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SPACE CENTER Roundup

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Expedition crew rotation highlights upcoming shuttle mission

Highlights of upcoming space shuttle mission STS-102 (International Space Station Assembly Flight 5A.1) include launch of the second resident crew to live aboard the ISS and delivery of the Leonardo Multi-Purpose Logistics Module (MPLM) to the space station. STS-102 will be the seventh space shuttle mission in support of assembly of the ISS.

The primary objective of the mission is to deliver and integrate the 5A.1 launch package into the orbiting ISS Stage 5A, including ISS crew rotation of three crewmembers. In addition to the Leonardo MPLM, the launch package consists of the Integrated Cargo Carrier (ICC), two Assembly Power Converter Units and gas can experiments in the orbiter cargo bay, and ISS equipment and supplies in the orbiter crew compartment.

The MPLM is a pressurized module that transports the U.S. Lab system racks, resupply/return stowage platforms, resupply stowage racks, and the Human Research Facility international standard payload rack to the ISS. The ICC carries the Pump Flow Control Subsystem, the Laboratory Cradle Assembly, the External Stowage Platform and the rigid umbilical, which will be installed onto the ISS during two scheduled space walks.

" ISS Flight 5A.1 will see a lot of 'firsts' for the International Space Station Program," said Bernestine Dickey, NASA 5A.1 launch package manager. "It will be the first crew rotation flight, the first flight of Multi-Purpose Logistics Module Flight Module 1 Leonardo, the first flight of a dedicated payload facility–the Human Research Facility, the first flight of the ISS long-term logistics plan to provide an on-orbit stowage capability for unpressurized spares–the External Stowage Platform, and the first flight where the Payload Operations Integration Facility at Marshall Space Flight Center becomes operational.

"Steve Prejean, the Boeing launch package manager, and I have been very fortunate to have worked with such a great and talented 5A.1 Launch Package Team consisting of hardware developers and cargo integrators from the many NASA and contractor organizations. All were instrumental in the development of this flight."

The STS-102 crew aboard *Discovery* includes Mission Commander Jim Wetherbee, making his fifth flight; Pilot James Kelly (first flight); and mission specialists Andy Thomas (fourth flight) and Paul Richards (first flight). In addition, Expedition Two Commander Yury Usachev, Expedition Two Flight Engineer James Voss and Expedition Two Flight Engineer Susan Helms will be aboard and will replace Expedition One Commander Bill Shepherd, Expedition One Soyuz Commander Yuri Gidzenko and Expedition One Flight Engineer Sergei Krikalev on the ISS, all of whom will return with the rest of the STS-102 crew.

The crew will install the MPLM onto the ISS over the course of two planned space walks during docked operations. During the space walks, the crew will prepare the MPLM for transfer, install hardware needed for ISS Assembly Flight 6A, and deliver spare parts to the space station.

Tasks planned for the first space walk, to be conducted by Voss and Helms, include removing an early communications antenna and disconnecting umbilicals from Portable Mating Adapter 3 so that it can be moved from the bottom-facing port on Unity to its left-facing port. The PMA will be moved at the end of the first space walk. The MPLM will be moved to the recently vacated bottom-facing port on Unity the next day.

