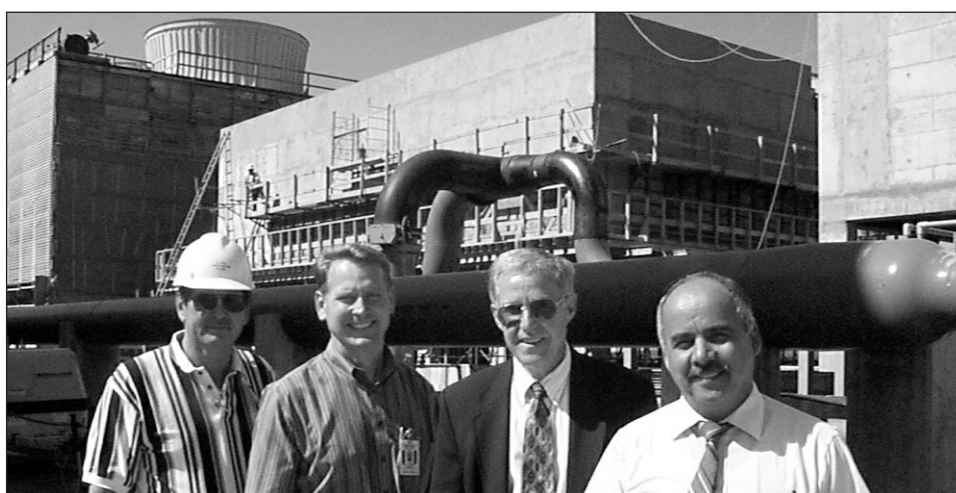
- ◆ The 200 and 300 areas have just had their overhead high-voltage electrical wires replaced by a \$1-million project. The construction contractor was Barnes Electric. ■



The Site Electrical Substation Construction Team, from left, includes Bill Harkleroad, project superintendent, Gardner-Zemke Construction Co.; Reinhard Brueckner; Ben Richardson, Gilbane Construction Co.; Marvin Bennett, NASA construction manager; and Bud Nichols, project engineer.



The Phase 2 Utility Tunnel Upgrade Construction Team, from left, includes Ray Burnette, Gilbane Building Co.; Jim Jones, project superintendent, C. L. Vick Construction Co. Inc.; Bob Kehoe, NASA construction manager; and Steve Campbell, project manager.



The Bldg. 24 Cooling Tower Construction Team, from left, includes Jim Jones, project superintendent, C. L. Vick Construction Co. Inc.; Gary Gastler, Gilbane Building Co.; Gene Hajdik, project engineer; and Tom Khalili, NASA construction manager.



The Bldg. 29 Bio-Plex Complex Construction Team, from left, includes Terry Tri, EC3; Tom Khalili, NASA construction manager; Gary Gastler, Gilbane Building Co.; and Henry Wyndon, project engineer.



The BOSS Contract Construction Team, from left, includes David Vice, BRSP superintendent; Gary Ridgway, BRSP construction manager; Doug Whitmarsh, BRSP superintendent; Greg LeSturgeon, NASA construction manager; Billy Isabell, BRSP superintendent; and Kyle Swensen, BRSP superintendent.

Many construction projects are about to begin

- ◆ May should see the start of the first phase of streetlight replacement or renovation across the main JSC campus area. The \$800,000 project will be followed by more streetlight repair over the next several years.

- ◆ Buildings 1, 3, 30A and MOW, and 31 will all have original roofs replaced soon. In April, the road in front of Bldg. 1 will be replaced in a 60-day project that will change traffic patterns in the area.

- ◆ Buildings 5 and 16 will get upgrades to fire sprinkler systems. The work, to begin in April and to be finished in five months, will be done after hours and on weekends by Arteaga Construction Co.

- ◆ Chiller No. 2 in Bldg. 48, the Emergency Power Building, is being replaced to add to backup cooling capacity to the Bldg. 30, the

Mission Control complex. Contractor BRSP is about half-way through the \$600,000 project.

- ◆ Another Bldg. 48 project involves installation of a new transformer. The \$500,000 project will allow greater flexibility and reliability in providing emergency power to Mission Control.

