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SPACE CENTER Roundup

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Astronaut, others tell of skin cancer tragedy, survival *JSC kicks off Solar Safe campaign*

By Mary Peterson

It began as just a little dark mole, not even as wide as a pencil eraser, on the back between the shoulder blades. It was not even where the sun usually shines. Yet, in less than four short years, Diana Ashby, late wife of Astronaut Jeff Ashby, succumbed at the age of 33.



Jeff Ashby

Now, as painful as those memories are, Jeff Ashby speaks freely of his late wife's premature end in the hope of sparing others a similar fate. "Six months before I lost Diana," he recalls, "my fellow astronaut and friend, Lacy Veach, also died of the disease. Both of their cancers, malignant melanoma, started as a small mole on the back and progressed almost identically."

In Diana Ashby's case, and similarly in that of Veach, the mole was not painful. Usually they're not. Neither did it bleed. It was very small and had just begun to show signs of change when it was removed.

What might have been the end of the story was followed by major surgeries, chemotherapy, and radiation treatments – all fruitless attempts to stem the spread of the melanoma throughout her body. "It is important for people to remember," Ashby said, "that while skin cancer starts in your skin, it can metastasize, move into the bloodstream, and affect all of your major organs, including the brain." Typical lifespan is about three years. Diana survived nearly four.

Barry Waddell, business manager for the International Space Station Program, is a warm, affable guy who counts himself lucky, very lucky. Having grown up in Maine, where, according to him, "summer usually lasts about a week," he had never concerned himself with the prospects of skin cancer. Neither did he court the sun by golfing, fishing, surfing, or doing any of the usual things identified

with chronic sunburn, so it was of little concern when he noticed a small, reddish freckle on his face seven years ago. "Nothing to it," a general practitioner had said. Even some years later when it appeared a bit angry, the dermatologist doubted its significance until a biopsy revealed it was melanoma.

"I was shocked!" Waddell says. "I had been told don't worry about it, it's probably an infection, and there was a 50-50 chance it could be basal cell carcinoma, the least dangerous form of skin cancer."

From the outset, Waddell's cancer was not considered life threatening, partly because it was so thin, and the outlook was considered very good. Today, three surgeries and one skin graft later, he has a crater-shaped scar on his cheek that is a daily reminder of the threat to his life. But he is a survivor.

"I'm vigilant about having my skin checked regularly because I know I have to be!" This is the mantra of Debbie Denton, an employee development specialist in Human

Resources. More aware than most, she has experienced probably as many as 30 or so reasonably severe sunburns in her lifetime and has a history of skin cancer in her family, most of whom, like herself, are fair-skinned and prime physiological candidates for the disease.

"When I was diagnosed with basal cell carcinoma, I wasn't really surprised, because I kind of expected it," Denton says, revealing a dime-sized, whitish scar on her left hand, about four times the size of the original lesion (a very tiny red spot).

While basal cell is the most curable form of skin cancer, she never lets her guard down and includes, at intervals, a full body check in her trips to the dermatologist.

The common thread among each of these stories? Skin cancer is scary – what

was, what might have been, what the future could hold. How much we take for granted – a bump here, a red spot there. After all, we grew up with a succession of skinned knees, cut fingers, rashes, and assorted

other assaults to the skin, so we're accustomed to ignoring most of it. This is exactly what JSC's Solar Safe campaign would like to change.

Throughout the summer months, you will see Solar Safe symbols, signs, and notices throughout the site, offering education, information, and free, rapid skin testing for all employees, using state-of-the-art

teledermatology.

Some 800,000 to 1,000,000 cases of skin cancer will be diagnosed this year in the U.S., and 7,000 people will die from melanoma. Although skin cancer is the most common of all cancers, it is the most curable if detected early. Don't ignore this fact. Did we mention that the most devastating experiences began with just a small mole or freckle? ■

Diana Ashby worked tirelessly her final years to expedite cancer research. To that end, she founded The Melanoma Research Foundation dedicated to funding research toward treatment of melanoma and support of the melanoma patient community. The MRF can be reached at 800-673-1290 or at www.melanoma.org. We also recommend www.mpip.org.

Self-Exams Are Important:

- Skin cancer most common of all cancers
- Affects 600,000 Americans annually—and increasing
- Squamous cell carcinoma
- Malignant melanoma
- Look for changes of any kind
- Don't ignore a suspicious skin spot just because it's not painful
- Skin cancers may be painless, but are still dangerous

Look For:

- Three types of skin cancer: basal cell carcinoma, squamous cell carcinoma, malignant melanoma
- Look for changes of any kind
- Don't ignore a suspicious skin spot just because it's not painful
- Skin cancers may be painless, but are still dangerous

Warning Signs

- Skin growth that increases in size
- Appearance: pearly, translucent, tan, brown, black, or multicolored
- A mole, birthmark, beauty mark, or any brown spot that:
 - changes color
 - increases in size or thickness
 - changes in texture
 - is irregular in outline
 - is bigger than freckles, the size of a pencil eraser
 - appears after age 21
- Spot or sore that continues to itch, hurt, crust, scab, bleed, or bleed
- Open sore that does not heal within three weeks

If You Spot It... Stop It!

- Don't overlook or delay
- Consult your family physician or skin specialist

Protection

- Sunlight contributes to over 90% of all skin cancers
- Practice sun-protection habits:
 - Avoid peak sunlight activities—stay indoors or in the shade
 - Use a sunscreen rated SPF 15 or higher
 - Wear sunglasses, broad-brimmed hats, and protective clothing
 - Never tan naturally or artificially

Solar Safe Skin Cancer/Eye Damage Prevention Program

- Risk Factors (Risk Factors) sun exposure (sunbathing), fair complexion, childhood sunburns/blistering, skin moles
- Early Detection total body screening every 3 years to age 40, total body annually from 40 years of age
- Health Education

Check the NASA website: <http://www.nasa.gov>

DANGER SIGNS SKIN PIGMENTED LESIONS



Bob Gillispie and Celeste Evans demonstrate a new teledermatology concept whereby digital photos of skin lesions are sent to a downtown dermatologist for diagnosis and recommendations.

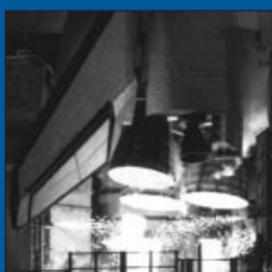


NASA JSC Photo JSC2000-03291 by Benny Benavides



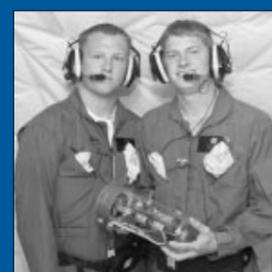
Technology companies at Expo.