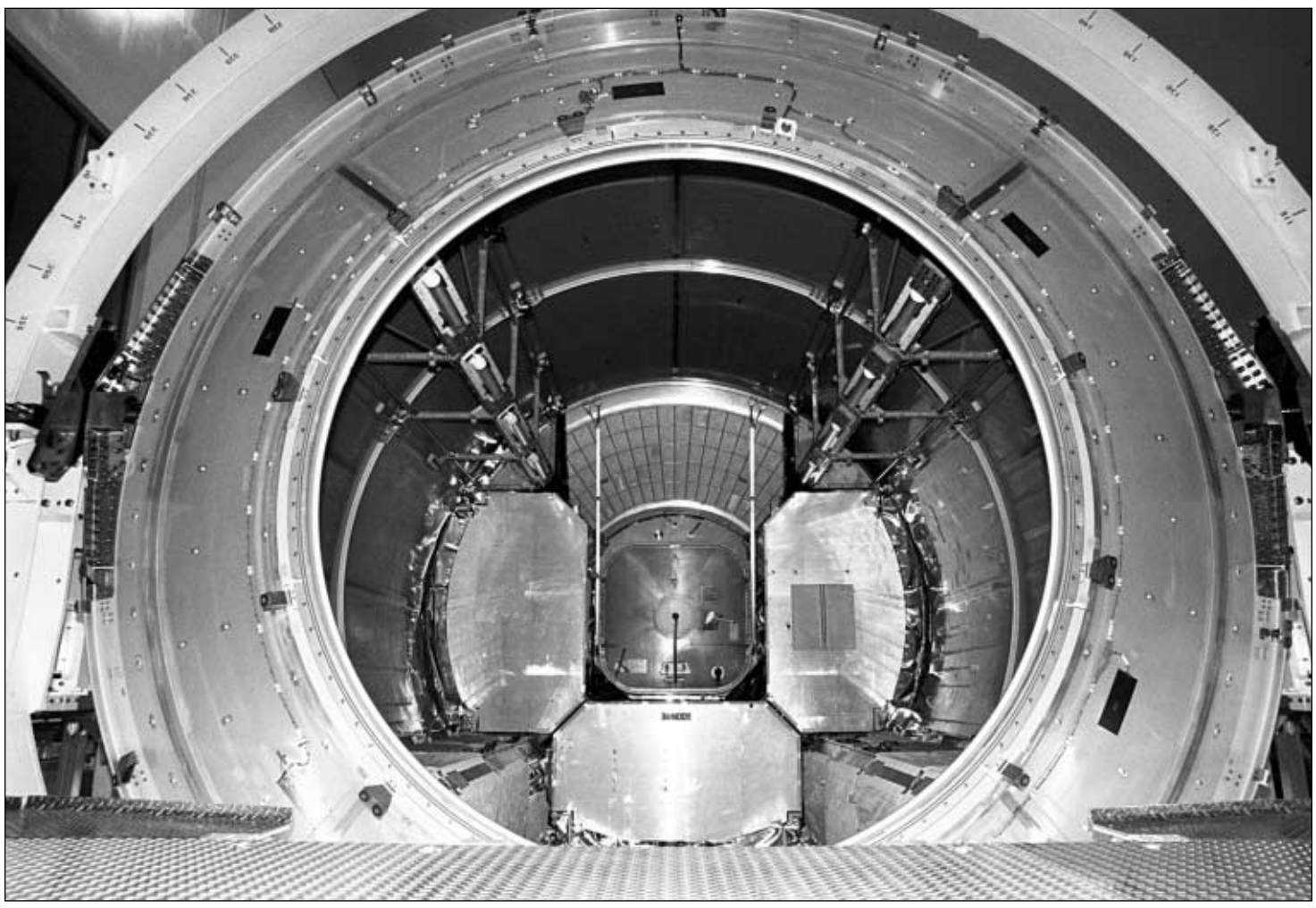
During the second space walk, Richards and Thomas will throw power switches to power the MPLM from station power supplies in the Lab. After the second space walk, the shuttle's robotic arm will be used to place the MPLM back into the payload bay.

This mission will be the first shuttle docking to the ISS that will occur along the velocity vector or +VBAR. The velocity vector points in the direction of motion of the ISS as it follows its orbit. The ISS will nominally maneuver to the docking attitude approximately two hours before docking. In this attitude, the Zvezda Service Module navigational light will be visible to the orbiter through the night period for use as a back-up navigational aid to the shuttle rendezvous radar sensor. The rendezvous radar supplies relative range, velocity, and angle data to the shuttle's on-board Guidance, Navigation, and Control computers.

During their nearly five-month stay aboard the ISS, the Expedition Two crew will install and conduct tests on the Canadian-made Space Station Remote Manipulator System, unload the Italian-made logistics module, conduct internal and external maintenance tasks, and conduct medical and science experiments. The SSRMS is scheduled to be delivered to the space station in April during STS-100 (ISS Assembly Flight 6A). In June, the STS-104 (ISS Assembly Flight 7A) crew will deliver the Joint Airlock, which will be added to the space station. Helms will be the SSRMS operator, taking the Airlock from the shuttle and berthing it to the space station.