"Construction at JSC is a total team effort," said Grady Owens, chief of the Facility Development Division. Its design engineers, the Plant Engineering Division Mechanical Operations Office engineers, Electrical Operations Office engineers, the BJ3 procurement staff, NT2 safety staff with Hernandez Engineering Inc. safety engineers, JB2 security specialists, BRSP engineers and support staff, the JJ4 construction

managers, and the Gilbane construction engineers "really make for an effective team," he said.

The team guides each project through the definition phase, the design phase, and finally through the construction phase, which generally takes three to four years. "The people who work these construction projects are challenged in some very unique ways," Owens said. "But it's apparent that they are having some fun along the way."

"If you think these projects are fun," said Parsons, "wait until we build the proposed 10-acre simulated Lunar and Mars landscapes along Avenue B. It will be a great place to take a break and reflect on the space program and its future." ■

Suiting up for the new millennium

WHAT TYPES OF SPACE-SUITS will be required to support long-duration human space flights planned for the next millennium? NASA will need advanced spacesuits and life support systems that will be able to withstand extended space walks to operate the International Space Station or travel back to the moon or on to Mars.

Beyond developing new suits and life support systems, new gloves, helmets and computers are being developed to meet increasing performance demands. The space-walking astronaut travels in a personal spaceship, complete with propulsion, communications and thermal control systems. New technologies are creating new products to fill needs in each of these areas.

"In the space-walking world, we think of the astronaut as embodying the whole spacecraft in miniature," says Mike Lawson, NASA project manager of the Advanced Technology Spacesuit Project. "All of the systems that are in a spacecraft are in this one-person spacecraft. That's what makes this particular area very unique. While most people work on one element or system, we work on almost all of them."

Members of JSC's Advanced Technology Spacesuit Project team, including civil servants and Lockheed Martin employees, are currently developing and evaluating new spacesuits and life support systems for three different missions: post-assembly station flights, lunar missions and missions to Mars. The next-generation spacesuit and life support system could be similar for all three missions except for hardware for the Mars mission, which will require unique carbon dioxide removal and thermal insulation systems.

"We've changed our philosophy from looking at what spacesuit provides the best mobility to considering the weight of the spacesuit as well," adds Lawson. "The objective now is to make spacesuits more mobile and lighter."

Those suits may be used for ISS operations. Beyond that, NASA has no official plans for a human space flight back to the moon or on to Mars, but the Advanced Technology Spacesuit Project team has to be prepared for whatever missions may come along. As a major part of this effort, outside contractors are developing the new spacesuits, while civil servants and Lockheed Martin employees are designing the life support systems on site.



Two prototype suits were recently delivered to JSC. The first is from ILC in Fredrica, Del. Called the I-suit, it is a lighter version of NASA's current 125-pound spacesuit. It has a soft upper and lower torso with minimum use of bearing "joints." The suit weighs 65 pounds (without life support).

The second prototype, from David Clark Co. in Worcester, Mass., was designed to have fewer metal bearings to reduce weight. The suit is modeled after the NASA escape suit worn for emergency escapes during shuttle liftoffs and landings, but with several additions and modifications to the joints. Fabric toroidal joints in the knees and hips are flexible without being heavy. The suit weighs in at a slight 26 pounds.

New helmets and computers are also being developed. Advanced communication systems will be integrated into the helmet. To deliver visual information, a retinal or heads-up display as well as a TV monitor could be incorporated into the helmet. To clear the chest area where the controls for the suit are located, NASA plans to move all controls to a computer mounted on the astronaut's arm or wrist.

"We are also continuing to investigate various developments towards enhancing glove mobility and long-term wear comfort," says Joe Kosmo, NASA's senior project engineer for advanced spacesuit development.

In the life support arena, three designs have been proposed as replacements for the current 165-pound Portable Life Support System. All three are suggested ways of packaging life support system components (such as the oxygen module and the ventilation loop). Each design is flexible enough to accommodate whatever equipment is needed to support station, lunar or Mars missions.

In the first, life support system components are plugged into a "motherboard." A second fits parts into a foam molding. The last, called the LEGO™, is a modular design that features compartments into which life-support components can be placed and replaced in the event of a malfunction.

"The current life support system is very efficient but has to be maintained by trained technicians," says Mike Rouen, NASA's head of mechanical design for the Advanced Technology Spacesuit Project. "For this reason, it is not the best for long-duration missions where astronauts will have to maintain the system. We plan to develop a life support system that the astronauts can easily maintain in space."

