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SPACE CENTER Roundup

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Computer problems overcome during STS-100

By Julie Burt

On April 24 – the eve of what was to be a historical robotic-arm handshake in space – an alarm sounded in the Destiny lab of the International Space Station and in the Mission Control Center. The primary command and control computer’s hard drive experienced a failure.

Expedition Two Flight Engineer Jim Voss, who said goodnight from the station six minutes earlier, returned from his sleep area to talk with the CAPCOM, or spacecraft communicator, in Mission Control.

The CAPCOM told Voss that the primary command and control computer could not link up with its hard drive. After repeatedly trying to gain access, they attempted to reset the computer. It failed, which set off the alarm.

Voss returned to bed when the backup computer, equipped with identical software, automatically took over. While they slept, the STS-100 and Expedition Two crews had no idea the days ahead would bring continuing computer problems and failures.

“These were the most serious events we have had since the beginning of the space station program,” said station Lead Flight

Director John Curry.

On April 25, eight hours after it was brought on as primary, the second computer began to show similar trouble and could not access its hard drive. Troubleshooters in Mission Control wanted

to switch over to a clean computer to resume the day’s activities. One more computer waited on standby to take over if needed.

Upon recommendations from the Onboard, Data, Interfaces and Networks

(ODIN) team and the Mission Evaluation Room (MER), Curry authorized the switchover to the third computer.

Against probability, the third computer did not work. After attempting to reset the computer, Mission Control lost all status data, or telemetry, from the station. The crew could not connect any of the United States system computers, leaving both Mission Control and the crew “blind” as to the status of the their systems.

In Building 30 at Johnson Space Center, Mission Evaluation Room personnel led the effort to understand the failures and recommend corrective action. The Mission Evaluation Room is in charge of the sustaining engineering and responsible for solving all on-orbit problems. “The MER has a lot of capability to put a lot of brainpower on problems. This problem was a real test of that,” MER Manager Scott Gahring said.

They called Honeywell—the primary contractor for the command and control computers—immediately when the problem surfaced. Key personnel flew to Houston while their Glendale, Ariz., team stayed involved in real-time evaluations.



NASA/JSC2001e16586

The ODIN team with ISS Lead Flight Director John Curry gather to hang the STS-100 plaque.

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Success!

Onboard crews and robotics flight controllers work to complete historical handshake

In the hours before the computers failed, the crew had completed Flight Day Four activities. This included the installation of the station’s robotic arm, Canadarm2, to the lab cradle assembly on the Destiny lab. It was powered up and ready to go for the next day’s activities—a loaded checkout of Canadarm2 and the transfer of the space lab pallet—the device on which it was launched—to the Shuttle’s robotic arm.

The station arm hung over the Destiny lab holding the pallet while the crew slept and while the failures were occurring.

Unfortunately, the failures made it impossible for the crew to perform robotics operations as they were trained. Software needed to be loaded on the SSRMS from the failed computers. Since the hard drives could not be accessed, the software stored in them was out of reach as well.

The STS-100 lead robotics flight controller, Aaron Goldenthal, had to act fast. He sent updated procedures to the robotics trainers for verification. Then, he told the crew that they would now have to work in what is known as “single joint mode.” Instead of being able to program the arm to move to a certain place and then push a “go” button, they would now have to activate each individual movement separately.

As if that was not enough, the Robotic Work Station could not pick up the arm’s activity. This made for a long process of the crew executing a command and the ground confirming the command was accepted.

The robotics flight controller would send up a procedure for the crewmember to follow. The crewmember would manually turn a switch to choose a joint on the Station’s arm. The arm would move in

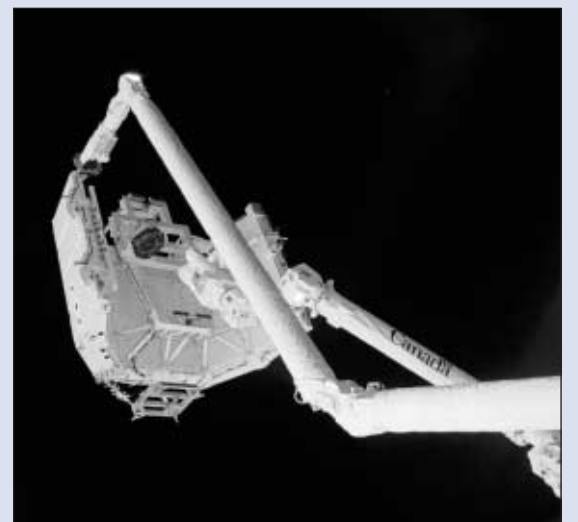
a selected direction. Then the crewmember would put on the brakes. Finally, the robotics flight controller would have to confirm that the movement occurred.

“It was like watching grass grow,” said lead station robotics trainer Lane Honeycutt. Under normal circumstances, the robotics operations were supposed to take four hours and 30 minutes. The crew only exceeded this by an hour and a half, doing the operations virtually manually with almost no computers working.

“The coordination between the crew and the robotics Flight Control teams was a picture of perfection,” Honeycutt said.

The space lab pallet was handed off and the Station’s

new arm was in a good configuration for the next assembly mission, 7A. ■



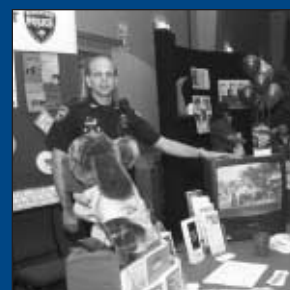
Though operating in ‘single joint mode,’ the Canadarm2 handed over its space lab pallet to the shuttle’s robotic arm.



EVA achievements recognized.
Page 3



Chili cookoff winners announced.
Page 4



Safety and Health Fair a success.
Page 5

STS-104



NASA JSC STS104-S-002

Launch Date: No earlier than June 20, 2001

Launch Vehicle:
Atlantis

Crew:
Crew Commander: Steven W. Lindsey
Pilot: Charles O. Hobaugh
Mission Specialist 1: Michael L. Gernhardt
Mission Specialist 2: James F. Reilly
Mission Specialist 3: Janet L. Kavandi

Elements:
Joint Airlock, which provides station-based Extravehicular Activity (EVA), or spacewalking, capability for both U.S. and Russian spacesuits

High Pressure Gas Assembly supports space walk operations and augments the Service Module gas resupply system

Additional information:
Three EVAs are scheduled for the 10-day mission



INFO TO KNOW

Viewing Shuttle launches and landings

Visitors interested in viewing a shuttle launch at Kennedy Space Center (KSC) may inquire about such opportunities offered by Delaware North Park Services, Inc., the concessionaire responsible for NASA's Guest Services at Kennedy Space Center. You may call them at (407) 449-4444.