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The shuttle as never seen before.

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High school experiments fly high.

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Ellington employee makes the call, saves coworker's life

When a coworker began pressing his hand against his chest, Terry Lee-Lamkins immediately knew something was wrong.

Her visitor, Larry Valenta, had entered her office visibly perspiring even though it was a cool November day at Ellington

Valenta accepted the aspirin and headed for a water fountain, but had to ask for some assistance to return to her familiar cubicle. At that time, Valenta conceded that something was "not right."

"My chest had started hurting during the walk to her office, but I had just returned

getting really bad but I still didn't want to call anybody. I was thinking, 'What if it isn't really anything?' I'd be getting all these people involved for nothing."

Lee-Lamkins, however, wasn't taking any chances. Even though he was reluctant to solicit any help, she made the call.

"I said, 'Larry, this call is more for me than it is for you,'" explained Lee-Lamkins. "I needed some help and I tried to keep presence of mind because I knew what was transpiring."

Lee-Lamkins called the Ellington Field firehouse and told them who she was, where she was, the situation and that she needed assistance immediately.

Emergency personal arrived at the site within minutes and took Valenta to Clear Lake Regional Hospital where he underwent quadruple bypass surgery.

"I remember hearing the doctor in the ER saying, 'Oh, yeah - it's a heart attack,'" said Valenta, who had exercised for years out at Ellington's workout facility but had tapered off last year. "I was thinking no way - he doesn't have the leads on right - something's messed up."

Valenta was walking within hours of the surgery and he now maintains a strict regimen of walking three miles a day and a much healthier diet.

"It was a religious experience," added Valenta. "You always hear all the

was indigestion," said Oscar Franklin, a paramedic at the scene who commended the workers for being on their toes when his team arrived. "It's extremely helpful when we get there and we can get an update on the patient's condition and know that immediate relatives have already been notified."

"The NASA team deserves a pat on the back," said Bo Atkinson, assistant fire chief, Ellington Field, who also responded to Lee-Lamkins' call. "They've made safety such a priority and always seem really caring about each other, providing the emergency response teams with courtesy and respect."

The American Red Cross honored Lee-Lamkins with a medal as one of their Everyday Heroes recently for her action. Lee-Lamkins, who received CPR certification as an aerobic instructor 15 years ago and has maintained it ever since as part of the AOD flight crew, says her advice to others is "make the call, especially if you are not sure what is really going on."

Valenta's care team offers the following suggestions to prevent and respond to cardiac emergencies.

- Call for help first. On site dial x33333, at Ellington dial x44444 and at home or away, dial 911.
- Check to see if the patient has a history of heart complications and if they are allergic to aspirin. If available, give them two aspirin (such as Bayer Children's Formula™ or other children's chewables, not Advil™ or other ibuprofen medications.)
- If you can't determine that



NASA JSC Photo JSC2000E09315 by Robert Markowitz

Ellington Field emergency personnel came to the aid of Larry Valenta when he experienced a near-fatal heart attack late last year. Shown here are paramedics Monty Cartwright, left, and Oscar Franklin, right, key players in the emergency response, with Valenta. Not pictured: Bo Atkinson, Don Williams and Jessie Alexander who also assisted with the rescue.

Field. When he had called only a few minutes earlier, Lee-Lamkins thought she had detected some oddity in the conversation and, when she saw him, a sense of déjà vu overcame her.

She was with her father in their front yard when he suffered a stroke.

Although a stroke and a heart attack are not the same, the memory came flooding back as she watched Valenta indicatively rubbing his chest.

Valenta insisted he was okay and just needed her to sign some documents, but Lee-Lamkins was hesitant and delayed their encounter by asking him rudimentary questions about the paperwork.

"I noticed straight-away that he was sweating heavily and was increasingly out of breath," said Lee-Lamkins. "I thought to myself, well, I'll give him some aspirin and see if he can make it to the water fountain."



Photo by Nicole Cloutier

Terry Lee-Lamkins holds her Peer Recognition Award, for her lifesaving actions during a coworker's heart attack.

from lunch and thought it was maybe from that," said Valenta. "I could feel the perspiration just rolling off of me and I just wanted to get out of there, but Terry kept talking and asking questions about the software modification. That's when it started

things that you are supposed to do to take care of yourself, but when it happens to you, that is when you believe."

Doctors have since told Valenta that his type of heart attack, one with few early symptoms, was especially dangerous. They estimate that without Lee-Lamkin's quick action, he likely would have had a 1 in 10,000 chance of surviving the episode.

"We were impressed that his coworkers had recognized that there was a problem and didn't just assume it

When he began rubbing his chest, it was a dead giveaway.
-Terry Lee-Lamkins

the symptoms indicate a heart complication or might be the result of indigestion or heartburn, don't take chances - make the call.

- To minimize your risk of heart problems, exercise regularly, keep your weight and blood pressure low and enjoy a healthy, low fat diet.

Franklin adds, "If the pressure is radiating from your chest outward, or if it can not be relieved by resting, then it potentially is a cardiac emergency and requires immediate medical attention." ■

Technology Expo attracts leading hardware, software companies

The second annual ODIN Alliance Technology Expo hosted by OAO was held at the Gilruth Center on March 30 and 31, and it was a huge success. More than 800 people attended the event, which included 20 computer vendors and JSC civil servants and

contractors. Compaq, Apple, Microsoft, HP, Sun, Siemens and Cisco were just some of the vendors who participated with booths at the show. Everyone who attended was able to see the latest and greatest in computer technology for the year 2000.

This year's expo included "break-out" sessions upstairs at the Gilruth Center. These sessions were especially popular, with hands-on demonstrations and more detailed classes where the vendors were able to reach groups of people who wanted to learn more about a specific

product or software/hardware. There were even training sessions available, which included Excel and Powerpoint.

Overall, the ODIN Alliance Technology Expo 2000 was a fun and informative way to learn more about what is available for JSC through the ODIN contract. ■



NASA JSC Photo JSC2000-09926 by James Blair

Linda Sweeney, OAO Odin, shows Scott Rosenbaum, ISD, a personal data assistant (Palm Pilot) at the OAO/Odin Alliance booth.



NASA JSC Photo JSC2000-09927 by James Blair

Cathleen Vacek, Sun Microsystems, talks with James Dawson at the Sun Microsystems booth.