In the next few years, NASA will choose the best ideas from each system prototype. The end objective is to develop a new suit and a new life support system to be tested in a vacuum chamber in 2003. ■



JSC Photo S99-02354



JSC Photo S99-02353



JSC Photo S99-02355

1. LEGO Team members are, from left, front: Heather Paul, NASA; Mary O'Connell, team lead, Lockheed; Luis Trevino, NASA; back: Kevin Groneman, ILC; Kase Urban, ILC; Robert Trevino, NASA; Eric Kanon, Lockheed; Mark Swan, ILC; Sharon Lafuse, NASA.
2. Foam Team members are, from left, front: Wendel Smith, ILC; Kevin Groneman, ILC; back: Heather Paul, NASA; Kase Urban, ILC; Richard Stinson, Lockheed; Scott Andrea, Lockheed; Eric Kanon, Lockheed; Mike Rouen, NASA; Mark Swan, ILC.
3. Members of Motherboard Team are, from left, front: Howard Slade, team lead, Lockheed; Heather Paul, NASA; back: Siraj Jalali, Lockheed; Kase Urban, ILC; Dwayne Kautz, OSS; Cyle Sprick, OSS; Eric Kanon, Lockheed; George Kessler, OSS; Jeff Templeman, OSS.

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 9

In his opening statement to the Aviation/Space Writers Association press conference in Bldg. 2 April 9, John Young quipped, "People stop me on the street all the time and ask what is STS-1."

He and Bob Crippen then went into details of the 54-hour, 150-mile orbital altitude mission of the first Space Transportation System flight.

Young is the commander and Crippen is the pilot for STS-1.

The first mission will confirm whether the vehicle will perform "the way we want it to," Robert Thompson, manager of the Shuttle Program Office, had said earlier in the briefing.

1 9 8 9

President Bush announced Wednesday his intention to nominate Rear Adm. Richard H. Truly to become the next NASA administrator.

Truly, a former astronaut at JSC, has been NASA associate administrator for space flight since February 1986. He led the recovery team following the *Challenger* accident in January of that year and headed the return to flight effort that culminated in *Discovery's* September 1988 launch.

"This marks the first time in its distinguished history that NASA will be led by a hero of its own making," Bush said, "an astronaut who had been to space, a man who has uniquely experienced NASA's tremendous teamwork and achievement."

1 9 9 4

Images from the Space Radar Lab-1 instruments are already providing scientists with puzzles and surprises as the Earth-looking radar mounted in Endeavour's cargo bay makes its maiden flight.

At press time Wednesday, both the orbiter and SRL were performing flawlessly, and all of the planned observation sites around the world had been observed at least once, with many more planned before landing next week.

Early on, scientists were ecstatic with an image of the Sahara desert in Egypt and Sudan, Africa, which looked below the shifting sands to reveal an extensive network of ancient riverbeds.

Guidoni to escort first Italian station element to orbit

EUROPEAN SPACE AGENCY ASTRONAUT Umberto Guidoni, Ph.D., will be on board *Discovery* when it delivers one of the Italian Space Agency's contributions to the International Space Station on a mission targeted for April 2000.

Guidoni is the first astronaut named to shuttle flight STS-102, which will carry one of three multi-purpose logistics modules (MPLM) scheduled for launch to the International Space Station. Named "Leonardo," the 21-foot-long, 15-foot-wide module was built by ASI under a bilateral agreement with NASA that included a flight opportunity for an Italian astronaut for the first MPLM mission.

Leonardo can carry up to 10 tons of cargo housed in standard space station equipment racks. For this flight, Leonardo will carry equipment and supplies to outfit the U. S. laboratory module, "Destiny," which is scheduled for a March 2000 launch. Leonardo, and its follow-on modules Raffaello and Donatello, is designed to support dual functions, initially carrying cargo to orbit and then serving as on-orbit space station modules.

Guidoni has one previous shuttle mission to his credit. He flew as a payload specialist on board STS-75 in 1996. During that 16-day mission, he and six other astronauts supported numerous experiments comprising the United States Microgravity Payload, and also demonstrated the ability of the NASA/ASI's Tethered Satellite System to generate electricity.

