SPACE CENTER
Roundup

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United States Lab set to fulfill its destiny

With solar arrays installed and unfurled to supply all the power it needs, the U.S. Destiny Laboratory is ready to assume its place in International Space Station Program history.

The primary objective of STS-98, ISS Assembly Mission 5A, is to deliver and install Destiny onto the ISS. As the centerpiece of research on this world-class scientific orbiting outpost, this workshop in space will support research in cancer, diabetes, and materials, just to name a few.

The Laboratory module is a pressurized, environmentally controlled element. It provides equipment for research and technology development and houses ISS environmental and data management systems. The Lab provides a shirtsleeve environment for long-duration crew activities and operations.

The aluminum module is 28 feet long and 14 feet wide. It is comprised of three cylindrical sections and two endcones that contain the hatch openings through which crewmembers will enter and exit the module. The Lab will be mated to the forward port of Unity (Node 1).

Inside Destiny are five systems racks that will provide life-sustaining functions on board including electrical power, cooling water, air revitalization, and temperature and humidity control. Each rack weighs about 1,200 pounds. Six additional systems racks and one payload rack will be flown to Destiny on the next flight. Four stand-offs provide raceways for module utilities–interfaces for ducting, piping, and wiring to be run to/from the individual racks and throughout the Lab. Thirteen racks that will provide platforms for a variety of scientific experiments will follow on subsequent missions.

The Lab has an optical quality window (principally for Earth science observations) and a window shutter to protect the window from potential micrometeoroid and orbital debris strikes during the life of the ISS. The crew manually opens the shutter when the window needs to be used. The shutter will be installed during the third scheduled space walk during the mission.

Crewmembers will work inside the pressurized facility to conduct research in numerous scientific fields. Scientists throughout the world will use the research results to enhance their studies in medicine, engineering, biotechnology, physics, materials science, and Earth science.

The STS-98 crew aboard *Atlantis* includes Commander Ken Cockrell, making his fourth flight; Pilot Mark Polansky (first flight); and Mission Specialists Bob Curbeam (second flight), Tom Jones (fourth flight) and Marsha Ivins (fifth flight). The flight will be the seventh space shuttle mission in support of the assembly of the ISS. Jones and Curbeam will install the U.S. Lab to the forward port of Unity and perform external outfitting over the course of three space walks.

Pressurized Mating Adapter 2 (PMA 2) will be deberthed from Unity and temporarily stowed on the Z1 Truss. The Lab will then be berthed to Unity; PMA 2 will then be removed from the Z1 Truss and berthed to the Lab's forward Common Berthing Mechanism.

Lab installation activities will begin on Flight Day 4 with Extravehicular Activity (EVA) 1. Key activities planned for EVA 1 include connecting all of the critical power and fluid umbilicals between the Z1 Truss and the Lab. The ISS crew will complete Node to Lab vestibule outfitting toward the end of the EVA. Together these connections will permit Lab activation upon completion of the space walk.

After the Lab is activated and cooling has been established to avionics, the ground will take over activation of the Lab systems. The Pressure Control Assembly (PCA) will be activated, followed by smoke detectors in the Lab. Then the Common Cabin Air Assembly will be started to provide air circulation and scrubbing of the Lab atmosphere. The Guidance, Navigation and Control Multiplexer/Demultiplexers (MDMs) will then be activated and loaded with the appropriate software. The Lab Power Management Controller Unit MDMs will be checked out as well. The ground will then command the Emergency Egress

STS-98 crewmembers take part in Crew Equipment Integration Test (CEIT).

Please see **Destiny**, Page 2

Continued from Page 1

Destiny

Lighting batteries to begin charging, followed by activation of the Lab interior lights. The Lab condensation (shell) heaters will be activated, and the survival heaters will be deactivated. The ground will also activate and check out much of the audio equipment in the Lab. The Control Moment Gyros will also be prepared for spinup, which will occur the following day.

Upon successful activation of the Lab, both the STS-98 crew and the Expedition One crewmembers will ingress the Lab on Flight Day 5 and begin the physical tasks associated with outfitting Destiny.

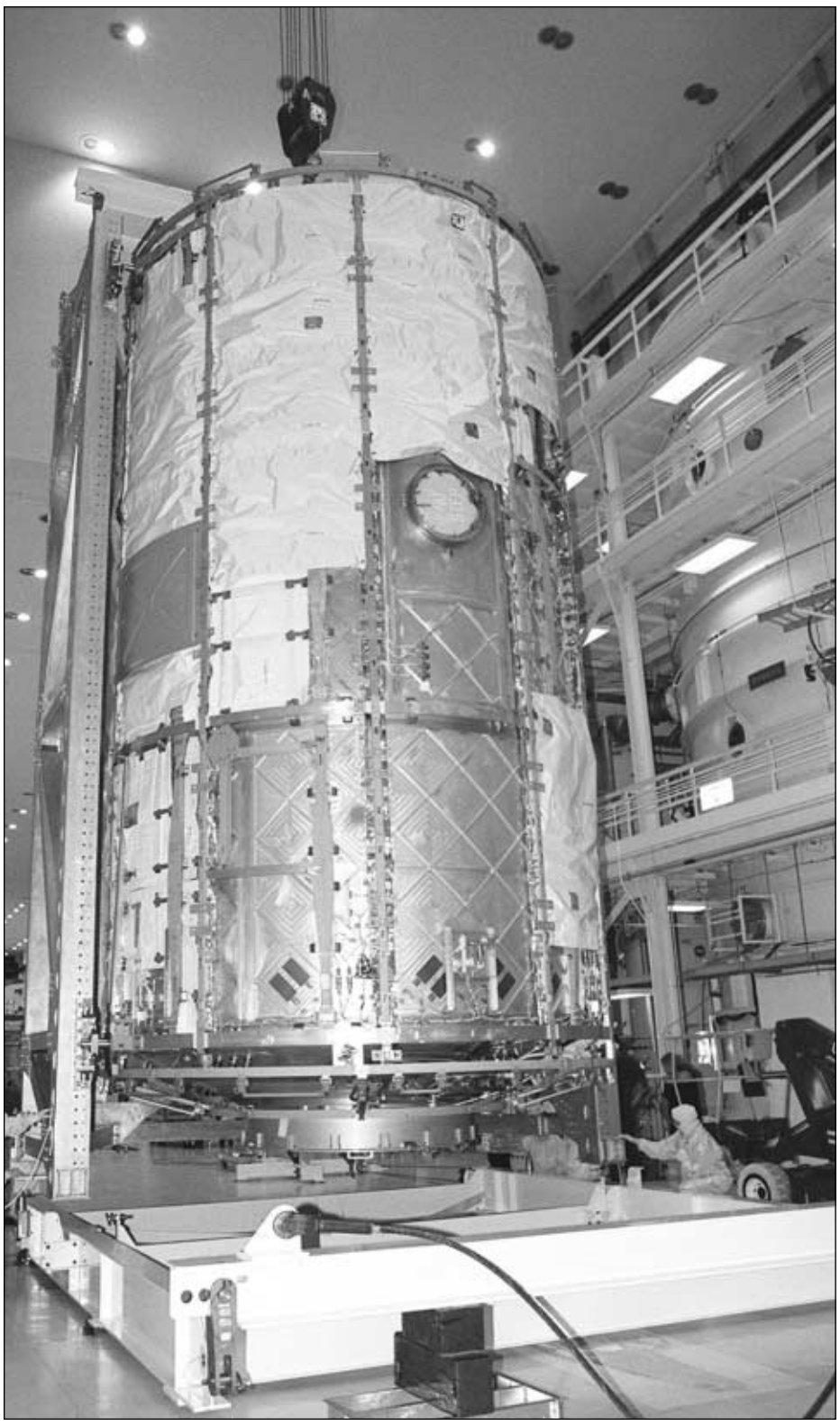
During the second space walk scheduled for Flight Day 6, PMA 2 will be relocated to the Lab forward port. The EVA crewmembers will then work together to remove the Lab Power Data Grapple Fixture (PDGF) from the orbiter sidewall and install the PDGF on the Lab. The PDGF will be used by the Space Station Remote Manipulator System, the new station robotic arm that will arrive on Mission 6A.