The Expedition Two crew will conduct an internal EVA during the stage between 5A.1 and 6A to move the docking cone (a special hatch that is also used for docking) that was used for the Service Module docking to the nadir port on the SM transfer compartment. This activity will support future docking of the Russian Docking Compartment, which is also the Russian EVA Airlock, currently scheduled to be launched and docked to the space station after the STS-104 mission. This internal EVA will be

Please see **EXPEDITION CREW ROTATION**, Page 3



The inside of Leonardo, the first Multi-Purpose Logistics Module for the International Space Station, is seen after the end cap is removed. It is one of three from Alenia Spazio and will be operated by NASA and supported by ASI, the Italian space agency. The MPLMs will be carried in the payload bay of a shuttle orbiter and will provide storage and additional work space for up to two astronauts when docked to the ISS. Leonardo is scheduled to be launched on STS-102 in March.

High-tech rescue vehicle on the way.

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Space flight pioneer recounts storied life.

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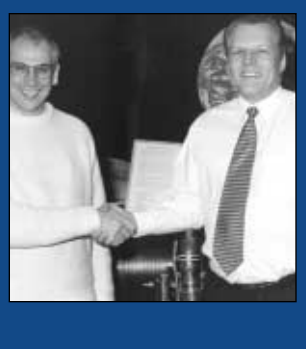

White Sands wins quality award.

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Italy's Multi-Purpose Logistics Modules serve as station's 'moving vans'

Built by the Italian Space Agency (ASI), the Leonardo Multi-Purpose Logistics Module is the first of three such pressurized modules that will serve as the International Space Station's "moving vans," carrying laboratory racks filled with equipment, experiments and supplies to and from the station aboard the space shuttle.

The unpiloted, reusable logistics modules function as both a cargo carrier and a space station module when they are flown. Mounted in the space shuttle's cargo bay for launch and landing, they are berthed to the station using the shuttle's robotic arm after the shuttle has docked. While berthed to the station, racks of equipment and supplies are unloaded from the module and then old racks and equipment may be reloaded to be taken back to Earth. The logistics module is then detached from the station and positioned back into the shuttle's cargo bay for the trip back to Earth. When in the cargo bay, the cargo module is independent of the shuttle cabin, and there is no passageway for shuttle crewmembers to travel from the shuttle cabin to the module.

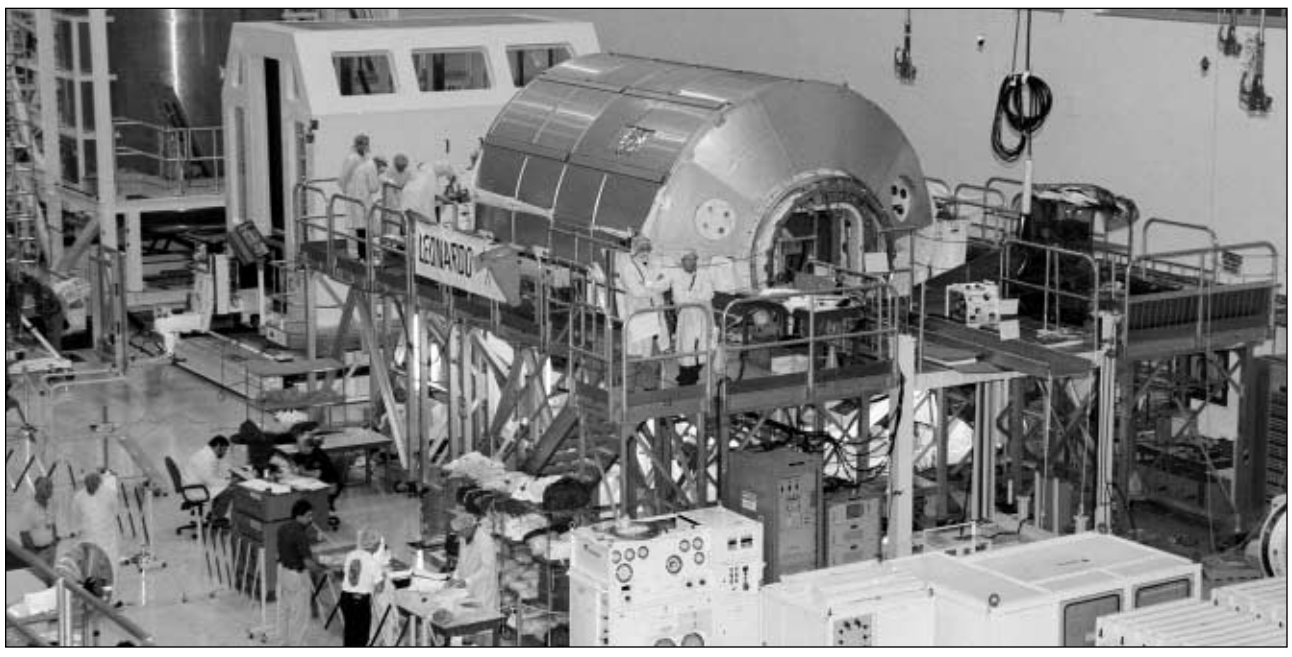
To function as an attached station module and as a cargo transport, the logistics modules also include components that provide some life support, fire detection and suppression, electrical distribution and computer functions. Eventually, the modules also will carry refrigerator freezers for transporting experiment samples and food to and from the station. Although built in Italy, the logistics modules, technically known as Multi-Purpose Logistics Modules or MPLMs, are owned by the U.S. and provided in exchange for Italian access to U.S. research time on the station.