The remaining crew members will be named at a later date. ■



Umberto Guidoni

JSC Photo S96-00284

For information on Guidoni, or any astronaut, see the NASA Internet biography home page at URL: <http://www.jsc.nasa.gov/Bios/>

Dialing for disaster

By Mary Peterson

IT WAS NIGHT, on a road not heavily traveled. A man on his way home, when suddenly his car smashed into a bridge, injuring the driver seriously. It would have been just another wreck and may have gone little noticed, except the driver was famed country singer George Jones, and the cause of the wreck was believed to have been, at least in part, the result of his talking on a cellular phone.

In still another incident, reported by the National Highway Traffic Safety Administration, a woman was driving her minivan on a rural road near her home when she became startled by the ring of her cell phone. As she reached over to retrieve the instrument from its bracket, she drifted off the road to the right, sideswiping a tree. Her child, in the right front passenger position, died as the result of head injuries received in the collision.

There are countless, similar stories. Even JSC has not been immune. A Close

Call was reported when a car driving on 2nd Street, adjacent to the Bldg. 17 parking lot and heading toward the Saturn Lane exit, narrowly missed hitting a pedestrian in the crosswalk. The pedestrian, at midpoint, had looked both ways and, thank goodness, was paying attention. The driver, who was busily talking on a cell phone, did not stop, and never appeared to notice.

What was once thought of as a novelty used primarily by business has now become commonplace among the masses, with the NHTSA estimating the current number of cell phones in use nationwide at 54 million – a number that could double by the year 2000. And the road hazard is expected to get worse.

"As cars more and more become an extension of the home and office, we're creating a whole new array of potentially hazardous distractions," says NHTSA Administrator Ricardo Martinez. It is, admittedly, hard to practice defensive driving when you're talking on the phone.

"But, to increase concentration and cut your risk, there are things you can do," suggests Barb Buchholz of the AAA.

Below is a list of safety tips to follow while driving and using a cellular phone:

- ◆ Place calls while stopped, or have someone dial for you.
- ◆ Use the cell phone in the "hands-free" mode.
- ◆ Avoid intense, emotional, or complicated conversations.
- ◆ Use "memory dial" to minimize dialing time.
- ◆ And always give driving your full attention.

Even the Texas Legislature has recognized the spiraling liability posed by cell phone use. House bill 994, authored by Paul Moreno, D-El Paso, was introduced on February 10 of this year. The bill, if passed, would prohibit the use of car phones unless the vehicle is stopped or unless the phone can be used without applying either of the operator's hands. The proposed effective date would be September 1, 1999. And, while this might not be an inexpensive solution, most would agree it would be better than having their cell phones taken away. ■

TICKET WINDOW

Exchange Store hours

Monday-Friday

Bldg. 3 7 a.m.-4 p.m.

Bldg. 11 9 a.m.-3 p.m.

All tickets are non-refundable.

Metro tokens and value cards are available.

For more information, please call x35350.

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
Fiesta Texas	.....adult	\$18.25
	.....(child under 48")	\$15.50
Astroworld Early Bird (valid through May 31)	.....	\$17.75
Astroworld One-day Admission	.....	\$21.00
Astroworld Season Pass	.....	\$54.75
(valid at all Texas Six Flags Theme Parks and Water World)		
Water World	.....	\$10.75
Moody Gardens (2 of 6 events)	.....	\$9.75
Sea World	.....adult	\$27.25
	.....child (age 3-11)	\$18.25
Schlitterbahn Water Park	.....adult	\$20.75
	.....child (age 3-11)	\$17.50
Space Center Houston	.....adult	\$10.25
	.....child (age 4-11)	\$6.50
(JSC civil service employees free.)		
Splash Town Water Park	.....adult	\$14.50 (child 48" and under)
	.....	\$11.50

ROUNDUP
Frosch, Yardley cover new space technology in STS development

New communications system takes flight

For more information on SSCS, visit the SSCS URL at: <http://www4.jsc.nasa.gov/eaprojects/gfe/sscs.htm>



JSC Photo S99-000826

By Matt Lemke

TEAMWORK has long been the foundation on which many NASA successes have been built. One latest success involves the Space to Space Communications System.

Mark Chavez, David Lee and Matt Lemke of the Avionic Systems Division and Mark Schmalz of the Systems Engineering Office have led a large, diverse group of contractor and civil service professionals who have created a communications network capable of linking the International Space Station, the orbiter, and space-walking astronauts simultaneously.