The third scheduled space walk will occur on Flight Day 8. Key activities planned include moving the spare S-Band Antenna Support Assembly from the orbiter to the ISS stowage site, installing the window shutter on the Lab and connecting PMA 2 umbilicals to the Lab.

The ISS crew and/or ground controllers will perform some activation and checkout tasks of the Lab after the orbiter crew ingress is complete. The ground will command a checkout of the Internal Video Distribution Subsystem Orbital Replacement Units (ORUs). As there is no video capability on this mission, this will be a functional checkout of the equipment to verify that it survived launch in good shape. The ground also will perform a health and status check of the Ku-band radio frequency group. Once again, this will be a health check of the ORUs because there will not be any Ku-band capability available until Mission 5A.1.

The ISS crew will inspect the wastewater tank in the Lab to verify that there are no leaks. Other activation procedures that will be performed by the ISS crew after the orbiter leaves include the activation and checkout of the water vent system, inhibiting the water vent system, and activation and checkout of the vacuum vent system. The ISS crew will also install a Pressure Control System extension duct to assist the flow of air through the PCA.

Atlantis and the five-member crew are slated for launch no earlier than Jan. 19 with landing at Kennedy Space Center set for no earlier than Jan. 29. ■



> ***"The scientific community has anxiously awaited the installation and activation of Destiny to begin a new era of long-duration, space-based research. Crewmembers and ground-based researchers will utilize the orbiting laboratory to expand our knowledge of biological and material processes, learn more about our planet and solar system and develop new commercial applications in space."***
>
> – Ven Feng, NASA increment payload manager

Destiny Science

The centerpiece of research on the International Space Station, the U.S. Destiny Laboratory will support experiments and studies that may lead to new answers to medical questions.

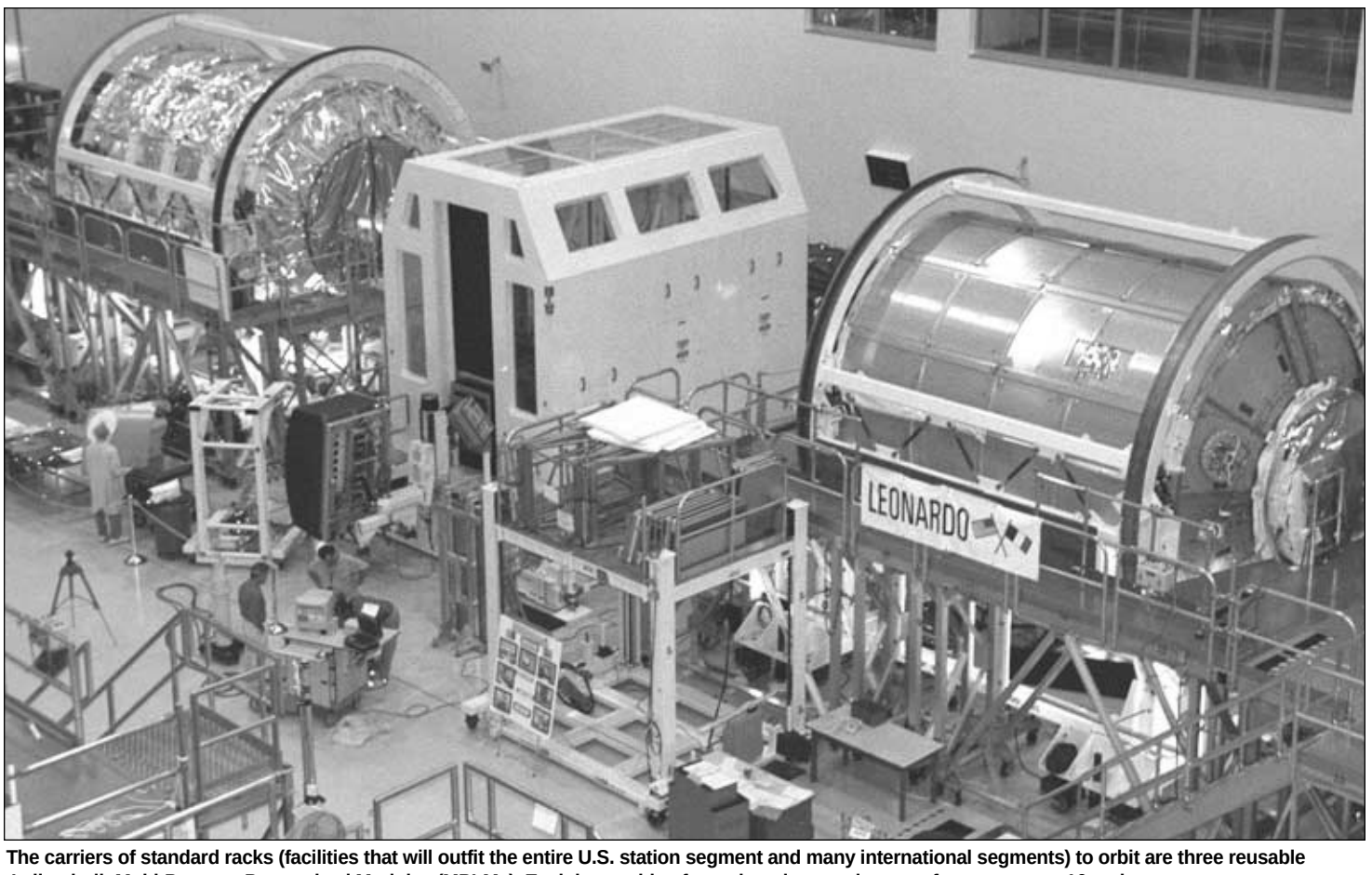
"The scientific community has anxiously awaited the installation and activation of Destiny to begin a new era of long-duration, space-based research," said Ven Feng, NASA increment payload manager. "Crewmembers and ground-based researchers will utilize the orbiting laboratory to expand our knowledge of biological and material processes, learn more about our planet and solar system and develop new commercial applications in space."