C O M M U N I T Y N E W S**JSC co-ops visit local high schools**By **Kylie Moritz**

Each spring and fall the cooperative education (co-op) students venture out past the main gate of JSC to influence and encourage high school students to pursue higher education and to focus on math and science classes.

A committee of volunteer co-ops was set up in January to begin organizing the High School Outreach Program for this spring. The committee was responsible for choosing the high school, making arrangements for the co-op visit, organizing presentation groups and checking out space flight hardware.

This year's committee was led by Janna Althaus, a co-op from Texas A&M University. Althaus took time from her busy schedule in the Mechanical Systems Group to plan the successful expedition. She said she thinks high school outreach is a great way to spread knowledge to a lot of students.

During one week in March, the co-ops spoke to 32 classes, reaching approximately 600 students. Each presentation was led by two co-ops and consisted of overviews and questions and answers about the history of NASA, the International Space Station, X-38, Mars missions, space shuttle, career opportunities at NASA, and college life.

Paul Brower, a co-op from Purdue, feels that he definitely reached students by participating in the program. "I can confidently say that I've made a difference in someone's life because of the program. It might mean that a student will think twice before choosing not to go to college or that someone will pay more attention in science class for just a day."



NASA JSC Photo JSC2000-02787 by Benny Benavides

Ray Ventura, left, Georgia Tech, and Kylie Moritz, Colorado State University, prepare for a student presentation at Santa Fe High School as part of the High School Outreach Program.

Several co-ops agreed that the High School Outreach Program increases the students' interest in NASA and the space program and is fun at the same time.

Christopher Ranieri from Pennsylvania State University said, "It's always fun to talk about something you love, and an

indicator that it was a success was that many students were asking how they themselves could get involved."

Jason Niebuhr from Wichita State University said that the students seemed to have gained an appreciation for what we do at JSC and now may have a greater

interest in pursuing an education that may someday bring them here.

"High school outreach helps NASA to appear more realistic to high school students and helps them realize that they too can be a part of NASA," added Althaus.

While the co-ops are involved in many projects from day to day, they felt that this program was well worth their time and effort away from their usual tasks.

Genefer Brice from the University of Idaho said, "If only one person left from the presentation with a greater desire to go to college, or with the dream of working for NASA one day, then I think it was very worth it."

According to the co-ops, this spring's High School Outreach Program was a great success. Many of them even expressed interest in participating in more outreach opportunities in the future.

Andrew Perrone, from Texas A&M, explained, "I would definitely participate in such a program again. We never know when we're going to spark someone's interest in the space program and propel them to a career at NASA or at least get them interested in math and science."

"I would want to give more presentations because support for the space program can only be obtained one classroom at a time," added Chip McCann, who is from the University of Wisconsin-Madison.

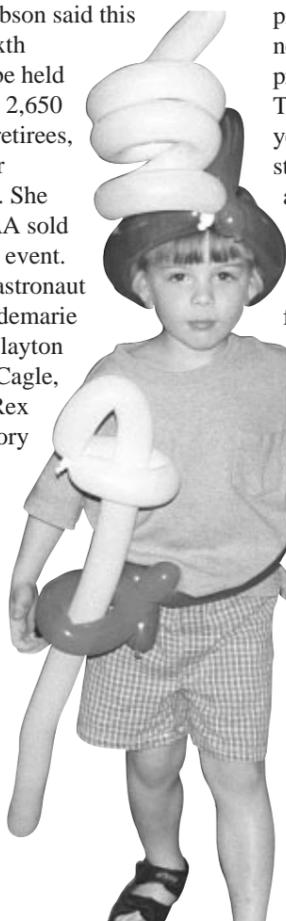
Erica Walsh from the Georgia Institute of Technology said, "I think that it's very important to reach out to high school students because most of them have no clue that it will be in their generation that space exploration will take a huge leap, and it will be because of them." ■

Thousands brave stormy weather to attend JSC Family Picnic

Tornado and severe thunderstorm warnings were not enough to keep thousands of employees from attending the NASA-JSC Family Picnic April 2 at Astroworld.

JSC Employee Activities Association President Ginger Gibson said this year's picnic, the sixth consecutive one to be held at Astroworld, drew 2,650 NASA employees, retirees, contractors and their families and friends. She reported that the EAA sold 2,951 tickets for the event.

Members of the astronaut corps including Heidemarie Stefanshyn-Piper, Clayton Anderson, Yvonne Cagle, Kenneth Cockrell, Rex Walheim, and Gregory H. Johnson were on hand to sign autographs. The Houston Livestock Show & Rodeo speakers committee entertained the crowd with singers,



a band, and a melodrama skit. Face painters and clowns were on hand.

"Though the weather didn't cooperate this year and it rained off and on all afternoon, we still had a great turnout," said Gibson, who chaired this year's picnic committee. "Actually, many did not mind the bad weather because we pretty much had the park to ourselves. There were no long lines at the rides this year. During the heavier rains, folks stayed nice and dry in the A&W Ranch area and enjoyed all of the other activities and entertainment that were provided."

The photograph shows some of the fun that took place at Astroworld's A&W Ranch, where JSC employees gathered to enjoy barbecue and each other's company, play horseshoes and listen to music. In addition, those who made it to the ranch received free complimentary passes for another visit at Astroworld later this year. ■

Fans of all ages enjoy NASA picnic.

NASA JSC Photo JSC2000-03221 by Ginger Gibson

REACHING OUT

For a second consecutive year, JSC exhibited at the Houston International Festival April 8-9 and 15-16 highlighting the center's upcoming community outreach activities.

Brazil was the festival's featured country this year and, as such, Brazilian-born Astronaut Marcos Pontes rode in the festival's Samba Parade kicking off the event. The parade was broadcast live on Channel 13. He and Astronauts Charles Camarda, Nick Patrick, and Mike Foreman signed more than 1,000 autographs throughout the event for festival visitors.

Additionally, 25 JSC volunteers distributed Open House 2000 postcard fliers, JSC bookmarks, bookcovers, and stamped children's hands with tattoos of the shuttle, astronauts, Earth, Moon and Mars.

This year's festival has been deemed the most popular in its 29-year history with an estimated total attendance of more than 500,000.