For STS-102, Leonardo will be filled with equipment and supplies to outfit the U.S. Laboratory Destiny, which was carried to the station during STS-98.

Construction of ASI's Leonardo module began in April 1996 at the Alenia Spazio factory in Turin, Italy. Leonardo was delivered to Kennedy Space Center from Italy in August 1998 by a special Beluga cargo aircraft. The cylindrical module is about 21 feet long and 15 feet in diameter, weighing almost 4.1 metric tons. It can carry up to 9.1 metric tons of cargo packed into 16 standard space station equipment racks. Of the 16 racks the module can carry, five can be furnished with power, data and fluid to support a refrigerator freezer.

The names of the other two MPLMs are Raffaello and Donatello. The Italian Space Agency chose the names of the modules because they denote some of the great talents in Italian history. Leonardo da Vinci, an extraordinary inventor-scientist, civil engineer, architect, artist, and military planner and weapons designer; Donato de Betto di Bardi Donatello, Florentine sculptor and one of the founders of modern sculpture; and Raffaello Sanzio, an artist whose work stands alone for its visual achievement of human grandeur.

"Alenia Spazio completed the construction of Raffaello in summer 1999 and delivered it to KSC on August 13, while Donatello was delivered to KSC on Feb. 1 this year," said Dr. Saverio Lioy who served as the Alenia infrastructure manager during the MPLM development. "The partnership between NASA and ASI and respective prime contractors Boeing and Alenia Spazio was excellent and provided a solid background for the continuation on the other programs presently ongoing like Nodes 2 and 3, the Automated Transfer Vehicle and the Cupola." ■



Workers in the Space Station Processing Facility work on Leonardo, the Multi-Purpose Logistics Module.

Expedition 2 Crew

James Voss
Expedition Two Flight Engineer

NASA Astronaut James Voss (Colonel, USA, Ret.) was born on March 3, 1949, in Cordova, Alabama, but considers Opelika, Alabama, to be his hometown. He received a bachelor of science degree in aerospace engineering from Auburn University in 1972, and a master of science degree in aerospace engineering sciences from the University of Colorado in 1974. Voss has been working at JSC since November 1984. Selected as an astronaut candidate by NASA in June 1987, Voss completed a one-year training and evaluation program in August 1988, which qualified him for assignment as a mission specialist on space shuttle flights. He has worked as a flight crew representative in the area of shuttle safety, as a CAPCOM, providing a communications interface between ground controllers and flight crews during simulations and shuttle flights, and as the Astronaut Office training officer. A veteran of four space flights, Voss has logged over 600 hours in space. He flew as a mission specialist on STS-44 in 1991 and STS-53 in 1992, and was the payload commander on STS-69 in 1995. He last flew as a mission specialist on STS-101 in 2000. His honors include the NASA Outstanding Leadership Award (1996), NASA Exceptional Service Medal (1994), and four NASA Space Flight Medals.