Destiny is the primary research laboratory for U.S. payloads. It will support experiments in microgravity research, human life science, fundamental biology and ecology, Earth observations, space science and commercial applications. By Flight 5A.1 (STS-102), the U.S. Lab will support Earth photography and the Human Research Facility in which radiation measurements, psychological evaluations, and neural response experiments will be conducted.

In 2002, shuttle flights will deliver the Minus-Eighty Laboratory Freezer for ISS, Microgravity Science Glovebox and Window Observational Research Facility. Eventually, Destiny can accommodate 13 payload racks with experiments in human life science, materials research, Earth observations and commercial applications. The results of these experiments will allow scientists to better understand our world and ourselves and prepare us for future missions to the Moon and Mars.

In the future, Destiny will be joined by laboratory modules sponsored by the National Space Development Agency of Japan, European Space Agency and Rosaviakosmos.

The Boeing Co. began construction of the 16-ton, state-of-the art research laboratory in 1995 at the Marshall Space Flight Center in Huntsville, Ala. The Lab was shipped to Kennedy Space Center in Florida in 1998. It was turned over to NASA for pre-launch preparations in August 2000.



The carriers of standard racks (facilities that will outfit the entire U.S. station segment and many international segments) to orbit are three reusable Italian-built Multi-Purpose Pressurized Modules (MPLMs). Each is capable of carrying nine metric tons of cargo—up to 16 racks.

Today's weather forecast for Jupiter is…

Imagine being a student in a middle school classroom in rural Texas, or in downtown Los Angeles, and receiving radio waves directly from Jupiter. That's what students who participate in the Space Operations Management Office's (SOMO) educational project, Goldstone Apple Valley Radio Telescope (GAVRT), are doing. SOMO, which was created in 1995, is a NASA-wide organization managed at JSC under the leadership of Stan C. Newberry. Its primary objective is to provide space operations services for customer missions at lower cost to the agency, emphasizing reliance on commercial service providers.

The GAVRT project is the result of a partnership involving NASA/SOMO, the Jet Propulsion Laboratory in Pasadena, California, and the Lewis Center for Educational Research in Apple Valley, California. Students have access to a 34-meter (112 ft. diameter) radio telescope that until recently was part of NASA's Deep Space Network. The antenna, known as Deep Space Station 12 and located at the Goldstone Deep Space Communications Complex in the Mojave Desert, California, has for the past 30 years communicated with many of JPL's robotic space exploration missions, including Voyagers 1 and 2.

GAVRT is a unique educational project that helps students learn that science is a process and not merely a repetition of memorized facts. The goal of the project is to provide students and educators with curriculum vehicles that will promote science literacy, support a better understanding of the scientific process, and provide the opportunity to collect real-time data with sophisticated science equipment through distance learning.

Using a curriculum module called "Jupiter Quest" which meets national and state science standards, students' studies of the Jovian system culminate in observing sessions where, under the guidance of a GAVRT-trained teacher, they take control of the giant antenna via the Internet. Students learn how to calibrate and point the antenna, then use two different radio frequencies, X-band and S-band, to gather data on the temperature of Jupiter's atmosphere and on the intensity of the radiation belts.

Students work in teams to collect and analyze the data, which is then forwarded to JPL, where it is checked and added to a Jupiter database. Because the high-energy particles in the radiation belts can damage spacecraft components, JPL scientists have been gathering this data for use in planning future space missions. GAVRT students contribute to that growing bank of knowledge.

GAVRT has been operational for three years. A total of 65 teachers have been trained, bringing their knowledge and guidance to 5,200 students in 44 schools in 14 states. The teachers report increased interest in science by their students, and in some cases overall improvement in attitude and accomplishment in other school subjects. Certainly students reap the added benefit of experiencing team involvement and problem solving.

Maintaining the antenna, developing operational software and advising on the accuracy of the science is the responsibility of JPL, while the curriculum preparation, teacher training, and support to the school participants falls to LCER. When a class goes online to access the antenna, the connection is made through the Operations Control Center in Apple Valley and LCER operators are online with the teacher and students to assist with queries regarding either operation or the curriculum.

When the Cassini spacecraft flew by Jupiter last month, selected GAVRT schools took special measurements that will help the Cassini spacecraft perform additional science experiments to enhance the science return when the spacecraft arrives at Saturn and Titan.

GAVRT is bringing a broader understanding of science and the scientific process to many of America's students. One intriguing aspect of the project is the possibility for real discovery—the data students gather is original and the answers are not known beforehand.

This educational project is just the beginning according to Newberry. As NASA migrates toward commercial service providers in satisfying its ground network requirements, SOMO will assess initiatives that will transfer some of NASA's ground communications assets to educational institutions. SOMO is also developing a K-12 teaching curriculum on space and ground communications. ■

For further details on current and upcoming education and outreach activities, please contact Cheevon (Mi-Mi) B. Lau at x36239.

Space Shuttle *Endeavour* and the International Space Station December 9, 2000 flyover

Palm Beach Gardens, Fla. 6:26 p.m. - 6:31 p.m. E.S.T.

Space Shuttle *Endeavour* (STS-97) and the International Space Station pass by the planet Venus (bright object at center right of photo) on December 9, 2000. The clouds are illuminated by a full Moon in the lower left of the photo.

At the time this photo was taken, Canadian astronaut Marc Garneau, aboard *Endeavour*, talked with John Manley, Canadian minister of foreign affairs and international trade; Mac Evans, Canadian Space Agency president; and elementary schoolchildren at the Museum of Science and Technology in Ottawa.

The close-up photo below shows the separation between *Endeavour* (top line) and the ISS (bottom), and a brief brightening of the ISS by several magnitudes.

Photo 2000 Copyright by Doug Murray

Whimisical door decor wins decorating contest

Kate Brown and Stacie Bennett kneel by their door. The two won first place in the Avionics System Division door decorating contest for their creative depiction of the Grinch attempting to make off with Cindy-Lou Who's Christmas tree while Max looks on.