Car passes are no longer available for KSC due to the large number of requests by the public. However, there are many off-site viewing locations that offer prime viewing opportunities. You can find more information about these sites on the KSC Website at <http://www.ksc.nasa.gov/>.

A recorded manifest of anticipated launch dates is available by calling (407) 867-4636. During countdown, a recorded launch status is available at (407) 867-0600. The Future Flight Launch Schedule is also available online at <http://spaceflight.nasa.gov/shuttle/future/index.html>.

Due to the average cloud cover in the area, shuttle landings are frequently more difficult to see than launches. In addition, there is no viewing area large enough to accommodate the general public. However, any of the off-site viewing locations mentioned on the KSC Website can also be used to see a shuttle landing. ■

Adjustments made to launch dates

The Shuttle and Station programs recently decided to adjust a number of launch dates to accommodate wiring modifications and structural inspections to two orbiters, and to provide the proper spacing between Expedition missions to the ISS. The changes were officially confirmed at a Joint PRCB attended by Shuttle and ISS Program Managers Ron Dittmore and Tommy Holloway. The changes made are:

- STS-108 (UF-1)**
Moves from 11/19/01 to 11/29/01 (one week after Thanksgiving)
- STS-110 (8A)**
Moves from 1/17/02 to 2/28/02
- STS-111 (UF-2)**
Moves from 3/14/02 to 4/18/02
- STS-112 (9A)**
Was officially baselined for 7/11/02



NASA JSC 2001e15196 photo by James Blair

On May 2, the P3/P4 Space Station Segment Structural Test Article was moved into an upright position for testing in Building 49, at the Vibration and Acoustic Test Facility. The segment was to undergo an acoustic test to demonstrate the ability of the hardware to withstand the acoustic environment produced during the shuttle launch. The ISS P3/P4 space station module consists of the ISS second port truss segment and associated equipment packages. It is being designed and fabricated by Boeing-Huntington Beach (segment P3) and Boeing-Canoga Park (segment P4). It is scheduled to be flown on STS-111 in April 2002 (Payload ISS-12A).

EXPERIMENT CORNER

Expedition Two Science Experiments

For the next several issues, we will list some of the science experiments being performed on the International Space Station.

ADVASC
Advanced Astroculture-Express Rack 1
Dr. Weijia Zhou, University of Wisconsin-Madison

A plant growth experiment that will be used to study the effects of microgravity on the chemical and genetic make-up of a plant in the same family as cabbage and radishes. The seeds will grow into plants whose seeds will be returned to Earth for study. Delivered during STS-100/6A in April 2001. Earlier versions flown on eight previous shuttle missions and on Mir.

More ADVASC info:
[Expedition Two press kit, p. 7](#)

ARIS ICE-Active Rack Isolation System
ISS Characterization Exp.-Express Rack 2
Dr. Jim Allen, Boeing, Houston, TX

The Active Rack Isolation System absorbs vibrations that could affect sensitive scientific experiments. Experiments aboard the space station that are sensitive to vibrations will be put in EXPRESS Rack 2. The ARIS ICE portion of this equipment will measure in real-time any vibrations the ARIS equipment experiences during crew exercise, Canadarm2 movements, dockings/undockings, etc. Delivered aboard EXPRESS Rack 2 during STS-100/6A in April 2001. ARIS flew in 1996 aboard the STS-79 mission to Mir.

More ARIS ICE info:
[Expedition Two press kit, p. 8](#)

Bonner Ball Neutron Detector-Human Research Facility Rack Tateo Goka, NASDA, Japan

Measures the amount of neutron radiation that enters the space station. Neutron radiation can affect the blood-forming marrow in bones. The data will be used to develop countermeasures to protect astronauts on long duration missions. Delivered during STS-102/5A.1 in March 2001. Flown previously on shuttle.

More Bonner Ball info:
[Expedition Two press kit, p. 9](#)
<http://spaceflight.nasa.gov/station/science/experiments/bball.html>

CEO-Crew Earth Observations-Destiny Lab
Dr. Kamlesh Lulla, NASA JSC, Houston

Photographs taken by the crew, using handheld cameras that are used to record long-term changes on the surface of the Earth. Initiated on station with Expedition One crew in November 2000. Continuing a program that began with the first spaceflights (Mercury) in the early 1960s.
More CEO info:
[Expedition Two press kit, p. 10](#)
<http://eol.jsc.nasa.gov/>

The Expedition Two press kit can be found at:

http://spaceflight.nasa.gov/station/crew/exp2/exp2_presskit.pdf



EVA achievements spotlighted at awards event

The EVA (Extravehicular Activity) Project Office sponsored an annual EVA award event on May 8, 2001, in the Gilruth Ballroom. The event recognized the civil service and contractor community for the activities in the past year.

Ron Dittmore, Manager of the Space Shuttle Program, was the guest speaker. Steve Doering, Acting Deputy Manager, read citations. G. Allen Flynt, Acting Manager, EVA Project, and Leroy Chiao, EVA Crew representative, presented the following awards:

MISSION AWARDS

Certificates designed with flown EVA patch

STS-99 Shuttle Radar Topography Mission

For outstanding support to the successful STS-99 mission

STS-101 2A.2a, ISS Assembly

For support of the successful EVA that was executed on STS-101, 2A.2a

STS-106 2A.ab, ISS Assembly

For support of the successful EVA that was executed on STS-106, 2A.2b

STS-92 3A, ISS Assembly, Z1 Truss

For support of the successful EVA's that were executed on STS-92, 3A

STS-97 4A, ISS Assembly, P6 Truss

For outstanding support to the successful EVA's that were executed on STS-97, 4A.

STS- 98 5A, Destiny Laboratory Module

For support of the successful EVA's that were executed on STS-98, 5A.