The radio system was flown successfully during the STS-95 mission. Astronauts aboard STS-96 and later flights will use it as their primary communications

system for space walks. Plans call for the station radio to be launched on Flight 5A with the U.S. Laboratory Module, and SSCS will become fully functional during Flight 6A when the station's external antennas are installed.

The project began in 1991 as a study of how to enhance the capabilities of the current communications system while providing the new capabilities required for the space station. A state-of-the-art time division, multiple access radio network was selected to provide digital quality audio communications among up to five radios simultaneously. This capability will be essential for station assembly flights to allow multiple space-walking astronauts to communicate with both the orbiter and the station. In addition to providing voice communications, the radios can transmit

status and crew health data to the orbiter and the station and exchange information between the orbiter and station computers. To accomplish all of these tasks simultaneously, each radio has a custom designed modem that operates more than 10 times faster than the best commercial modems available today.

The SSCS consists of numerous pieces of hardware from around the country. Radios were designed and tested in the Avionic Systems Division with a joint NASA and Lockheed Martin team. After the initial design was completed, Litton Amecom in College Park, MD, joined the team as the manufacturer and worked in a concurrent engineering role to ensure the radios would be easy to build. Boeing, Litton and Lockheed Martin designed and built antennas.

A GROUP OF PROFESSIONALS has worked together to create the Space to Space Communications System, a network capable of linking the International Space Station, orbiter, and space-walking astronauts simultaneously. Team members are, from left, front: Darwin Patterson, Dave Prentice, John Ngo, Bob Davis, Matt Lemke, Ellen Simmons, Romeo Sanchez, Kanishka Desilva, Samantha McDonald, Ron Merkel, Dawn Greer and Carmelita Brown; back: Robert Watson, Mark Chavez, Ron Hollis, Dave Lee, Jeff Rouze, Cesar Gonzales, Phil Corral, Ron Lewis, Scott Wheeler and Ilia Rosenburg.

In addition to flight equipment, numerous pieces of ground support equipment were built to support radio testing, orbiter testing, U.S. Lab testing, thermal-vacuum testing and crew training. System testing with multiple radios in various configurations was performed on site at the Engineering Systems Test Laboratory. ■

Conservationscape: *Keeping our water clean*

YOU MAY HAVE NOTICED a new look on the south side of Bldg. 30. The old holly hedges are gone and in their place is what is termed a conservation landscape or "conservationscape." Conservationscapes make use of resource efficient plants (REPs) that require relatively little in terms of chemical inputs or water. REPs are native and adapted plants that are well suited to local extremes of wet and dry weather. According to Dr. John Jacobs, Texas Agricultural Extension Service, "we have so many native and adapted landscaping plants available to us in this area that a true conservationscape does not have to have the gravel and cactus look, but can actually be quite lush."

The conservationscape at Bldg. 30 is the result of a partnership between Clean Water for Armand Bayou and JSC. It is intended to be a high profile demonstration that can show employees and the local community that conservationscapes can be an important tool for water quality and conservation in our own backyards. In the Bldg. 30 conservation demonstration project, native and adaptive plants and a new irrigation system were used. Soon, there will be signs and pamphlets available to provide information that individuals can use to learn about the conservationscape concept and get more information for using this technique at home. Guided tours of the Bldg.30 conservationscape will be offered on the hour from 10 a.m. - 1 p. m. on Earth Day, April 22.

The conservation demonstration also makes an important statement about JSC's commitment to the local environment. Inappropriate landscaping is a major contributor to impaired water quality in the lower Galveston Bay Watershed. Most common landscaping plants are inefficient and require fertilizers and pesticides. These chemicals frequently end up in rainfall runoff and pollute local bayous, bays and estuaries.



JSC Photo S99-04384 by James Blair

For more information on conservationscapes, call Dr. John Jacobs at 281-291-9252.

As anyone with a yard in Texas can attest, typical landscapes are also major water users and can account for well over half the residential water consumption during summer months. By providing a demonstration conservationscape, JSC and Clean

The newly planted "conservationscape" on the south side of Bldg. 30 features resource efficient plants that require relatively little in terms of chemical inputs or water.

Water for Armand Bayou hope to increase awareness of residents in the Houston and Clear Lake area of alternate landscape options and their beneficial effect on local water bodies.