Message from Tommy Holloway...

What's ahead for the International Space Station

The new star on the horizon is something to see!

It's 105 tons today–about the size of a shuttle –and when fully assembled will grow into one million pounds. When the P6 solar array unfurled its 240-foot end-to-end wings on Mission 4A, we installed the capability for power equivalent to 10-15 homes, enough to operate into Phase 3.

ISS Vision Statement

Our vision is a human outpost in space bringing nations together for the benefit of life on Earth...and beyond.

We will make revolutionary discoveries and establish the permanent international presence of humans in space to advance the exploration of our solar system and enable commerce in space.

We've been operating on orbit with a permanent crew for about two months, and already have exercised our ground and orbit teams to respond to the challenges we are encountering. The complexity and size of International Space Station integration is forcing us to learn and work together in ways only imagined. Our learning curve is growing exponentially. Much more is expected from us as the steep trek up the mountain, to build and operate the ISS, continues.

We are eleven flights into our amazing sequence. Eight flights were accomplished in 2000. In 2001, another eleven flights are planned, and the next major element and centerpiece of the U.S. segment, the laboratory Destiny, is on deck.

Year 2000 Accomplishments

In year 2000, we put three major elements on orbit. The Russian-built and launched Service Module arrived on orbit in July. The Z-1 Truss segment and first U.S. solar array (P6) were launched on shuttle flights in October and November, respectively. We launched two shuttle logistics and maintenance missions (STS-101 in May and STS-106 in September) and two Russian Progress refuel/resupply flights (in August and November). The first permanent crew (Expedition 1) launched October 31 on a Soyuz rocket, and ISS became a long-duration space flight program, with the parallel responsibility of operating and utilizing the station while continuing to build it. What's ahead for the International Space Station is an equally rigorous launch schedule and new challenges that will come along with it.

What's Ahead

In 2001, we'll launch six shuttle flights to the station, three with major elements: the U.S. Lab on ISS Flight 5A, the Canadian robot arm system on ISS Flight 6A, and the U.S. Airlock on ISS Flight 7A. Three shuttle flights will resupply, refurbish and help maintain the station: ISS 5A.1, ISS 7A.1 and ISS UF 1. Two of these flights, ISS 5A.1 in March and ISS 7A.1 in June, will rotate Expedition crews 2 and 3, respectively. The Russian docking compartment providing a docking port for the Soyuz vehicle and additional EVA capability is another major element due in 2001. Additionally, the Russians will launch Progresses and two Soyuz flights.

ISS Highlights of 2001

We kick off the year with STS 98, ISS Flight 5A—and the U.S. Lab Destiny. Once Destiny is activated several key things will happen. Prime control will switch from MCC-Moscow to MCC-Houston. The Control Moment Gyros that were installed along with the Z-1 Truss last fall on the 3A mission will be activated and take over the job of station attitude control, saving valuable propellant needed for other station maneuvers. Destiny will provide power distribution and high-rate S-band and Ku communications capability, as well as thermal and environmental control for the U.S. segment. Command and data handling will be transferred from the node Unity to Destiny.

Destiny can accommodate 24 rack locations. Five systems racks are already installed at launch. Eventually the lab will be outfitted to include materials science racks, fluids and combustion experiments and commercial materials research.

Destiny will significantly increase the habitable volume of ISS and put space station science on stage as ISS utilization begins. Next summer, a space shuttle flight will transport individual research payloads to the ISS.

The laboratory is built by our prime contractor Boeing and represents a monumental growth in ISS capability. The thousands who have brought it to the launch pad deserve a hearty pat on the back.

Enhancing Space Walking and Working

Our capability to live and work in space will be greatly enhanced by adding the robot arm and the airlock to the station. The Canadian robot arm will be launched to the station featured in the Canadian-built mobile servicing system and will assist ISS assembly tasks through its ability to "inch-worm" along the truss and modules. The arm is needed for helping loading and unloading the shuttle Orbiter cargo bay, assisting in ISS construction tasks and assisting astronauts during EVAs. It will also play a vigorous role in support of station maintenance, which will prove to be a new and exciting set of tasks on orbit. When the U.S. Airlock is brought to the station on ISS Flight 7A (STS-104) in May, astronauts and cosmonaut crewmembers will be able to perform space walks in both Russian and American spacesuits, and without the presence of the shuttle. Our ability to work in space will be greatly enhanced, as well as our versatility. The 6A flight will also bring up a UHF antenna , which will provide space-to-space communications capability for U.S.-based space walks. The Airlock flight will also bring a High Pressure Gas Assembly to support space walks and augment the existing gas resupply system in the Service Module. The Airlock on orbit will mark the end of Phase 2 of station assembly and set us up for Phase 3, the final stages of ISS assembly that will last into the year 2006. The International Space Station outfitting will continue to be a major theme of flights between now and 2006. This enormous job involves 122 Standard Racks or telephone booth-size facilities that will outfit the entire U.S. segment and several international segments. Thirty-seven racks are reserved for scientific payloads and experiments, 32 racks are used for ISS subsystems, 14 are dedicated to crew health care equipment, and the rest are for stowage. The carriers of these racks to orbit are three Italian-built Multi-Purpose Pressurized Modules (MPLMs) manufactured by Alenia Aerospazio in Turin. These modules are reusable and capable of carrying nine metric tons of cargo—up to 16 racks. The MPLMs function as both station cargo carriers and station modules as the shuttle arm will dock and undock them, returning them to Earth for the next load. Named after famous Italian scientists and artists, Leonardo, Raffaello and Donatello, ISS MPLM flights begin with 5A.1 (STS-102) in March, and on 6A and 7A.1 and each will continue to be used throughout assembly.