STS-102 5A.1 Expedition Two Crew

For support of the successful EVA's that were executed on STS-102, 5A.1.

EVA HONOR AWARDS

EVA certificate with flown EVA patch for events and activities that are not planned or scheduled

John Graf

For outstanding efforts to identify and validate the inability of the Draeger Tubes to detect MMH contamination of an EVA crewmember

Armon Knight

For outstanding support for the waiver process for shipping the USA Simplified Aid for EVA Rescue (SAFER)

Gary Krch and Greg LeStourgeon

For outstanding efforts to build and certify the quick disconnect lever tool prior to the flight of STS-98

Eric Darcy

For outstanding efforts to coordinate multiple REBA battery engineering tests

Patrick Donovan

For outstanding efforts during STS-97, in helping to solve the problem with the tensioning cable of the solar array

Ernie Becker

For leadership and dedication to improve safety and test operations at the NBL

Lyn Rose

For excellent support in developing the EVA Flight Data File checklists for each mission

Patricia O'Connell and David Segovia

For outstanding efforts to develop and reproduce labels for the exterior of the International Space Station elements

John Donnellan

For outstanding effort for the International Space Station Nodes 2 and 3 Extravehicular Activity (EVA)

Jeff Case and Eleazar "Yuma" Escobar

For diligence and attention to detail, a problem with the High Strength Bridge Clamp was uncovered prior to STS-100, 6A

SPACEFLIGHT AWARENESS TEAM AWARDS

STS-97, Team 4 Solar Array Recovery Team

For their real-time mission support of the STS-97 EVA repair of the damaged solar array wing. Without the efforts of these people, the ISS would not have two fully functional Solar Array Wings.

STS-97, Sunnyvale Solar Array Recovery Team

During STS-97, this team traveled with very short notice to Sunnyvale, California, where they worked long hours with the Solar Array Wing designers to develop, test and relay to Houston the procedures that were used to repair the damaged solar array.

EMU Decontamination Procedure

For their superior efforts in developing procedures for decontamination of the EMU. These procedures were crucial to the safety of the crew and success of the first EVA on STS-98 when EV2 became contaminated with ammonia.

EMU Oxygen Contamination Recovery Team

For their dedication and exemplary efforts in identifying and recovering from the hydrocarbon contamination found in the Secondary Oxygen Packs (SOP's) in the EMU System. Their efforts allowed for the safe and on time support of critical ISS assembly missions.

JSC GROUP ACHIEVEMENT AWARDS

Strela Temporary Stowage Device Team

For the successful quick-turn delivery of the Strela Temporary Stowage Device for STS-101, used to temporarily stow Strela on PMA1

SHOSS Box Team

In recognition of their outstanding support of the EVA's conducted on STS-101 and STS-106

Increment 1 EVA-Integrated Product Team (IPT)

For extraordinary effort in developing new procedures and processes to ensure the EVA readiness of the first ISS Long Duration Flight Crew and ground controllers.

EVA Analysis Integration Team (AIT)

For support of the EVA AIT in resolving cross flight issues, evaluating requirements exceptions, and ensuring EVA policies and principles are applied to ISS hardware and operations

Gold Salt Hydrozine Detection Team

For the successful implementation of a Hydrazine Detection System for STS-102 5A.1

Joint EVA Tether Team

For utilizing the best of both U.S. and Russian EVA experience in developing a Joint U.S./Russian Tether Protocol for the International Space Station

STS-97 EVA Tool Team

For outstanding support to the successful Tool Development Efforts for the STS-97 Mission

EVA Technical Interchange Team (TIM)

For demonstration of extraordinary commitment and exemplary professionalism in resolving complex international issues leading to better cooperation between US and Russian partners that resulted in improved proficiency and safety of ISS Increment EVA as documented in EVA TIM protocols signed in February and March of 2001

NBL KSC Trip Team

For contributions to identifying EVA flight hardware and training mockup differences to improve the quality of NBL training and EVA flight support

EMU Oxygen Contamination

Logistics Recovery Team

For dedication and performance exceeding all expectations in implementing a recovery plan after discovering hydrocarbon contamination in the EMU secondary oxygen system

EMU Processing Team

For the extraordinary efforts put forth associated with processing EMUs

Shuttle Flight

Five flights through 4A (CY00)

EVA's

Nine EVA's for a total of 59 hours and 37 minutes

Development Test

Eight Major NBL Development Tests, of which two were for verification purposes

Eight engineering runs, 24 crew runs

EVA Training

2,377 hours NBL training

358 NBL suited events

4,713 hours EVA training

(wet and dry)

891 Class III suit processed by FCE in support of training

Fit Checks (tool-to-tool)

Total: 2380

Hardware Processed

1098 EVA tools were processed

Number of New Tools Built

Completed 31 new tool development projects. For these new developments, 70 flight units and 56 training units were delivered.



Raytheon Technical Services elected to space research industry forum

Raytheon Technical Services Company (RTSC), a subsidiary of Raytheon Company (NYSE: RTNA, RTNB) and a leading support services provider for defense, federal and commercial customers, has been elected as a member of the National Space Biomedical Research Institute's (NSBRI) Industry Forum.

As an Industry Forum member, Raytheon will help NSBRI transfer biomedical technology and research advances to the general public.

"Raytheon's expertise in taking technologies and converting them to use in the commercial arena makes them a natural addition to the Industry Forum," said Dr. Joseph Kerwin, NSBRI Industry Forum chairman and a former astronaut. "Raytheon has exhibited a desire to make major contributions in this area, and it will

be a major asset to the Industry Forum."

The NSBRI, established in April 1997 following competitive selection by NASA, is a consortium of 12 research institutions leading a national effort to carry out the research necessary to ensure safe human exploration of space.

The Institute's research into the health risks associated with long-duration space travel is designed to affect similar conditions found on Earth. A few of these similarities include bone loss, muscle wasting, sleep disorders and balance problems.

Raytheon Technical Services Company provides technical, scientific and professional services for defense, federal and commercial customers worldwide. It specializes in management, operation and maintenance of customer facilities, equipment and systems; logistics and

life-cycle support; overhaul and repair depot operations; engineering, logistics and personnel support; space and earth sciences; test and training range support; and privatization of government services.