Clean Water for Armand Bayou is a federally funded program administered by the Texas Agricultural Extension Service to demonstrate clean water practices in both residential and agricultural settings. The Texas State Soil and Water Conservation Board and the Armand Bayou Nature Center join TAES in this cooperative effort. Clean Water for Armand Bayou is building several demonstration conservationscapes throughout the Armand Bayou watershed, most notably the Hanson House Conservationscape at the Armand Bayou Nature Center.

The team of Dr. John Jacobs (TAES) and Colin Shackelford (Texas A&M) with Clean Water for Armand Bayou, Ivy Alexander, project manager for JSC's Tolman Grounds, Pat Kolkmeier of JJ2's Mechanical Operations Office, and Sandy Parker of JJ12's Environmental Services Office all worked closely with Mark Fox Landscaping (who provided the final design and installed the plants) on the conceptual design. The low flow irrigation system was designed, provided and installed by the TAEService.

For details on the Bldg. 30 project, call or e-mail Sandra Parker, JSC's Environmental Services Office. ■

PEOPLE *on the* **MOVE****Key Management Assignments**

John Beall was named chief financial officer.

Linda Massey was selected as the chief, Logistics Division, Center Operations Directorate.

Al Wetterstroem was named manager, Biomedical Hardware Development and Engineering Office, Engineering Directorate.

Rhonda Moore was selected as chief, Manufacturing Services Branch, Manufacturing, Materials, and Process Technology Division, Engineering Directorate.

Larry Sweet was named chief, Information Products and Services Division, Information Systems Directorate.

Peggy Wooten was named chief, Information Science Branch, Information Products and Services Division, Information Systems Directorate.

Chris Ortiz was selected as chief, Systems and Applications Branch, Information Technology Division, Information Systems Directorate.

John Symes was named chief, Customer Support Office, Information Systems Directorate.

Lynn Buquo was named assistant chief, Customer Support Office, Information Systems Directorate.

Promotions

Carolyn Woolverton was selected as an administrative officer in the Astronaut Office, Flight Crew Operations Directorate.

Juanita Gibson was selected as a management assistant in the International Space Station Program Office.

Reassignments Between Directorates

Tom Ohnesorge moves from the Information Systems Directorate to the Mission Operations Directorate.

Chris Culbert moves from the Information Systems Directorate to the Engineering Directorate.

Mike Brieden moves from the Engineering Directorate to the Space Shuttle Program Office.

John Peck moves from the Space Shuttle Program Office to the Engineering Directorate.

Butch Hosler moves from the International Space Station Program Office to the Engineering Directorate.

Kevin Watson moves from the International Space Station Program Office to the Engineering Directorate.

Honey Hyman moves from the Space Shuttle Program Office to the ISO 9000 Office.

Ken Lassmann moves from the Business Management Directorate to the Technology Transfer and Commercialization Office.

Christopher Counts moves from the Mission Operations Directorate to the Safety, Reliability, and Quality Assurance Office.

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

David Jackson moves from the EVA Project Office to the International Space Station Program Office.

Mike Langan moves from the Engineering Directorate to the International Space Station Program Office.

George Nield moves from the Space Shuttle Program Office to the International Space Station Program Office.

Karen Peterson moves from the Mission Operations Directorate to the International Space Station Program Office.

Ron Spencer moves from the Mission Operations Directorate to the International Space Station Program Office.

Reassignments Between Centers

Bill Ramage moves to Marshall Space Flight Center.

Irene Bibyk moves to Goddard Space Flight Center.

Retirements

Manuel Avila of the Engineering Directorate.

John Hooper of the Engineering Directorate.

Mary Mechelay of the International Space Station Program Office.

Resignations

James McKinnie of the Mission Operations Directorate.

Jessica Cordero of the Mission Operations Directorate.

Debbie Webber of the International Space Station Program Office.

DATES & DATA**April 9**

Astronomers meet: The JSC Astronomical Society will meet at 7:30 p.m. April 9 at the Center for Advanced Space Studies, 3600 Bay Area Blvd. For details, call Chuck Shaw at x35416.

April 14

IAAP meets: The Clear Lake/NASA Chapter of the International Association of Administrative Professionals (formerly Professional Secretaries International) will meet at 5:30 p.m. April 14 at Bay Oaks Country Club. Cost is \$16. For details and reservations, call Tami Barbour at 281-488-0055, x238.

Astronomy seminar: The JSC Astronomy Seminar will meet at noon April 14, 21 and 28 and May 5 in Bldg. 31, Rm. 248A. For more information, call Al Jackson at x35037.