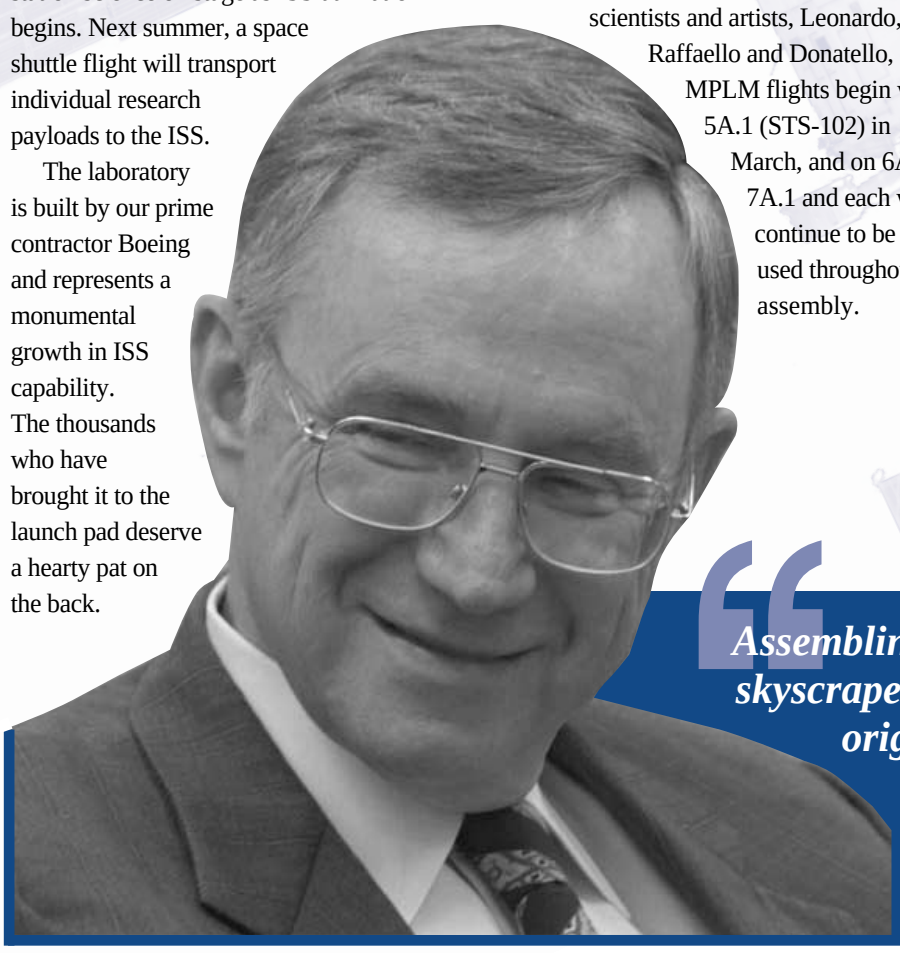
What's Ahead?

Every subsequent year an equally aggressive pace of 11-plus space flights is planned. Our Russian partner is slated to launch every year. Two flights of the manned Soyuz vehicles which continue to function as the ISS lifeboat, and 5-6 unmanned Progress flights to refuel and resupply the station are expected per year. In 2002, another six shuttle flights are planned with focus on building the Integrated Truss Structure. Named "the power bloc," major pieces of the station backbone such as the centerpiece (SO), first starboard (S1), first port (P1), and second port (P3/P4) will be flown on ISS Flights 8A, 9A, 11A and 12A. The UF2 flight continues the science outfitting.

In 2003, we will finish the truss structure, enhance station operations with a Canadian-built robot hand for the arm on UF4, add another node built by Europe under barter arrangement to the U.S. and anticipate growth of the Russian segment with docking and stowage modules/ compartments. Major features of 2004 include shuttle launches of the Japanese Experimental Module "Kibo" and the European Laboratory "Columbus." The UF4 flight will add the Express Pallet to the station for mounting external experimental equipment. In 2005 and 2006 we will continue to enhance the international segments with modules and habitation space so that when the ISS is assembled, it will have six functioning research laboratories, the interior volume of two 747 jumbo jets, power enough for about 50 homes, and 52 laptops interfacing with computers to control ISS subsystems. These computers will also be able to monitor the station's vital systems, an activity requiring several million lines of computer codes. The computer system will also be able to receive and use the latest software updates and innovations so our crews and scientists can take advantage of this growing capability. Assembling this one-million-pound space skyscraper, with world-class laboratories, originating from 100 locations and 100,000 people all over the world, is just the beginning.

This huge international team, representing five space agencies, involving 16 countries, and stretching across oceans and cultures, is succeeding with our mission to safely build, operate and utilize a continuously inhabited orbital research facility through an international partnership of governments, industries and academia. ■

Stay with us as this incredible story unfolds even more in 2001.



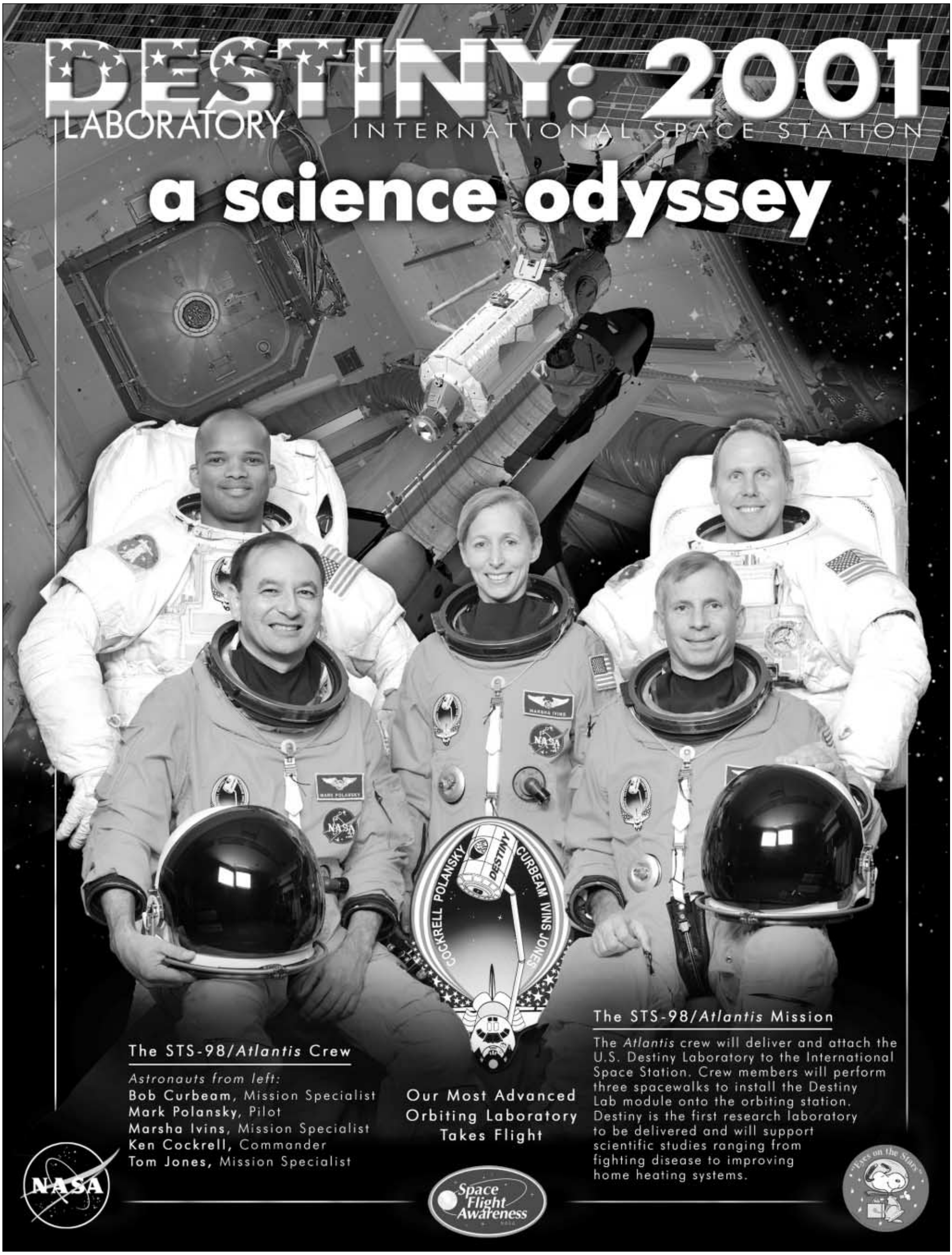
"Assembling this one-million-pound space skyscraper, with world-class laboratories, originating from 100 locations and 100,000 people all over the world, is just the beginning.