Steven Corbin, program manager for the Microgravity Sciences Application Department in the Aerospace Engineering Services group of RTSC, will represent Raytheon on the Forum.

"I am looking forward to this opportunity to leverage my personal experience in biotechnology with that of my company to the benefit of humanity, both in space and on Earth," Corbin said.

With headquarters in Lexington, Mass., Raytheon Company is a global technology leader in defense, government and commercial electronics, and business and special mission aircraft.

In addition to Raytheon, NSBRI

Industry Forum members include The Boeing Company, Draper Laboratories, Hoffman-LaRoche Inc., InDyne, Inc., Lockheed Martin Astronautics, Payload Systems, Inc., MBI International, SGI (formerly Silicon Graphics, Inc.), Southwestern Bell, United Space Alliance, Veridian and Wyle Laboratories.

The NSBRI's consortium members are Baylor College of Medicine, which serves as the lead institution, Brookhaven National Laboratory, Harvard Medical School, The Johns Hopkins University, Massachusetts Institute of Technology, Morehouse School of Medicine, Mount Sinai School of Medicine, Rice University, Texas A&M University, University of Arkansas for Medical Sciences, University of Pennsylvania Health System and University of Washington. ■

OUT & ABOUT

And the Chili Cookoff winners are...



Chili and fun were served up Saturday, May 5

Judged Best Chili:

- 1st Wing Nuts
- 2nd S.O.B. (Son of BARF)
- 3rd Crime Scene Chili
- 4th (tie) Jalapeno Attack
- 4th (tie) Wrong Stuff

People's Choice Chili:

- Catalytic Chili Peppers

Showmanship:

- 1st Catalytic Chili Peppers
- 2nd Surfin Chili
- 3rd Crime Scene Chili
- 4th Chili Wizards



GAMES:

Grapefruit Pass:

- 1st Wrong Stuff
- 2nd Chili Wizards
- 3rd Surfin Chili

Spoon Drop:

- 1st Wrong Stuff
- 2nd Arm Pit Chili
- 3rd Chili Wizards

Pyramid Build:

- 1st Hope's Hollywood Hot Stuff
- 2nd Catalytic Chili Peppers
- 3rd Ay Chihuahua

Space Trivia:

- 1st Surfin Chili
- 2nd Frisky Peppers
- 3rd Bugs



50 teams participated in this event



'Moo-ve' over

There's two new Longhorn Steers at JSC



NASA JSC 2001-01397 photo by James Blair

The first of the two donated steers, Trident Love, is released into his new home on the JSC pasture.

On Monday, May 9, two new employees started at JSC's Longhorn Pavilion.

Thanks to Wayne Turner and members of the Dow Chemical Company, and Bruce Withers and the Trident Energy Company, two Longhorn Steers were donated to the JSC Longhorn Project. Trident Love and DCC Ranger are the names of the new additions. Many people from NASA, the community, the Houston Rodeo and the Texas Longhorn Breeders Association of America were on hand to welcome the steers to their new home.

Along with two young steers, Joe and Terry Hlavinka also donated a new red tractor to the project. The Longhorn Project began in 1966, and continues to grow, with the help of volunteers and donations such as the one recently made.



NASA JSC 2001-01393 photo by James Blair

At right, Bruce Withers, founding president and CEO of Trident Energy Company and steer donor, is presented with a recognition award from Benny Hurzek, treasurer of the Texas Longhorn Breeders Association of America.

OUT & ABOUT

'Safety 'Round the Clock' Spring Fair a huge success

By Mary Peterson

What can you learn that's new about safety and health? Apparently plenty, as about 3,000 people streamed by the approximately 40 booths and outdoor activities that made up the "Safety 'Round the Clock" Spring Fair held Friday, May 11, at the Gilruth Center.

Things got off with a bang-literally. Brian Cornell, a master automobile technician, set off an air bag hourly outside to demonstrate its power and protection value in the event of an accident.

"Although air bags are designed to deploy only in a front-end collision," Cornell told onlookers, "it is possible, if rare, to set the device off by other means." He cited the case of a car that accidentally drove over a chunk of steel, resulting in bottom force impact sufficient to do the deed.

Cornell went on to explain how the air bag acts in concert with the seatbelt, tightening and loosening for maximum protection, all timed in a manner that is vir-

tually indistinguishable to the passenger.

Inside Gilruth were equally stimulating subjects, where fairgoers could talk to local law enforcement officers about safety in their own neighborhood and how to avoid being a crime victim. In some cases, they could even learn the statistics that applied to their area and what types of crime were the most prevalent. One booth displayed an array of guns and gunlocks for those concerned with unsupervised and unwarranted use of firearms.

And what if your house catches fire? One safety representative demonstrated a head covering of plastic with an attached breathing canister, telling audiences: "The Evac-U8 emergency escape smoke hood is the very latest in affordable technology to help you escape a burning building. People too often overlook the fact that more fire victims perish from smoke inhalation than from actual burn injury."

The award-winning design is widely used by Canadian and U.S. Government agencies as well as by hotels, air crews and major corporations. Some fairgoers, for the first time, could see its value in a home as well.

Those wanting health answers took



NASA JSC2001e16504 photo by David DeHoyos

About 3,000 people attended the 'Safety 'Round the Clock' Spring Fair on May 11. Below are some of the event's exhibitors demonstrating fire safety (left) and carseat safety (right).

advantage of subjects as far-reaching as nutrition and fitness to spinal irregularities, skin cancer screening, and blood sugar and cholesterol testing—all just for the asking.

"Now that we're fast approaching hurricane season," said a member of the JSC Spaceflight Meteorology Group, "we've had lots of takers on weather safety information, with many wanting to know where their home stands in relation to the flood plain." If you're new to the area, this was a must-see.

On the parking lot adjacent to the Center, drivers lined up to have their children's car seat checked for proper installation and to learn how to correct it themselves, if need be, from a team of trained technicians. Thanks to Cimarron, Inc., replacement car seats were provided to those whose equipment was substandard or had been recalled.

Colorful balloons dotted the walkways, while popcorn and hotdogs were freely munched by those squeezing in some learning time during their lunch hour, all lending a festive air to an otherwise serious set of subjects.