Yury Usachev
Expedition Two Commander

Expedition Two Commander Yury Usachev was born on Oct. 9, 1957, in Donetsk, Rostov, on Don Region, Russia. He graduated from Moscow Aviation Institute with an engineering diploma in 1985. Upon graduation, he went to work for Energia, participating in groups working with EVA training, future construction in space, public relations, and ergonomics. In 1989, he was appointed to the position of cosmonaut candidate at the Cosmonaut Training. From 1989 to 1992, he underwent a course of general space training. He was a member of the back-up crew for the Mir-13, 14, and 19 missions. From Jan. 8, 1994, to July 9, 1994, he served as board engineer on Space Station Mir. From Feb. 21 to Sept. 2, 1996, he again served as board engineer Mir-21. One month later, he and Yuri Onufrienko were joined by Shannon Lucid. Most recently, he served on the crew of STS-101, the third shuttle mission devoted to International Space Station construction. Altogether, he has logged more than 385 days in space and has participated in six space walks. He was awarded both the Hero of the Russian Federation and the Pilot/Cosmonaut medals after his first space flight in 1994. After his second flight, in 1996, he was awarded the Order of Service to the Country, Level III. He was also named a Chevalier in the French Honor Legion. NASA has awarded him the NASA Medal for Public Service and a NASA Space Flight Medal.

Susan Helms
Expedition Two Flight Engineer

NASA Astronaut Susan J. Helms (Colonel, USAF) was born on Feb. 26, 1958, in Charlotte, North Carolina, but considers Portland, Oregon, to be her hometown. Helms graduated from the U.S. Air Force Academy in 1980 with a bachelor of science degree in aeronautical engineering. She received her commission and was assigned to Eglin Air Force Base, Florida, as an F-16 weapons separation engineer with the Air Force Armament Laboratory. In 1982, she became the lead engineer for F-15 weapons separation. She received a master of science degree in aeronautics/astronautics degree from Stanford University in 1985. In 1987, she attended the Air Force Test Pilot School at Edwards Air Force Base, Calif. After completing one year of training as a flight test engineer, Helms was assigned as a USAF exchange officer to the Aerospace Engineering Test Establishment, Canadian Forces Base, Cold Lake, Alberta, Canada, where she worked as a flight test engineer and project officer on the CF-18 aircraft. Selected by NASA in January 1990, Helms became an astronaut in July 1991. A veteran of four space flights, Helms has logged over 1,096 hours in space. She is the recipient of the Distinguished Superior Service Medal, the Defense Meritorious Service Medal, the Air Force Meritorious Service Medal, the Air Force Commendation Medal, four NASA Space Flight Medals, and the NASA Outstanding Leadership Medal.

Expedition Two Science

With the addition of the US Laboratory Destiny this month, scientists are poised to begin a new era of space-based research aboard the International Space Station. Flight 5A.1 will deliver the first facility-class payload, the Human Research Facility, and a suite of radiation experiments. Flight 6A will deliver the first two EXpedite the PRocessing of Experiments to Space Station (EXPRESS) racks and a host of subrack experiments.

The experiments conducted during Expedition Two will characterize the ISS microgravity and radiation environments, test active rack isolation equipment, grow large protein crystals for pharmaceutical and materials processing applications, and photograph geological and meteorological events on Earth.

Increment Two also adds the Payload Operations Integration Center at Marshall Space Flight Center with five cadre teams to support round-the-clock operations. By Flight 6A, three Telescience Support Centers (at JSC, MSFC and Glenn Research Center) and remote sites around the country will be online. These include Boeing-Houston, Boeing-Seattle, Harvard University, the University of Alabama Birmingham, the University of California - San Diego, the University of Colorado - Boulder and the University of Wisconsin.