NASA JSC Photo JSC2000-12715 by James Blair

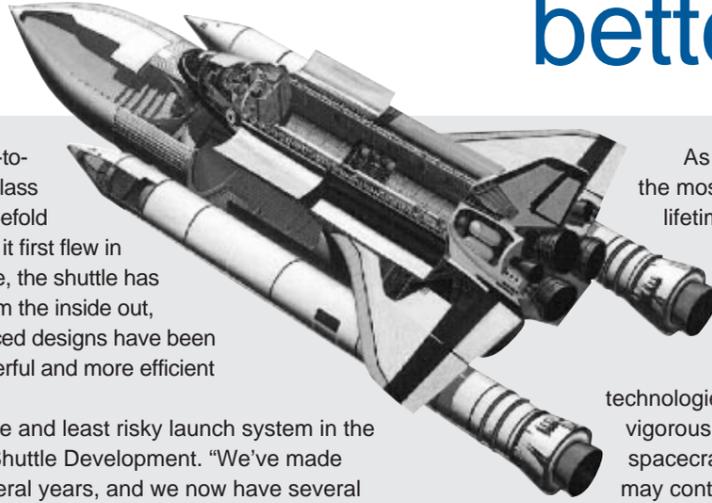
Robert Mayfield, 5, and his mother, Ramona Hoggard, get an autograph from Astronaut Nicholas J.M. Patrick.

The 21st Century space shuttle: better than ever

By James Hartsfield

On STS-101, *Atlantis* will be the most up-to-date space shuttle ever. From a new "glass cockpit" to main engines estimated threefold safer, *Atlantis* is far different than when it first flew in 1985. Hidden beneath its familiar shape, the shuttle has undergone a metamorphosis over the years – from the inside out, thousands of advances in technology and enhanced designs have been incorporated. Today's result is a safer, more powerful and more efficient spacecraft than ever before.

"The space shuttle already is the most reliable and least risky launch system in the world," said Elric McHenry, manager of Space Shuttle Development. "We've made major improvements in safety over the past several years, and we now have several things in work to make the system even safer."



As the fleet approaches the 100th shuttle launch this year, even the most-traveled shuttles still remain young in the 100-mission lifetimes for which they were designed. NASA is preparing for the possibility of flying the space shuttle for at least another decade, McHenry said, and future shuttle improvements are geared toward a goal of doubling the launch safety of the shuttle by 2005.

"Cutting risk is our top priority," McHenry said. "Several technologies available to us may be able to do that, and we plan to vigorously pursue them. In addition to making the shuttle a safer spacecraft for astronauts, developing these safety improvements may contribute to technologies that will be used one day on whatever next-generation reusable launch vehicle may be built."

Now flying: *Atlantis*' 'glass cockpit'

A new "glass cockpit" is the most visible of more than a dozen improvements flying for the first time on *Atlantis* on STS-101. In the new cockpit, eleven full-color, flat-panel display screens replace 32 gauges and electromechanical displays and four cathode-ray tube displays. The new cockpit displays, technically labeled the Multifunction Electronic Display Subsystem (MEDS), are 75 pounds lighter and use less power than before. The color displays provide easier pilot recognition of key functions. The new cockpit will be installed in all shuttles by 2002.

MEDS replaces obsolete parts, increases safety and redundancy and sets the stage for a future "smart cockpit" upgrade that will improve the way information is presented to shuttle crews, said Andy Allen, assistant program manager, Space Shuttle Upgrades, for United Space Alliance.

"If something goes wrong and you have a red or yellow indication, it will get your eyes to the right place a whole lot quicker than trying to scan a lot of green lines to find out what happened," Allen explained.

In all, *Atlantis* had more than 100 new modifications incorporated during a 10-month period at Boeing's Palmdale, Calif., shuttle factory in 1998.

"Some modifications to *Atlantis* are as small as putting different kinds of lines and hoses inside the vehicle and some are as large and as visible as the new cockpit and an exterior airlock," Allen said. "More than a dozen of the upgrades on *Atlantis* are flying for the first time on a shuttle." Most of *Atlantis*' upgrades will be incorporated into the entire shuttle fleet in the next few years.

In addition to the new cockpit, some of *Atlantis*' major improvements include: relocating the airlock to the payload bay to prepare for International Space Station assembly flights; updating portions of the



The new cockpit, technically labeled the Multifunction Electronic Display Subsystem (MEDS), has eleven full-color, flat-panel display screens that replace 32 gauges and electromechanical displays and four cathode-ray tube displays.

communications system; installing several weight reduction measures; providing additional protection to the cooling system; and strengthening the

crew cabin's floor. *Columbia* is now at the Palmdale factory receiving many of the same upgrades, including installation of the "glass cockpit."

Future shuttle upgrades: cutting risks in half by 2005

The top future shuttle enhancements that are now under development are hoped to double the shuttle's launch safety in the next five years, Elric McHenry said. They include: new sensors and computer power in the main engines that will "see" trouble coming a split second before it can do harm, allowing a safe engine shut-down; a new engine nozzle that will eliminate the need for hundreds of welds and potential leaks; electric generators for the shuttle's hydraulics that will replace the highly volatile rocket fuel that now powers the system; and a next-generation "smart cockpit" that will reduce the pilot's workload in an emergency, allowing the crew to better focus on critical tasks. Other improvements will make steering systems for the solid rockets more reliable, make the manufacturing of solid propellant safer and increase the strength of external fuel tank welds.

A "Smart Cockpit" – The new "glass cockpit" that will be initiated when *Atlantis* launches on STS-101 sets the stage for the next cockpit improvement, planned to fly by 2005: a "smart cockpit" that reduces the pilot's workload during critical periods. The enhanced displays won't fly the shuttle, but they will do much of the deductive reasoning required for a pilot to respond to a problem. By simplifying the pilot's job, this "smart cockpit" will allow astronauts to better focus on critical tasks in an emergency. The "smart cockpit" will take full advantage of the capabilities offered by the MEDS displays and will include some additional computer power to run enhanced displays.

Better Main Engines – The space shuttle's main engines operate at greater extremes of temperature and pressure than any other machine. Since 1981, three overhauls to the original design have more than tripled estimates of their safety. Now a fourth major overhaul, called the Block III engine, is planned that will make them even safer by 2005. The planned improvements include a high-tech optical and vibration sensor system and computing power in the engines that will "see" trouble coming a fraction of a second before it can do harm. Called the Advanced Health Monitoring System, the sensors will detect and track an almost microscopic flaw in an engine's performance in a split second, allowing the engine to be safely shut down before the situation can grow out of control.



Continued from Page 4 ●●●●●●

UPDATES

“With the advanced monitoring, we have hopes of being able to take out from 30 to 40 percent of the potential catastrophic engine failures by being able to detect them and shut the engine down before they occur,” McHenry said. Also, the engine’s main combustion chamber will be enlarged to reduce the pressures on internal components without reducing the thrust, and a new, simplified engine nozzle design will eliminate the need for hundreds of welds – over 500 feet of them – and potential leaks.