The fair was produced by Rindy Carmichael/MEI, in cooperation with the Safety and Test Operations Division of the Safety, Reliability and Quality Assurance Directorate. ■



Latest and greatest in technology featured at Expo

By Laurie Branham

The third annual ODIN Alliance Technology Expo hosted by OAO was a huge success.

Hundreds of people attended the event, which was held May 10. It included 12 computer vendors and JSC civil and contractor employees. Dell, Apple, Microsoft, HP, Sun, SGI, and Cisco were just some of the vendors who participated with booths.

Everyone who attended was able to see the latest and greatest in computer technology available under the ODIN contract for the year 2001.

OAO demonstrated 12 new seat types, including three UNIX seats each from SUN, SGI and HP and three printer seats from HP.

Also, OAO and Dell announced the

NASA Employee and Subcontractor Purchase Plan Web site.

Go to the ODIN Outreach Web page at http://www.houston.ooo.com/csd/cmoutr_home.html. Then click on the link: "Dell OAO/ODIN Customer Purchase Program." You must do this two-step process to get to the exact page.

This year's expo included "break-out" sessions upstairs at the Gilruth Center. These sessions had detailed classes where the vendors were able to reach groups of people who wanted to learn more about a specific product or software/hardware.

Overall, the ODIN Alliance Technology Expo 2001 was a fun and informative way to learn more about what is available for JSC through the ODIN contract. ■

Dave Matthews Band Tours JSC



Drummer Carter Beauford and Saxophonist LeRoi Moore of the Dave Matthews Band visited Johnson Space Center for several hours on Thursday, May 10. The band was in the Houston area to perform at the Cynthia Woods Mitchell Pavilion on May 11 and 12.

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 6

The elation of Gemini IX's perfect reentry and landing closest to the prime recovery vessel of any manned mission to date was tempered somewhat by the disappointment of not having done all the things that were set out as mission objectives.

Gemini IX's successes included pilot Gene Cernan's two hours and ten minutes of extravehicular activity, rendezvous with the Augmented Target Docking Adapter (ATDA) by three different rendezvous techniques, the gaining of knowledge of man's capabilities and limitations to do useful work in space and of the value of close-up manned observation of another satellite on orbit and the most accurately controlled reentry of any US manned space flight.

1 9 7 6

The first of two Shuttle Training Aircraft (STA) arrived at Ellington Air Force Base on Tuesday, June 8.

The STA is a modified Grumman Gulfstream II twin engine jet aircraft that will be used in crew training to simulate the flight characteristics of the Shuttle Orbiter.

Johnson Space Center personnel will perform a receiving inspection on the aircraft after its arrival. The STA will then be returned late this month to Grumman, Bethpage, N.Y., for installation of an electric aileron trim system. This minor modification to the STA control system will take approximately one week.

The second STA is scheduled for delivery to JSC late in July.

1 9 8 6

Although a minor storm by the standards of Carla or Camille, Hurricane Bonnie's approach toward the Texas Gulf Coast last week underscored JSC's continued efforts to be ready in the event of severe weather.

The Center declared a Level II state of preparedness at 11:15 a.m. June 25 when Bonnie, then headed directly toward Galveston, was upgraded from a tropical storm to a hurricane.

At level II, teams fan out across the Center and begin the several-hour-job of safing computer systems, strapping down trash can lids, sandbagging manhole covers and pulling the park benches in. During Level II, a Hurricane Command Post is activated in Bldg. 30 Action Center and a hurricane rideout team is assembled.

2001 Savings Bond Campaign

Two changes to program will make it easier to buy bonds

By Candace Hunt

JSC's U.S. Savings Bond campaign begins June 4 and continues through June 15, 2001. This year we have two changes to the Savings Bond program that make it easier to buy bonds through Employee Express and adds the option of a new type of bond, which gives our employees even more ways to save.

Employee Express enables employees to buy bonds through payroll savings, status their account and change their bond allotments, all with the click of a mouse. It's easy, fast and secure.

Additionally, we're now able to offer the inflation-indexed I Bond along with the Series EE Savings Bond through payroll savings. The new I Bond earns an adjustable interest rate that keeps savings growing over and

above inflation for up to 30 years. Their earning rate is based on the Treasury's fixed rate of return combined with a semi-annual inflation rate based on changes in the Consumer Price Index for all urban consumers (CPI-U). The current rate for I Bonds as of May 1 is 5.92 percent.

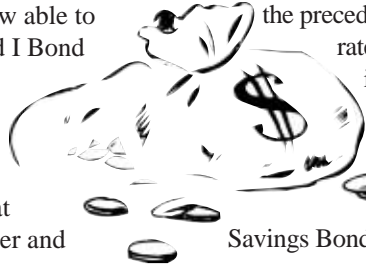
Interest rates for Series EE savings bonds are based on market yields of actively traded Treasury notes and bills, and are adjusted every six months, climbing as market rates increase. Each May 1 and November 1, the Treasury announces the rate, which is 90 percent of the average yield on five-year Treasury securities for the preceding six months. The current rate for EE Bonds as of May 1 is 4.50 percent.

Whether you choose I Bonds or Series EE Bonds, they provide many advantages. Savings Bonds are backed by the full faith

and credit of the United States. Your Savings Bonds are registered, so the Treasury can replace them if they're lost, mutilated or stolen. Interest earned is not subject to state or local taxes, and federal tax liability can be deferred until the bonds reach final maturity or are cashed, whichever is first.

In addition, when bonds are redeemed for the purpose of financing higher education—yours or your children's—interest earned under some circumstances is completely tax free. Bonds can be cashed any time after six months, but bonds cashed before five years are subject to a three-month interest penalty.

More information about savings bonds can be found on the JSC homepage at <http://www4.jsc.nasa.gov/> or on the Human Resources Office homepage at <http://hro.jsc.nasa.gov/>. If you have additional questions, contact your directorate campaign coordinator or Candy Hunt at 31836. ■



Safety experts agree the single most important factor in surviving a criminal attack is to have a personal safety strategy in place before it is needed.

Three out of four women fall victim—so even your odds. JSC Occupational Safety and Occupational Health offices will offer the Refuse to be a Victim seminar on Wednesday, June 6 in the Building 30 auditorium. The event runs from 11 a.m. to noon. The seminar will

offer tips and safety strategies from which you can develop your own plan.