–Tommy Holloway

DESTINY: 2001

LABORATORY INTERNATIONAL SPACE STATION

a science odyssey



The STS-98/*Atlantis* Crew

Astronauts from left:
Bob Curbeam, Mission Specialist
Mark Polansky, Pilot
Marsha Ivins, Mission Specialist
Ken Cockrell, Commander
Tom Jones, Mission Specialist

Our Most Advanced Orbiting Laboratory Takes Flight

The STS-98/*Atlantis* Mission

The *Atlantis* crew will deliver and attach the U.S. Destiny Laboratory to the International Space Station. Crew members will perform three spacewalks to install the Destiny Lab module onto the orbiting station. Destiny is the first research laboratory to be delivered and will support scientific studies ranging from fighting disease to improving home heating systems.

NASA

Space Flight Awareness

"Eyes on the Stars"

Flight Schedule 2001

Jan. 2001	STS-98 Destiny Laboratory Module
Mar. 2001	STS-102 Logistics and Resupply MPLM
April 2001	STS-100 MPLM, UHF Antenna, SSRMS
May 2001	STS-104 Joint Airlock High Pressure Gas Assembly
June 2001	STS-105 MPLM
Aug. 2001	STS-107 Research Mission
Oct. 2001	STS-108 MPLM
Nov. 2001	STS-109 Hubble Space Telescope Servicing Mission

Ripped from the ROUNDUP

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

1 9 7 6

Electric propulsion research took a giant step forward as engineers at NASA's Lewis Research Center surpassed the old world mark with the completion of 15,000 hours of successful operation of an eight-centimeter mercury ion thruster.

Initiated in the summer of 1973, the tests sought to evaluate ion chamber erosion and peeling of sputtered metal observed in previous life tests; to determine the reliability of thrusters under cyclic operation; and to identify longer term failure modes not apparent in shorter tests.

During the 15,000 hours of operation, Lewis engineers performed 460 re-starts over the 26-month period.

1 9 8 1

NASA's test version of the space shuttle's main propulsion system successfully completed on Saturday, January 17, its last scheduled test firing before the shuttle's maiden flight planned for March. The test was conducted at the National Space Technology Laboratories, near Bay St. Louis, Miss.

The firing, which lasted 10 minutes, 25 seconds, was the twelfth and longest test of the system to date. It brings the total firing time on the main propulsion test article to more than one hour - the equivalent of more than seven shuttle flights. This included six firings that were programmed to meet or exceed the duration necessary to put a shuttle into orbit.

The shuttle's main propulsion test article consists of three high-performance, liquid-fuel main engines mounted in a simulated tail section of an orbiter; a large external propellant tank; and associated hardware. The shuttle's main propulsion system, together with its two solid rocket boosters, will generate the thrust necessary to launch the vehicle on its flight to orbit.

1 9 8 6

NASA has switched the launch of the Hubble Space Telescope with the launch of the first Earth Observation Mission. Under the new schedule, the Space Telescope will be launched on Oct. 27 and EOM will lift off on Aug. 18, 1986.

Crews assigned to the missions will also switch to stay with the payloads for which they have been trained.

The change was made to provide additional contingency time for the delivery of the Space Telescope from the West Coast, through the Panama Canal to the Kennedy Space Center. While satisfactory progress is being made by the major contractor, Lockheed Missiles and Space Co., Sunnyvale, Calif., to support the earlier launch date, it was deemed desirable to provide the added contingency time to insure that no slips occur in the space shuttle launch schedule.

Brown and Root Services, Pioneer earns OSHA VPP recognition

NASA JSC Photo 2000e30044 by Bill Stafford

BRSP Safety Action Team receives VPP Merit flag. Pictured with the team are George Abbey, JSC director; Dick Castleberry, BRSP general manager; and O. J. Alverez, OHSA Region VI VPP coordinator.

On December 1, Brown and Root Services, Pioneer (BRSP) officially received "Merit" recognition in the OSHA Voluntary Protection Program (VPP) and ISO 14001 certification for its environmental management system.

O. J. Alverez, OSHA Region VI VPP coordinator, presented a certificate and VPP Merit flag to Richard T. Castleberry, BRSP general manager, and BRSP's Safety Action Team at an awards luncheon held at the Gilruth Center.

On hand were George Abbey, JSC director; Bill Parsons, JSC deputy director; Nate Wright, Center Operations Directorate director; John Stout, BRSP vice president of Operations, Maintenance & Logistics; and more than 400 BRSP employees.

"This is a truly gratifying occasion for me," said Castleberry. "Today, OSHA is recognizing the remarkable achievement of our employees in creating and maintaining a safe workplace for themselves and our customers. They've earned this recognition and I'm intensely proud of them."

VPP recognizes and promotes effective safety and health management through a cooperative relationship among management, labor and OSHA.

BRSP's employee-driven Safety Action Team led by Ino Castillo played a critically important role in the project achieving VPP status. Each team member received a trophy: Kenneth Hawley, Construction; Glenda Locher, Engineering; Jim Hayman, Jim Tindall, and David Farrill, Maintenance; Charles Nelms, Operations; Gary Steadman, Castillo, Mike Yelton, Ron Johnson, Logistics; Keith Arnone, Environmental; Russ Tucker, OMNISEC; Roosevelt Owens, Tolman Building Maintenance; Brian Turner, Tolman Grounds Maintenance; John Fayle, Rigging and Welding Specialists; Elaine Cates, CC Distributors; and Donna Vaughn, Tim DeLong, Abel Garza, Safety.