Safer Hydraulic Power – Aside from the main engines and solid rockets, the single highest-risk equipment on the space shuttle are the Auxiliary Power



Interior of a Super Lightweight External Tank.

Units, generators that power the shuttle’s hydraulics. Today, those generators run on hydrazine, a highly volatile and toxic rocket fuel. But recent advances in battery and electrical power technology – much of it developed by the automotive industry – may replace that system by 2005, eliminating many hazards not only in flight but also on the ground. Electric motors, powered by a bank of lightweight batteries, may be developed to power the shuttle’s hydraulic system, providing greater reliability for astronauts in flight as well as providing a safer workplace for ground crews.

Landing Gear, Solid Rockets and External Tank Upgrades – Future improvements for the Solid Rocket Boosters include a redesign of several valves, filters and seals in the steering system to enhance their reliability as well as studies of the potential for an electrical system to power the booster hydraulics. Also, changes to the solid rocket propellant manufacturing process will make the workplace safer for shuttle technicians. For the External Tank, a new friction-stir welding technique will produce stronger and more durable welds throughout the tank. Another minor upgrade in work at present is a strengthening of the shuttle’s main landing gear tires and wheels.

Safety Enhancements Under Study – In addition to the top-priority improvements planned during the next five years, other shuttle improvements are being studied, McHenry said. “For the rest of this year, we are looking at the shuttle’s crew escape system and studying improvements, if any, that could be made to it. We also are looking at the orbiter’s thermal protection system for potential improvements,” McHenry said. “We have no plans right now to implement anything in those areas, but we’re looking into any possibilities. We’ll decide by the end of the year what we may want to do, if anything.” ■

Major space shuttle improvements**A brief history**

April 1983, STS-6: A Lighter Fuel Tank – A redesigned Lightweight External Tank, 10,000 pounds lighter than the original design, flew on STS-6 in 1983, increasing the shuttle’s cargo capacity by the same amount. In 1998, a Super Lightweight External Tank flew on STS-91, further reducing the tank’s weight by 7,500 pounds and again increasing the shuttle’s cargo capacity by the same amount. The new Super Lightweight Tank is manufactured from a Lockheed Martin-developed aluminum-lithium alloy that is not only lighter, but also is 30 percent stronger than the previous tank design.

September 1988, STS-26: The Return to Flight – When *Discovery* returned the shuttle fleet to space following the *Challenger* accident, more than 200 safety improvements and modifications were ushered in. The improvements included a major redesign of the solid rockets, the addition of a crew escape and bailout system, stronger landing gear, more powerful flight control computers, updated inertial navigation equipment, and several updated avionics units.

May 1992, STS-49: Endeavour’s Maiden Voyage – *Endeavour*’s first flight in 1992 marked the debut of many shuttle improvements, including a drag chute to assist braking during landing, improved nosewheel steering, lighter and more reliable hydraulic power units, and updates to a variety of avionics equipment.

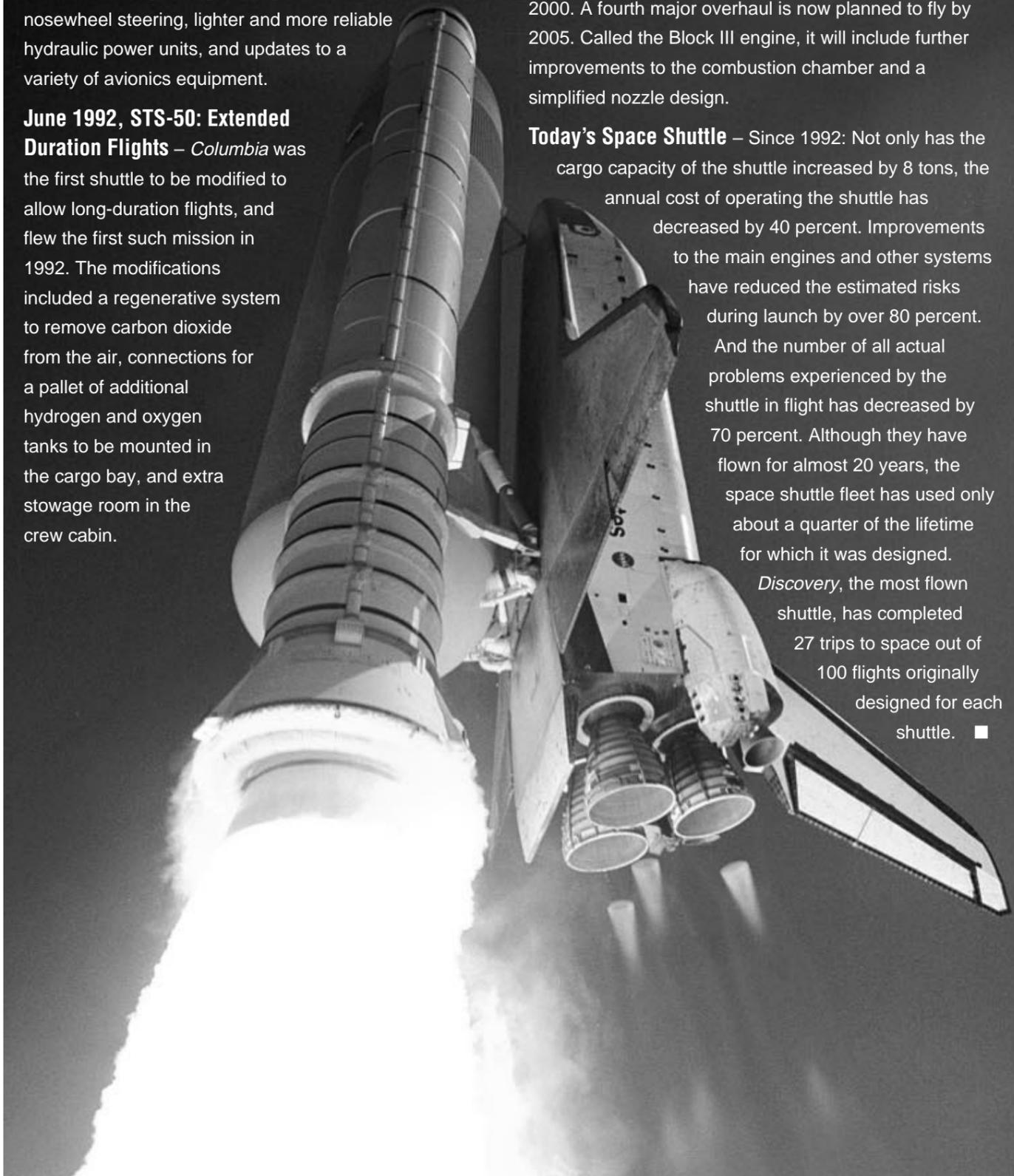
June 1992, STS-50: Extended Duration Flights – *Columbia* was the first shuttle to be modified to allow long-duration flights, and flew the first such mission in 1992. The modifications included a regenerative system to remove carbon dioxide from the air, connections for a pallet of additional hydrogen and oxygen tanks to be mounted in the cargo bay, and extra stowage room in the crew cabin.