Seating is limited, so arrive early. For more information, call (713) 682-8060 or e-mail tomneal@flash.net

**Refuse
To Be A Victim**

Continued from Page 1

STS-100 overcomes computer problems

From Kennedy Space Center, NASA and Boeing personnel—who ran prelaunch Multi-Element Integrated Testing with the hardware—flew to Houston to help out. The International Software Integration Lab, located at the Sonny Carter Training Facility, also supported the troubleshooting.

Lead ODIN flight controller Jim Dewberry worked with his staff to check software loaded to the computers for any anomalies.

When station Flight Director Mark Ferring's team relieved Curry's team in the station Flight Control Room, the shuttle's communication system provided the only communications that ground controllers had with the station.

Mission Control then spent the next several hours attempting to get the computers to respond. "We had a lot of people working some really long hours trying to solve this problem," said Gahring.

Light...camera...

"Finally, we decided to try a command where the result would be obvious to the crew. We attempted to turn off a light in the Destiny lab, which actually worked," Ferring said. "So we knew that somehow the third computer was processing commands but was not shipping data and command responses to the ground."

As the time approached for the tired crew to go to sleep, they routed a video signal via the shuttle using a special "extension cord." They also positioned a television camera to view the light in the Destiny lab. When Mission Control sent commands, the light would turn on or off to confirm the computer was paying attention. Mission Control used this extensively through the night as a way to monitor progress as they attempted to restore ground command of the station.

The docked shuttle proved an invaluable resource during this trying time. "We were able to continue communicating with the station crew via voice and video while we attempted to figure out what could possibly be causing the loss of all

three primary computers," said Ferring.

"Without the coordinated efforts of both crews, the shuttle and station flight control teams and the sharing of shuttle and station onboard technical resources, I believe the troubleshooting and eventual recovery of the system would have been even more difficult and time consuming than what we experienced," Ferring said.

Mission Control executed a plan to recover telemetry. It worked. The second computer was operating again. An alarm woke the crew and they connected a laptop to get the status of the station. They also arranged the computer to send data via the docked shuttle.

Now that the computer system had a lifeline, regaining use of the S-band antenna—offline because of the failures—proved the next challenge. When the crew attempted to connect with the antenna, the computer failed. For the first time, the station lost the use of all command and control computers.

"These computers are used for command and control of the station. This is why we built the redundancy. It is incredible for three to fail in a 24-hour period," Curry said.

Logically, a plan existed in the event that all three shut off. The two Unity module computers have a software design called Mighty Mouse for its "Here I come to save the day" effort. When this executed and the computers "power cycled," the second computer recovered. It has been up and running ever since. The command and control system finally regained stability.

Shortly after the recovery of the second computer, in the early hours of the morning on April 26, the Unity computers failed. The ODIN team resolved the problem and the Unity computers recovered full data capacity.

Not out of the woods yet...

The crew borrowed a payload computer to replace the first command and control computer. The ODIN team and the Mission Evaluation Room's avionics team worked to load software

into the "new" computer over the weekend of April 28, the first ever in flight attempt. The computer is fully functional on backup mode, but more activity is required to get it ready for assembly mission 7A. The failed hard drive returned aboard *Endeavour* May 1.

A spare, built out of existing computer components on board, replaced the third computer. Three teams working round-the-clock shifts over the weekend of May 5 loaded the spare with software.

"I am so proud of the ODIN team because they responded to these failures with tough and competent spirit," Curry said. "No mistakes were made in the commands or the loading of the software. This is why today we have three fully functioning command and control computers. It is a tribute to the work of the ODIN team and the Mission Evaluation Room team."

Flight controllers disabled the second computer's safing response so if the hard drive failed, the whole computer would not shut down. The station used the computer until the International Software Integration Lab certified a new hard drive, which arrived on the Russian Progress flight May 22.

The faulty mass storage devices are still under review at Raymond, the hard drive manufacturer.

"In my 20 years in operations at JSC, I witnessed the most Herculean effort of my career during this mission," Ferring said. "The selfless dedication to understanding and resolving this problem by the engineering and operations communities was a sight to behold."

"Program management bent over backwards to ensure that all available resources from around the country were made available to the execution teams to attack this situation. The eventual success at regaining reasonable computer functionality and completing all the major objectives of this mission under severely degraded conditions is a fitting tribute to the teams' success." ■



GOOD NEWS**Boeing employee named 2001 Buyer of the Year**

Russell Carroll, Boeing Director of Buyer Management and Procurement, was named 2001 Buyer of the Year by the Houston Minority Business Council (HMBC). The award was presented at the Council's quarterly luncheon recently.

Carroll was selected from a field of 50 nominees representing 23 Fortune 500 companies throughout Houston. The award is presented annually to an individual who, in the past three years, has successfully increased expenditures



Russell Carroll

and efforts towards the growth and development of minority business firms.

Carroll joined The Boeing Company in 1978 as a material planner in commercial airplanes. He held numerous positions in Wichita, Philadelphia and Seattle before being transferred

to Houston to support the International Space Station program in 1993. His efforts in Houston have included doubling dollar expenditures with minority

business enterprises from \$13.2 million in 1998 to \$26.5 million in 2000.

He also has been proactive in providing minority suppliers the opportunity to compete exclusively for engineering and technical services contracts exceeding \$100 million for the ISS, Space Shuttle and other Houston-based programs. He also created a forum to communicate specific procurement needs to the local community and established an ISS Supplier of the Year award to recognize and celebrate the exceptional accomplishments of suppliers.

"I applaud Russ Carroll for his vision in ensuring minority participation in the Boeing ISS program," said Brewster Shaw,

Boeing Vice President and General Manager. "His guidance has helped contribute to the success of our Small Business program and helped us promote a unified ISS team consisting of our customer, our company and our suppliers."

Boeing is NASA's prime contractor to design, develop, manufacture and assemble the ISS.

The Houston Minority Business Council is involved in increasing and expanding business opportunities and business growth for minority business enterprises. Its membership consists of 230 major corporations and more than 800 minority-owned businesses. ■

Wayne Thomas receives NASA procurement honor

Wayne A. Thomas was recently selected as NASA Procurement Supervisor of the Year. He has been supporting the procurement organization in various positions since 1990, and was promoted to supervisor in 1998.