The December 1 date held special significance for BRSP as it marked one year with no BRSP "days away" lost workday cases. Four BRSP major sections were recognized for having gone 1,340 days without a "days away" lost workday case: BRSP Construction, Engineering Design, Plant Operations, and Environmental.

Two BRSP subcontractors were also recognized for their exceptional safety performance: Rigging and Welding Specialists had gone 1,250 days without an OSHA recordable case, and Tolman Grounds Maintenance had gone 1,340 days without a "days away" lost workday case injury. ■

Texas travel counselors tour JSC

Texas travel counselors from the twelve official Texas Travel Information Centers are greeted at Space Center Houston by the astronaut mascot as they are taken for a tour of the space center and the Mission Control Center on Nov. 9. The counselors were hosted for their one-day study tour of the Clear Lake area by the Clear Lake—NASA Area Convention & Visitors Bureau as part of their weeklong tour of the Gulf Coast region. Also acting as hosts for the guided tour were Roger Bornstein, director of marketing; Mike Wampler, general sales manager; and Jay Austin, tour guide, all from Space Center Houston; Lynn Shigekawa, development director, and Mark Kramer, naturalist, Armand Bayou Nature Center; and Brett Kellerman, executive vice president, and Tim Anderson, general manager, Kemah Boardwalk. The group was accompanied by Francy Phelps, director, Clear Lake–NASA Area Convention & Visitors Bureau. ■

TICKET WINDOW

The following discount tickets are available at the Exchange Stores

AMC Theaters	$5.00
Moody Gardens (2 events) (does not include Aquarium Pyramid)	$10.75
Moody Gardens (Aquarium only)	$9.25
Space Center Houston . . . . . adult . . $11.00 . . . .child (age 4-11) (JSC civil service employees free.)	$7.25
Space Center Houston annual pass	$18.75
Postage Stamps (book of 20)	$6.60
Entertainment Books	$20.00
Franklin Planner refills (Classic Style)	$25.50
Franklin Planner refills (Seasons and Montecello)	$30.25

Check out our new Web site on the JSC People page at: http://hro.jsc.nasa.gov/giftshop/

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.
- Sweetwater Pecans . . . . . $6.25 per lb.
- Chocolate-covered Pecans . . . . $8.00 per lb.

For additional information, please call x35350.

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

2000 The Year in Review

January

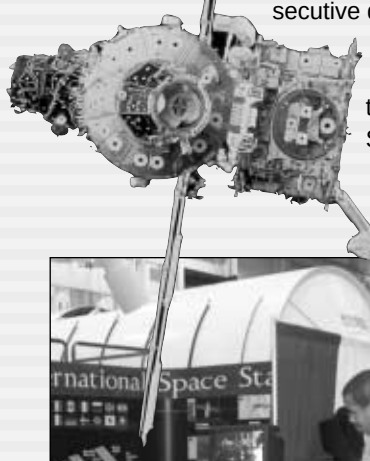
A team developing a prototype International Space Station "lifeboat" called the X-38 Crew Return Vehicle successfully flew the world's largest parafoil parachute at the U.S. Army's Yuma Proving Ground in Arizona.

February

One hundred forty-four high school students, some of whom may live on Mars one day, got a chance to plan what living and working conditions will be on the Red Planet during the second annual JSC Mars Settlement Design Competition.

October

Discovery and its STS-92 crew delivered two major station components to the orbiting outpost: the Z1 Truss (communications platform) and a new docking port. Crewmembers completed four consecutive days of space walks to complete the linkup of the two elements to the International Space Station.



March

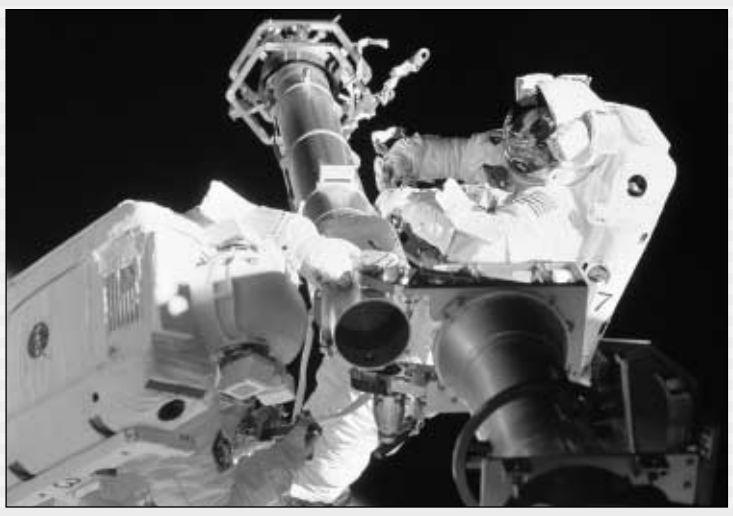
JSC Associate Director (Technical) John Young received the National Space Trophy at a black-tie celebration at Space Center Houston during which several JSC employees received Stellar Awards from the non-profit Rotary National Award for Space Achievement Foundation.

July

A Proton rocket carrying the crucial Zvezda Service Module was launched from Launch Pad 23 at the Baikonur Cosmodrome in Kazakhstan.

November

More than 2,100 professionals from industry, academia, government and the community took advantage of Inspection2000 to talk with NASA representatives and investigate opportunities to apply space technologies to their own endeavors. People from 28 countries, 42 states, U.S. Virgin Islands and Washington, D.C. preregistered to attend.



April

For the first time in the history of NASA's Reduced Gravity Student Flight Opportunities Program, community college students got a chance to fly their experiments aboard the KC-135 "Weightless Wonder." Forty-eight students from throughout Texas, but mostly from the Houston area, participated in eight teams as members of flight and ground crews.

May

Atlantis' STS-101 crew got the Memorial Day holiday off to a great start, gliding to a landing on May 29, completing a successful mission to service and supply the International Space Station.

June

An eclectic mix of ethnic performances helped JSC celebrate American Heritage Week.

August

JSC's annual community event went above and beyond when it came to illustrating the many facets of the nation's human space flight center to a record crowd of 130,000 during Open House 2000.

September

Atlantis and its seven-member STS-106 crew, five astronauts and two cosmonauts, performed a space walk to connect power, data and communications cables between the newly arrived Zvezda Service Module and the station.

December

Endeavour's STS-97 crew delivered the first U.S. solar arrays that will provide power to the station and enable the operation of the U.S. *Destiny* Lab.

PEOPLE on the MOVE

Human Resources reports the following personnel changes:

Key Personnel Assignments

Michele Brekke was named manager, Space Shuttle Customer and Flight Integration, Space Shuttle Program.