June 1995, STS-71: International Space Station Assembly – The first docking of a shuttle with the Russian Mir Space Station debuted changes made to the shuttle that allowed it to dock with Mir and prepare for assembly of the International Space Station. To allow docking with Mir and with the ISS, the shuttle’s airlock was relocated from inside the cabin to the cargo bay on all orbiters except *Columbia*. Reductions in weight also were developed, including lightweight lockers, seats and other cabin equipment. Those changes, coupled with the super lightweight external tank and performance improvements, increased the cargo capacity for the shuttle by 16,000 pounds since 1992.

July 1995, STS-70: Space Shuttle Main Engines – The shuttle main engines have had three major redesigns that have more than tripled estimates of their safety. With its first flight in 1995, the first redesign, called the Block I engine, included design changes to strengthen the oxygen turbopump and engine powerhead. The second overhaul, called the Block IIA engine, included a larger throat to the main combustion chamber and first flew on STS-89 in January 1998. The third redesign, called the Block II engine, includes a stronger fuel turbopump and will fly for the first time in 2000. A fourth major overhaul is now planned to fly by 2005. Called the Block III engine, it will include further improvements to the combustion chamber and a simplified nozzle design.

Today’s Space Shuttle – Since 1992: Not only has the cargo capacity of the shuttle increased by 8 tons, the annual cost of operating the shuttle has decreased by 40 percent. Improvements to the main engines and other systems have reduced the estimated risks during launch by over 80 percent. And the number of all actual problems experienced by the shuttle in flight has decreased by 70 percent. Although they have flown for almost 20 years, the space shuttle fleet has used only about a quarter of the lifetime for which it was designed.

Discovery, the most flown shuttle, has completed 27 trips to space out of 100 flights originally designed for each shuttle. ■



Ripped from the ROUNDUP

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

1 9 6 5

Distance between the Mars-bound Mariner IV spacecraft and the Earth is increasing by about one million miles a day, the National Aeronautics and Space Administration announced recently. May 14, after 167 days in space, Mariner IV is 80 million miles from Earth and has traveled 253 million miles in its separate orbit. Its velocity relative to the Earth is 46,500 miles per hour, and 51,000 miles per hour relative to the Sun. Straight-line distance between Earth and the spacecraft will be 134 million miles when Mariner IV makes its closest approach to Mars July 14.

1 9 9 0

Nearly 100 employees and their families skipped out to the JSC Child Care Center for grand opening ceremonies Sunday to witness ribbon and cake cuttings and tour the new facility. The Child Care Center opened its doors to 54 children Monday. The 3,600-square-foot center, which took about six months to build, can accommodate 62 children, 20 infants, 12 toddlers and 30 pre-schoolers. Operational funding was generated by donations and tuition. Much of the finishing work was done by parents and volunteers.

1 9 9 5

On board the Mir Space Station, cosmonaut-researcher Norm Thaggard and his two crewmates, Commander Vladimir Dezhurov and Flight Engineer Gennadiy Strekalov, are preparing for next Friday's planned space walk, the first of four extravehicular activities to ready the orbiting space station for the arrival of *Atlantis* in June. Dezhurov and Strekalov are checking out their spacesuits, umbilicals and tools, and also beginning some special exercises designed to condition their arms and hands for the demanding work of the space walk. Thagard is continuing to study the Mir environment as he and his crewmates end their seventh week on orbit. Last weekend, he used a sampler to test the air on Mir for post-flight analysis.

NMA White Sands Chapter announces winners of speech contest

By Steve McDougle

The NASA White Sands Chapter of the National Management Association held its annual American Enterprise Speech Contest on March 16. The first place winner was Christina Marie Curry from Mesilla Valley Christian School. Lance Barrett from Mayfield High School took second place. Stephanie Ramirez, also from Mayfield High School, finished third. Lance Barrett is the son of Denise Barrett, Honeywell Engineering Laboratories secretary at White Sands Test Facility, Las Cruces, New Mexico.

The Las Cruces Toastmasters Club 4509 provided judges for the event, held at the Gerald Thomas Hall at New Mexico State University. Cash prizes of \$200, \$150, and \$100 were awarded to the first, second, and third place winners. About 40 people were in the audience to hear the contestants give their views on the American Enterprise System. The title of Curry's speech was "www.e-commerce.com."

Curry will represent the NASA White Sands Chapter of NMA in May at the Southwest Regional Competition in Oklahoma City. The Chapter will pay all expenses for Curry and a chaperone

to go to the conference, where she will compete for a \$2,000 first place prize and a chance to represent the southwest area at the national competition to be held in October. ■



High school students, from left, Christina Curry, Lance Barrett, and Stephanie Ramirez took top honors at the NMA American Enterprise Speech Contest.

GILRUTH CENTER NEWS

Sign up policy:

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

Gilruth badges:

Required for use of the Gilruth Center. Employees, spouses, eligible dependents, NASA retirees and spouses may apply for photo identification badges from 7:30 a.m.-9 p.m. Monday-Friday and 9 a.m.-2 p.m. Saturdays. Cost is \$10. Dependents must be between 16 and 23 years old.

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

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

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

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

Weight safety: Required course for employees wishing to use the Gilruth weight room. Pre-registration is required. Cost is \$5. Annual weight room use fee is \$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. Kristen Taraszewski, instructor.

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

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

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

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

TICKET WINDOW

The following discount tickets are available at the Exchange Stores

General Cinema Theaters	\$5.50
Sony Loew's Theaters	\$5.50
AMC Theaters	\$5.00
Fiesta Texas	adult ..\$20.50 ..child (under 48 inches) .. \$17.25
Astroworld Early Bird (use by June 18)	\$17.25
Astroworld	1 day ..\$21.00 .. 2 day .. \$31.00
WaterWorld	\$12.00
Moody Gardens (2 events) (does not include Aquarium Pyramid)	\$10.75
Moody Gardens (Aquarium only)	\$9.25
Sea World	adult ..\$29.00 ..child (3-11 years) .. \$19.25
Schlitterbahn	adult ..\$21.50 ..child (3-11 years) .. \$18.00
Space Center Houston	adult ..\$11.00 ..child (age 4-11) .. \$7.25 (JSC civil service employees free.)
Space Center Houston annual pass	\$18.75
Splash Town	1 day ..\$13.00 ..Season Pass .. \$37.50
Postage Stamps (book of 20)	\$6.60

Exchange Store hours

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

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

For additional information, please call x35350.