As Deputy Manager of the Space Station Procurement Office, Thomas provided the leadership to restructure the ISS Prime contract with Boeing, which was valued at \$537 million. The restructure accomplished three Program goals:

- Re-establishing a cost performance incentive by converting the contract to cost-plus-award-fee with a cost factor.

- Reorganized the Exhibit A Statement of Work (SOW) into Design, Development, Test and Evaluation (DDT&E); Integration and Operation; Spares; and Other Product Development. The restructure of the SOW allows Boeing to concentrate on completing DDT&E and allows NASA to participate in the management of effort to accomplish element and launch package integration and assembly sequence planning and implementation.

- Globally settled approximately 38 requests for equitable adjustment, avoiding a significant and prolonged distraction to the Pro-

gram. This action also cemented the Boeing overrun of \$986 million.

Thomas participates in real-time decisions related to ISS Prime contract changes. This past year, 305 changes (109 UCAs) with an absolute value of \$679 million were cemented. Thomas provides the ISS technical managers' recommendations on scope and implementation strategy. Under his leadership, the Changes Team continues to manage an active workload of 66 UCAs and other letter RFP actions with a value of \$190 million.

Thomas also has the responsibility of managing 27 active contract and grants with a total value of \$700 million. At the same time, he guided the

efforts of procurement professionals as they tackled several new competitive and noncompetitive procurements. One of the more significant contract actions was the negotiation of \$100 million of additional goods and services for the Russians.

Interviews conducted by the HQ Procurement Survey Team noted: "The Space Station Procurement Office stood out especially as an area where members felt the organization was functioning very effectively and job satisfaction appeared to be relatively high based on employee comments."

The office received nine strengths and no weaknesses from the Headquarters Procurement Management Survey. ■

JSC Graphics and Exhibits groups receive national recognition

The IMPASS contract's Graphics and Exhibits departments were recently named winners in the Communicator Awards 2001 Print Media Competition.

The IMPASS Graphics department received the competition's highest honor, the Crystal Award of Excellence, for the design of the STS-98/ISS Destiny Laboratory commemorative poster produced for Spaceflight Awareness.

The combined efforts of IMPASS' Graphics and Exhibits departments earned the Award of Distinction, the competition's second highest honor, for JSC's newest event exhibit, which premiered at the 2001 Houston Livestock Show and Rodeo.



Recently members of the Graphics and Exhibits teams were recognized as winners in the Communicator Awards 2001 Print Media Competition.

NASA JSC 2001e01257 photo by David DeHoyos

The Communicator Awards is a national awards organization that recognizes outstanding work in the communications field. JSC's winning submissions were selected from the competition's 3,344 entries, which were submitted by leading corporations, advertising agencies and communications firms throughout the United States and from several foreign countries. ■

Valuable insight: Special day allows children to visit JSC

Share the wonder of working at JSC with your kids. This year's Bring Our Children to Work (BOCTW) Day is Friday, June 15, at the Gilruth. Sign-in begins at 8:30 a.m. and the presentations will be from 9 a.m. to 10:40 a.m.

Students will be treated to a "tour" of the International Space Station (ISS) using Virtual Astronaut. The Virtual Astronaut team members are Stacey Morrison, Steve Taylor, Cathy Gardner, David Kiss, Deborah Washington, Kevin Repa and Stephanie Castillo.

Chris Culbert and Jennifer Rochlis will present information on the newest technology in robotics.

Although various organizations may be planning activities and tours specifically for their own employees and students, parents/sponsors are encouraged to focus activities on the official Gilruth observance and within their own primary work area to minimize disruption to scheduled work activities. In addition, all JSC security and safety policies should be adhered to at all times.

Parents/sponsors may bring a maximum of two students (ages 9-15) to the presentations, and parents must remain with their students during the presentations. Students won't require badges; however, the students must be with an officially-badged adult during their visit to JSC.

"We have a few changes too from last year's event," said Jessie Hendrick of the Equal Opportunity Programs Office (EOPO). "Admission will be on a first-come, first-served basis. Attendance will be limited to the fire-code capacity of the

Gilruth. Only one morning session will be offered." She added that one of the students' favorites—a lunch special at both cafeterias 3 and 11 consisting of two corn dogs and fries for \$1.95—will still be offered. The beverage will be an additional charge.

Hendrick said the Gilruth event is one that kids will love. "BOCTW is a rare opportunity for your children to get an inside look at two different areas of work here at JSC," she said. ■

For more information, Please contact Hendrick at ext. 31203.

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

Allen Flynt was named Acting Manager, EVA Project Office.

Steve Doering was named Acting Deputy Manager, EVA Project Office.

Jim Van Laak was named Manager, Operations Integration, International Space Station Program Office.

Susan Creasy was named Acting Manager, Mission Integration and Operations Office, International Space Station Program Office.

Lili Moore was named Chief, Energy Systems Division, Engineering Directorate.

Randall Adams was selected as a Flight Manager, Space Shuttle Program.

Roberto Galvez was selected as a Flight Manager, Space Shuttle Program.

Additions to the Workforce

John Moore joins the Space Station Procurement Office, Office of Procurement, as a Contract Price/Cost Analyst.

Rosalie Solis joins the Space Station Procurement Office, Office of Procurement, as a Contract Specialist.

Heather Peters joins the Operations Division, Mission Operations Directorate, as an Operations Lead.

Jose Hernandez joins the Materials and Processes Technology Branch, Manufacturing, Materials, and Process Technology Division, Engineering Directorate, as a Materials Research Engineer.

George James joins the Structures and Dynamics Branch, Structures and Mechanics Division, Engineering Directorate, as an Aerospace Engineer.

Sarah Finch and *Nicholas Hines* join the Engineering Resources Management Office, Office of the Chief Financial Officer, as Program Analysts.

Glinda Calloway joins the Office of the Chief Financial Officer, as a Program Analyst.

Eric Bucher joins the Space and Life Sciences Resources Management Office, Office of the Chief Financial Officer, as a Program Analyst.

Leroy Evans and *Marci Paden* join the Space Station Resources Management Office, Office of the Chief Financial Officer, as Program Analysts.

Henk Roelant joins the Space Shuttle Division, Safety, Reliability, and Quality Assurance Office, as an Aerospace Engineer.