Michael Downey was selected as deputy chief, Energy Systems Test Branch, Energy Systems Division, Engineering Directorate.

Additions to the Workforce

William McArthur joins the Astronaut Office, as a mission specialist astronaut, and director of operations, Russia in Star City.

Lauren Lunde joins the Vehicle Integration Test Office, Flight Crew Operations Directorate, as a flight crew support specialist.

Derek Hassmann joins the Flight Director Office, Mission Operations Directorate, as a flight director.

Donald Reed joins the Advanced Development Office, as an aerospace engineer.

Promotions

Matrenia Anumele was selected as a contract specialist in the Projects Procurement Office, Office of Procurement.

Venessa Jankowski was selected as a contract specialist in the Institutional Procurement Office, Office of Procurement.

Sonia Zavala was selected as the division secretary in the GFE Flight Projects Office, International Space Station Program.

Reassignments to Other Centers

Jeane Smith moves to Kennedy Space Center.

Rena Perwien moves to Stennis Space Center.

David Lengyel moves to Headquarters.

Reassignments to Other Directorates

David Marquette moves from the Mission Operations Directorate to the Information Systems Directorate.

Hector Gongora moves from the Information Systems Directorate to the Center Operations Directorate.

Kenneth Dwyer moves from the Mission Operations Directorate to the Space Shuttle Program.

Mike Engle moves from the Mission Operations Directorate to the International Space Station Program.

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

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

Patty Moore moves from the Mission Operations Directorate to the International Space Station Program.

Dianne Murphy moves from the Space Shuttle Program to the International Space Station Program.

Jose Limardo-Rodriguez moves from the Engineering Directorate to the Space and Life Sciences Directorate.

Resignations

Troy Estes of the Office of the Chief Information Officer.

Christine Mack of the Office of Procurement.

Tran Tran of the Mission Operations Directorate.

Duane Johnson of the Engineering Directorate.

Donald Wiley of the Safety, Reliability, and Quality Assurance Office.

DATES & DATA

January 12

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

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, Rm. 423. All skill levels are welcome. For more information, please call James Mulberry at x39287 or James Termini at x32639.

January 17

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

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

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

January 18

Communicators meet: The Clear Lake Communicators, a Toastmasters International club, meet January 18 and 25 at 11:30 at Wyle Laboratories, 1100 Hercules, Suite 305. For more information contact Allen Prescott at (281) 282-3281or 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.

January 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.

February 1

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

February 5

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 Co. Library at 10851 Scarsdale Blvd. For more information contact Murray Clark at (281) 367-2227.

February 6

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

IAAP meets: The Clear Lake/NASA Chapter of the International Association of Administrative Professionals meets at 5:30 p.m. in the Colonial Room at Grace Community Church, 14325 Crescent Landing. Cost is $12. For more information, contact Elaine Kemp at 281-483-0556.

February 14

MAES meets: The Society of Mexican-American Engineers and Scientists meets at 11:30 a.m. in Bldg. 16, Rm. 111. For more information contact Laurie Carrillo at 281-244-5203.

Tickets on sale for 'Spaceship Rodeo' event at Space Center Houston

If you want to have the time of your life dining and dancing to the best music in town, enjoy the attractions at Space Center Houston, and visit with the Texas Independence Trailriders, then buy your tickets today for the NASA Go Texan "Spaceship Rodeo" TrailRide Dinner Dance. The event will be held from 7 p.m. to 11 p.m. February 6 at Space Center Houston.

Tickets cost $20 per person. For only $20 you receive dinner and two drinks, get to dance to Kelly McGuire and Hurricane and see the attractions at Space Center Houston plus clowns, dancers, and ropers from the Houston Livestock Show and Rodeo Speakers Committee.

Tickets can be purchased at the JSC Exchange Store in Bldg. 11 or at Space Center Houston.

Proceeds raised from the event benefit the Houston Livestock Show and Rodeo.

NASA BRIEFS

NASA ROBOTICS MAY HELP SPINAL CORD PATIENTS

NASA engineers and University of California, Los Angeles (UCLA), neurophysiologists are creating a robot-like device that could help rehabilitate thousands of Americans with spinal cord injuries.

"We are developing a prototype robotic stepper device that when complete will be used as part of rehabilitation that can potentially help some people now wheelchair-bound take their first steps," said Jim Weiss, program manager for collaborative neural repair at NASA's Jet Propulsion Laboratory (JPL), Pasadena, CA. "This system can do the work of four therapists and help monitor a patient's progress in a controlled manner."

The device, still in the development phase, will look like a treadmill with robotic arms, and will be fitted with a harness to support the patient's weight. The arms resemble knee braces that attach to the patient's leg, guiding the legs properly on the moving treadmill.

The robotic stepper device is one of several projects in the Neural Repair Program at the UCLA Brain Research Institute and JPL. UCLA neurologists now believe that by using the robotic stepper device in rehabilitation, some patients functionally confined to wheelchairs may be able to learn to walk again, and those with limited movement could improve their level of walking.

NASA and UCLA researchers emphasize the robotic stepper is still in development and is not yet ready for use in rehabilitation. However, the device could be part of clinical trials at UCLA in about three years.

"We see tremendous potential for rehabilitation that uses this form of therapy," said Dr. Reggie Edgerton, professor in the departments of physiological science and neurobiology at UCLA.

"Some rehabilitation centers around the world are starting programs that will allow therapists to train individuals affected with spinal injuries, stroke and perhaps other neuromotor disorders to improve their mobility and stepping capacity," Edgerton said. "This robotic device could help therapists in those rehabilitation efforts."

Current rehabilitation therapies are labor-intensive, and require up to four therapists. Unlike therapists, who only sense and observe a patient's progress, the robotic device takes precise measurements of the person's force, speed, acceleration, and resistance, counting each step the patient takes. These precise measurements help therapists monitor the day-to-day progress of their patients and provide valuable information on the effectiveness of the therapy. These measurements will be used by a control system that can assist the robotic stepper device as needed.

JPL robotic engineers have worked alongside therapists to develop the device, which has highly sensitive sensors that collect up to 24 different data readings of the patient's activity. The device, connected to a computer, displays the information on the screen for the therapist to monitor.

According to Weiss, the same device could also someday be useful to astronauts and help them walk safely after prolonged periods in space, such as extended missions on the International Space Station.

JPL and UCLA are actively pursuing efforts to commercialize the robotic system. JPL technically supported UCLA in filing a patent application in August.

"Many technologies developed at NASA for space exploration have tremendous medical applications. We can provide practical solutions based on our engineering experience," said Dr. Antal Bejczy, senior research scientist and lead engineer on the robotic stepper device at JPL.

SPACE CENTER Roundup

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