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



KC-135 ups and downs may provide lifetime direction

By John Ira Petty

They're young, enthusiastic, flexible, and very bright. And you have to wonder if the experiences of high school students in the Fly High program aboard Johnson Space Center's KC-135 might have reshaped some career plans.

The students certainly seemed to have fun in the microgravity of the plane's cargo area during the two-week flight program in early April. Many were proud of their scientific experiments, and just about all of them were impressed with what they saw of NASA.

"It was a blast – you were kind of out of control," said Jerrell High School's Chris Barner of the flight. "I'd do it again in a heartbeat."

He and teammate Brandi Hoerman said their experiment, aimed at finding an object's center of mass, worked well. The six or seven months of work, culminating in the KC-135 flight, "was a fascinating, positive experience," she said.

Brownwood High School's Scott Benson said of the flight, "It was real neat. It was so amazing. It was awesome. It was crazy. It was a lot of fun."

He and teammate William Poulson had just come off the plane after operating an experiment looking at gyroscopic stabilization. "It was great," said Poulson. "I don't think this is going to point me in a new direction, but it was definitely an experience."

A Del Rio High School experiment focused on washing hands, which is more complicated than it sounds in microgravity. "We were testing different nozzles and spray patterns," said student Micah Langley. "The flight was awesome. It was a great opportunity and we had a lot of fun. It was a weird thing – sort of like you were falling. Once you got used to it, it was great."

Del Rio's Dasia Reyes said, "The feeling is hard to explain unless you go up there. It was indescribable – the neatest thing I've ever experienced."

They were among about 140 students, including ground crew members, and 20 teachers from around Texas who participated in 14 teams during the



NASA JSC Photo JSC2000E11065

Jerrell High School: Jill Burke (teacher), Chris Barner and Brandi Hoerman.

high school flights, part of NASA's Reduced Gravity Student Flight Opportunities Program. Ten teams had journalists flying with them.

John Bain, a KC-135 test director who flew with the students, said they had put a lot of time and effort into their

research. "They're bright kids who do well in class. Some don't know what

they're going to do," Bain said. "For many, this is the first time they're doing a science project that really leads to something."

"I think," he said, "that it does give them a lot of direction in their lives. Besides, they've been a lot of fun." ■



NASA JSC Photo JSC2000E11064

Brownwood High School: William Poulson, Scott Benson and Steve Duran (NASA mentor).

NASA JSC Photo JSC2000E11062

Del Rio High School: Dasia Reyes, Bruce Sauser (NASA mentor) and Micah Langley.

Employees invited to attend dedication of retired KC-135

With more than 58,000 parabolas to its credit, NASA 930, NASA's fourth KC-135, has been retired and is now on permanent display at Ellington Field. The aircraft will be officially dedicated at a ceremony May 15 when it becomes the property of the City of Houston.

JSC employees and contractors are invited to attend the outdoor ceremony, which begins at 10:30 a.m. at Ellington Field's main entrance. Houston Mayor Lee Brown will be in attendance with other state and city dignitaries.

Visible from Highway 3, the 104,000-pound plane is mounted on three 16-foot-deep concrete and reinforcing steel piers, positioning the aircraft in a nose-up attitude, creating the perception that it is taking off over Aerospace Boulevard.

The plane was towed from its hangar to its new location in early March. To move it to the top of the piers, engineers designed a removable gravel ramp, upon which the plane was towed. Once permanently affixed to the piers, the gravel was removed, leaving the majestic plane to greet onlookers.

In its display attitude, the aircraft will be able to withstand 125-mph winds. The FAA requirement for fixed structures at Ellington mandates that they must withstand



NASA JSC Photo JSC2000E09128 by James Blair

NASA 930, the fourth in JSC's fleet of "weightless wonders," is towed up an embankment to its permanent home at Ellington Field. The aircraft has been retired and now is positioned in "take off" position over Aerospace Boulevard.

hurricane-strength winds, but the designers incorporated a safety factor of five to protect against gusts. NASA and the City of Houston partnered in the project to memorialize the aircraft.

"The KC-135 microgravity research program has played a fundamental role in our space program," said Stuart Williams, KC-135 project engineer and lead for the project. "Microgravity research dating back to the Skylab program and the Apollo-Soyuz project has flown aboard NASA 930."

NASA 930 was the fourth in a series of five KC-135s NASA enlisted as part of its microgravity research program. It was retired in 1995 after the airframe reached the end of its economic life.

"This plane spent many years in a corrosive environment, and the elements were the principal factor in its aging," said Williams. "Later in its life, some fatigue

started to add to the maintenance effort, and the downtime necessary to keep the airframe airworthy was cutting into its mission readiness."

A fifth "Weightless Wonder" remains active in the NASA aircraft fleet and will likely continue to fly four or five more years. In the meantime, management will determine if the program will be continued with KC-135s or with another aircraft. ■

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

Steve Campbell was selected as chief, Planning and Integration Office, Center Operations Directorate.

David Birmingham was selected as manager, Space Operations Resources Management Office, Office of the Chief Financial Officer.

Lisa Stephens-Hammond was selected as deputy chief, Life Support and Habitability Systems Branch, Crew and Thermal Systems Division, Engineering Directorate.

Monty Goforth was selected as chief, Laptop Production and Development Branch, Flight Avionics Division, Mission Operations Directorate.

Mark Geyer was selected as manager, Program Integration Office, International Space Station Program Office.

Tracy Minish was selected as chief, Reconfiguration and System Engineering Branch, Flight Avionics Division, Mission Operations Directorate.

Jeff Bertsch was selected as chief, Flight Design Requirements and Integration Office, Flight Design and Dynamics Division, Mission Operations Directorate.

Additions to the Workforce

Kevin Lee joins the Biomedical Hardware Development and Engineering Office, Engineering Directorate, as a project engineer.

Raymond Aronoff joins the Manufacturing Integration and Technology Branch, Manufacturing, Materials, and Process Technology Division, Engineering Directorate, as a project engineer.

Peter Spidaliere joins the Space Shuttle Program Office as a space shuttle development manager.