Bill Joiner joins the Moscow Technical Liaison Office, International Space Station Program, as a Program Analyst.

Promotions

Diana Norman was selected as an External Relations Specialist in the External Relations Office.

Tim Boyes was selected as a Contract Specialist in the Space Shuttle Procurement Office, Office of Procurement.

Stephanie Hunter was selected as a Contract Specialist in the Institutional Procurement Office, Office of Procurement.

Carlise Ishmel was selected as an Administrative Assistant in the Office of Procurement.

Troyonia Ross was selected as a Printing Specialist in the Imagery and Printing Branch, Information Products and Services Division, Information Systems Directorate.

Becky Castillo was selected as an Inventory Management Specialist in the Property and Equipment Branch, Logistics Division, Center Operations Directorate.

Reassignments to Other Centers

Pam Adams moves to the Kennedy Space Center.

Terry Lambing moves to the Kennedy Space Center.

Reassignments to Other Directorates

Jannette Reed moves from the Human Resources Office to the Office of Procurement.

Dawn Borden moves from the Mission Operations Directorate to the Space Shuttle Program.

Christine Boykin moves from the Mission Operations Directorate to the Space Shuttle Program.

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

Jeevan Perera moves from the Engineering Directorate to the International Space Station Program.

Retirements

John Whitely of the Systems Management Office.

Henry Littlejohn of the Flight Crew Operations Directorate.

Bill Reeves of the Mission Operations Directorate.

Edward Kubiak of the Engineering Directorate.

Scott Rosenbaum of the Information Systems Directorate.

Robert Pocklington of the International Space Station Program.

Claudette Gage of the Space and Life Sciences Directorate.

Resignations

Lee Berlin of the Legal Office.

Kyle Fairchild of the Mission Operations Directorate.

Michael Le of the Engineering Directorate.

Greg Harbaugh of the EVA Project Office.

Correction: A caption on Page 1 of the May 4 issue indicated STS-1 pilot Bob Crippen was speaking with Col. Joe Engle. He was actually speaking with Chuck Lewis, one of the flight directors for STS-1. We apologize to both Mr. Engle and Mr. Lewis.

DATES & DATA**June 1**

Chess Club meets: The Space City Chess Club meets each Friday evening from 5:30 p.m. until 9 p.m. at the Clear Lake United Methodist Church, 16335 El Camino Real, room 423. Other June meetings will be held on the 8, 15, 22 and 29. All skill levels are welcome. For more information, please call James Mulberry at x39287 or James Termini at x32639.

June 4

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

NSBE meets: The National Society of Black Engineers meets at 6:30 p.m. at Texas Southern University, School of Technology, first floor. For more information contact Kimberly Topps at 281-280-2917.

June 5

Quality Society meets: The Bay Area Section of the American Society for Quality meets at 6 p.m. at Franco's Restaurant. For more information contact Ann Dorris at x38620.

June 6

Spaceland Toastmasters meet: The Spaceland Toastmasters meets on Wednesday Mornings at 7 a.m. at the House of Prayer Lutheran Church 1515 Bay Area Blvd at Reseda. Other June meetings will be held on the 13, 20 and 27. For more information, contact Ava Sloan at 713-768-6336 or asloan@hal-pc.org

Spaceteam Toastmasters meet: The Spaceteam Toastmasters meet at 11:30 a.m. at United Space Alliance, 600 Gemini. Other June meetings will be held on the 13, 20 and 27. For more information contact Patricia Blackwell at 281-280-6863.

June 7

Communicators meet: The Clear Lake Communicators, a Toastmasters International club, meets at 11:30 at Wyle Laboratories, 1100 Hercules, Suite 305. Other June meetings will be held on the 7, 14, 21 and 28. For more information contact Allen Prescott at 281-282-3281 or Richard Lehman at (281) 280-6557.

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

NASA BRIEFS**NASA TECHNOLOGY HELPS IN SEARCH FOR "HEAVENLY COFFEE"**

A NASA research mission will use an unpiloted aircraft, known as an "Uninhabited Aerial Vehicle" or "UAV," to aid Hawaiian coffee growers by providing the growers with spectral (or color) images of their crops. From this information the growers will know, down to the day, the best time for harvesting the beans, bringing the best flavor to consumers.

Part of NASA's UAV-based science demonstration program, these flights will show the ability of this type of aircraft to carry Earth-viewing scientific payloads in long-duration missions at altitudes exceeding the endurance of a pilot in a traditional aircraft. These capabilities will benefit both U.S. scientific and commercial objectives well into the new millennium. The mission will allow NASA to provide sound science to a multi-billion dollar American industry.

Coffee is the leading agricultural commodity traded on world markets, and Hawaiian coffee is some of the finest in the world. A key to producing excellent coffee is knowing the right time to harvest the beans. The research team will use the Pathfinder-Plus aircraft, a high-flying solar-powered UAV built by AeroVironment, Inc., Monrovia, CA, to loiter for long periods over crop fields during the harvest season.

Researchers hope the craft's unique capability will provide data the growers can use to select the best time to harvest the beans.

NASA TECHNOLOGY TAKES OFF INTO DARK AND STORMY NIGHTS

NASA will also use the "UAV" for a research mission to better understand how lightning forms and dissipates during thunderstorms. The remotely piloted, high-flying aircraft will fly above and around the dangerous disturbances, gauging the various elements that unleash the fury of storms.

The mission will utilize the ALTUS UAV, built by General Atomics, San Diego, Calif., taking advantage of its remotely piloted capability, along with its high altitude (up to 55,000 feet) and slow speed. Researchers from the University of Alabama at Huntsville, with colleagues from NASA's Goddard Space Flight Center, Greenbelt, Md., will chase down thunderstorms in Florida to better understand the relationship between storms and lightning. When a developing storm is spotted at NASA's Kennedy Space Center in Florida, researchers will send the ALTUS above and around the storm, while the remote pilots remain safely on the ground.

Using precision instruments aboard the aircraft, researchers will take measurements to determine lightning potential of the storms in the hopes of better understanding how different physical characteristics in the atmosphere can contribute to development of lightning. These data will increase understanding of lightning and storms, while providing federal, state and local governments new disaster-management information for use in the areas of severe storms, floods and wild fires.

SPACE CENTER Roundup

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