Spaceland Toastmasters meet: The Spaceland Toastmasters will meet at 7 a.m. April 14, 21 and 28 and May 5 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. April 14, 21 and 28 and May 5 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. April 14, 21 and 28 and May 5

at United Space Alliance, 600 Gemini. For details, call Patricia Blackwell at (281) 282-4302 or Brian Collins at x35190.

April 15

Directors meet: The Space Family Education board of directors will meet at 11:30 a.m. April 15 in Bldg. 45, Rm. 712D. For more information on this open meeting, call Gretchen Thomas at x37664.

JSC NMA meets: The JSC National Management Association will meet at 7:30 a.m. April 15 at the Gilruth Center.

April 21

Scuba club meets: The Lunarins will meet at 7:30 p.m. April 21. For details, call Mike Manering at x32618.

April 26

Alzheimer's support group meets: The Clear Lake Alzheimer's Caregiver Support Group will meet from 7:30 p.m. to 9 p.m. April 26 in the first floor conference room in St. John Hospital, West Building, in Nassau Bay. For details, call Nancy Malley (281-480-8917) or John Gouveia (281-280-8517).

April 29

Radio Club meets: The JSC Amateur Radio Club will meet at 6:30 p.m. April 29 at the Piccadilly, 2465 Bay Area Blvd. For details, call Larry Dietrich at x39198.

NASA BRIEFS**SPACE-AGE TECHNOLOGY PEEKS AT AMERICAN HISTORY**

A team of NASA scientists working at the request of the National Archives has proved that the containers preserving several pages of the U.S. Constitution are still safely sealed.

Scientists from Langley Research Center adapted a laser system from an atmospheric research program to peer into the encasements protecting three of the five pages of the Constitution. By analyzing how the laser was affected by water vapor within the cases, the scientists determined the two middle pages of the Constitution and the transmittal page are still protected by their half-century-old helium and water vapor atmosphere.

"This was a once-in-a-lifetime opportunity," said Dr. Joel S. Levine, the scientist who managed the project. "The U.S. Constitution is one of the most important documents in the history of the world. It was an honor and a privilege to be asked to perform this research."

In the early 1950s, the Declaration of Independence, the Constitution and the Bill of Rights, collectively known as the Charters of Freedom, were sealed in specially prepared containers.

The cases were filled with humidified helium to protect the documents. When scientists beamed the laser into the cases, the water vapor inside partially absorbed the beam. By analyzing the absorption pattern, the scientists determined that the atmosphere had not changed.

ALLIEDSIGNAL WINS WHITE SANDS CONTRACT

JSC has awarded a contract to AlliedSignal Technical Services Corp., Columbia, MD, for testing, evaluation and maintenance services for the center's White Sands Test Facility. Major subcontractors to AlliedSignal are L&M Technologies, Inc. and Lynx, Ltd.

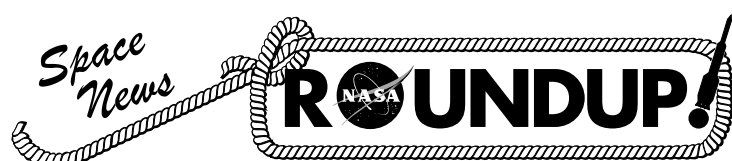
The potential value of the contract, including award fees based on performance, is estimated at \$324 million. The contract effort will be divided into a two-year base period and three options for additional one-, two- and two-year periods sequentially.

SPACE RESEARCH MAY LEAD TO NEW FLU-FIGHTING DRUG

A NASA-industry team has used the results of space shuttle experiments to develop a new flu drug that may decrease the length and severity of the illness and even prevent the development of symptoms in those exposed to the virus.

"With NASA support for space- and ground-based research, we successfully mapped the molecular structure of the influenza virus," said Dr. Larry DeLucas, director of the Center for Macromolecular Crystallography at the University of Alabama at Birmingham. "The mapping exposed the virus' weaknesses in greater detail and our industrial partners were able to develop a drug that exploits those weaknesses."

Dr. Ming Luo, a professor at the Center for Macromolecular Crystallography, and an international team of crystallographers developed the "molecular map" of the flu virus from space grown protein crystals. The map was used to design drugs that block the undesirable characteristics of the virus.



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