Troy Whitney joins the Shuttle Training Support Branch, Aircraft Operations Division, Flight Crew Operations Directorate, as an electrical engineer.

Promotions

Jessica Miller was selected as a contracting officer in the Institutional Procurement Office, Office of Procurement.

Reassignments Between Directorates

Walt Marker moves from the Space and Life Sciences Directorate to the Office of the Chief Information Officer.

Carolyn Fritz moves from the Mission Operations Directorate to the Engineering Directorate.

Sabbir Hossain moves from the International Space Station Program Office to the Engineering Directorate.

Rick Weller moves from the Office of the Chief Information Officer to the Engineering Directorate.

Jay Wright moves from the International Space Station Program Office to the Engineering Directorate.

Marcia Kerr moves from the Engineering Directorate to the Space Shuttle Program Office.

Ken Martindale moves from the Office of Procurement to the International Space Station Program Office.

John Uri moves from the Space and Life Sciences Directorate to the International Space Station Program Office.

Reassignments Between Centers

Eddie Zavala of the Mission Operations Directorate moves to Dryden Flight Research Facility.

Retirements

John Aaron of the Engineering Directorate.

William Renegar of the Engineering Directorate.

Vicki Nisbet of the Human Resources Office.

Resignations

Pat McKee of the Mission Operations Directorate.

Brenda Moulton of the Mission Operations Directorate.

Phillippe DeJour of the Engineering Directorate.

David Adlis of the International Space Station Program Office.

Mike Demasie of the EVA Project Office.

NASA BRIEFS**NASA DEVELOPS A DRILL FOR THE FUTURE**

It's an invention that may eventually end up in the hands of every craftsman and orthopedic surgeon.

Scientists at NASA's Jet Propulsion Laboratory, together with engineers from Cybersonics, Inc., Erie, Pennsylvania, have developed an ultrasonic device that can drill and core very hard rocks and also has medical applications.

Potential medical uses include extracting pacemaker leads and the drilling necessary during surgical or diagnostic procedures involving the human skeletal structure. Future space missions could include drilling for samples using lightweight landers with robotic arms and small rovers that roam the surface of an asteroid or planet.

"The drill is an ultrasonic device that offers exciting new capabilities for space exploration in future NASA missions," said Dr. Yoseph Bar-Cohen, who leads JPL's Nondestructive Evaluation and Advanced Actuator Technologies unit. "Besides the immediate benefits of the technology to NASA, it is paving the way for other unique ultrasonic mechanisms that are being developed in our laboratory and elsewhere. Such devices can be made to be small and lightweight, to consume little power and to exhibit a high standard of reliability."

The drill is driven by piezoelectric actuators, which have only two moving parts but no gears or motors.

NASA TECHNOLOGY STRIPS SHIPS OF LOOSE CHIPS

A new robotic device that safely strips paint from the hulls of ships without polluting the environment is based on NASA robotics technology.

The system, which has received kudos from environmentalist and undersea explorer Jean-Michel Cousteau, could revolutionize paint removal in the shipping industry. Current sandblasting methods potentially can contaminate waters surrounding harbors.

The new system consists of an automated robotic device that is magnetized to the ship, a set of high-pressure jet streams, and a controller that helps the robot navigate along the surface of the ship. The water is filtered and then reused, while the paint residue is collected in a container and can then be disposed of safely. Using this method, no toxic dust or paint flakes are generated to pollute nearby areas or to be inhaled by system operators.

DATES & DATA**May 14**

Scientific meeting: The 71st Aerospace Medical Association Annual Scientific Meeting takes place at the Westin Galleria & Oaks through May 18. The event, titled *New Horizons in Aviation and Space Medicine*, features seminars ranging from accident investigation to clinical and operational space medicine. There also will be an astronaut panel and lectures from former NASA Flight Director Eugene Kranz, Director of Space and Life Sciences Dave Williams and former JSC Project Officer and former AsMA president Dr. Stanley White. For registration and information visit www.asma.org or contact Dr. Paul Stoner at X39648.

May 17

Astronomy seminar: The JSC Astronomy Seminar Club meets at noon May 17, 24 and 31 in Bldg. 31, Rm. 248A. For more information contact Al Jackson at x35037.

Scuba club meets: The Lunarins meets at 7:30 p.m. For more information contact Mike Manering at x32618.

Spaceteam Toastmasters meet: The Spaceteam Toastmasters meets at 11:30 a.m. May 17, 24 and 31 at United Space Alliance, 600 Gemini. For more information contact Patricia Blackwell at (281) 280-6863.

May 18

Communicators meet: The Clear Lake Communicators, a Toastmasters International club, meets May 18 and 25 at 11:30 a.m. at Wyle Laboratories, 1100 Hercules, Suite 305. For more information contact Richard Lehman at (281) 280-6557.

Directors meet: The Space Family Education board of directors meets at 11:30 a.m. in Bldg. 45, Rm. 712D. For more information contact Lynn Buquo at x34716.

May 19

Book review: Tommy Holloway, NASA International Space Station manager, moderates the National Management Association's book club meeting reviewing *The 7 Levels of Change: The Guide to Innovation in the World's Largest Corporations*. The club meets at 11 a.m. at the Gilruth dining room. Lunch will be provided free to NMA members or \$7 for non-members. Please contact Karen Black at (281) 483-3001 by May 12 to RSVP.

May 24

Robotics Workshop: AIAA Houston section hosts *Robotic Helpers for Space Explorers*, a free automation and robotics workshop at the Gilruth Center at 8 a.m. Presentation followed by a panel discussion and a luncheon at noon. Event is free but advance registration is required by May 16. Lunch costs \$7.50. Contact Sheryl at (281) 483-8243.

INNOVATIONS 2000: Various technical societies (AIAA, IEEE, ISA, etc.) lead an afternoon of technical sessions covering a wide range of industries and disciplines. Event will be at the Gilruth Center beginning with a luncheon at noon, presentations at 1:15 p.m. and reception at 3:35 p.m. Advance registration is required by May 16. Conference fee is \$5. Lunch is \$7.50. For more information contact Sheryl at (281) 483-8243.

May 25

Radio Club meets: The JSC Amateur Radio Club meets at 6:30 p.m. at Piccadilly, 2465 Bay Area Blvd. For more information contact Larry Dietrich at x39198.

June 6

Quality Society meets: The Bay Area Section of the American Society for Quality meets at 6 p.m. at the Ramada King's Inn on NASA Road 1. For details contact Ann Dorris at x38620.

**SPACE CENTER Roundup**

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