Increment Two NASA payloads

Human Research Facility
- Dosimetric Mapping
- Bonner Ball Neutron Detector
- Hoffman-Reflex
- Phantom Torso
- Interactions

EXPRESS Rack 1
- Advanced Astroculture
- Microgravity Acceleration Measurement System
- Space Acceleration Measurement System
- Commercial Generic Biotechnology Apparatus
- Protein Crystal Growth–Single Thermal Enclosure System
- Commercial Protein Crystal Growth

EXPRESS Rack 2
- ARIS–ISS Characterization Experiment (ARIS-ICE)
- Physics of Colloids in Space

Stowed or Deployed Payloads
- Crew Earth Observations
- Earth Knowledge Acquired by Middle Schools (EarthKAM)
- Protein Crystal Growth–-Biotechnology Ambient Generic

Station truss segments arrive at Ellington Field

NASA JSC 2001e03693 Photo by Bill Stafford

STATION TRUSS TEST SEGMENTS ARRIVE AT ELLINGTON FIELD—The integrated Port 3 and Port 4 (P3/P4) space station truss Static Test Article is unloaded from the Super Guppy at Ellington Field. The P3/P4 STA will be transported to Bldg. 924 at the Sonny Carter Training Facility for outfitting, and then delivered to the JSC Vibration and Acoustic Test Facility in Bldg. 49, where it will undergo acoustic verification testing. Upon completion of the acoustic test program, the P4 protoflight portion of the STA will be refurbished to form the S6 flight element.

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Expedition crew rotation

performed in Orlans (Russian spacesuits). (A glitch that recently occurred with the Orlans is expected to be resolved.)

Expedition Two crewmembers will activate the Russian Docking Compartment during two scheduled EVAs. These space walks, to be conducted during the stage between 7A and 7A.1, will be performed in Orlans using the compartment as the airlock. The first of these EVAs will be performed by Usachev and Voss, the second by Usachev and Helms.

The Expedition Two crew is the first to complete training on tasks associated with conducting an EVA out of the Joint Airlock in a U.S. Extravehicular Mobility Unit. The crew used the Joint Airlock Facility in the Space Station Mockup Training Facility in Bldg. 9 to practice all EMU preparation and deferral activities including EMU checkout, EMU donning, Airlock depress and repress, EMU doffing and EMU water recharge. While the 7A shuttle crew will be the first crew to perform an EVA from the Joint Airlock, the Increment Two crew would also use it in the event of an unscheduled EVA during the 7A to 7A.1 stage.

The Expedition Two crew received training in Simplified Aid for Extravehicular Rescue, or SAFER, procedures in the Virtual Reality Lab and in EMU caution and warning use in a simulator in Bldg. 4. As a final "dress rehearsal" for their EMU tasks, crewmembers participated in a vacuum chamber run in which they suited up in flight EMUs and interfaced with qualified airlock hardware.

Each Expedition crew is trained to respond to a number of unscheduled tasks that can occur on orbit. Unscheduled EVA task training includes virtual reality sessions, Neutral Buoyancy Lab runs, and air-bearing floor mass-handling sessions. These consist of deferrable tasks for shuttle missions and maintenance tasks in the event of an onboard failure of an orbital replacement unit.

The Expedition Two crew officially began training on Sept. 15, 1997. In addition to their EVA training, crewmembers spent about three weeks training in Canada to operate the SSRMS. The crew trained in many facilities at JSC including the Space Station Training Facility as well as the Multiuse Remote Manipulator Development Facility in Bldg. 9.

The Expedition Two crewmembers will live aboard the ISS until mid-year. Their return trip, STS-105 (ISS Assembly Flight 7A.1), is currently scheduled for July.

At *Roundup* press time, *Discovery* was scheduled for launch on March 8. Mission duration is 11 days. ■

At the Shuttle Landing Facility, workers begin offloading Raffaello, the second Multi-Purpose Logistics Module for the International Space Station, from the "Beluga" Super Transporter that brought it from Italy. Weighing nearly 4.5 tons, the module measures 21 feet long and 15 feet in diameter.

Approaching the station

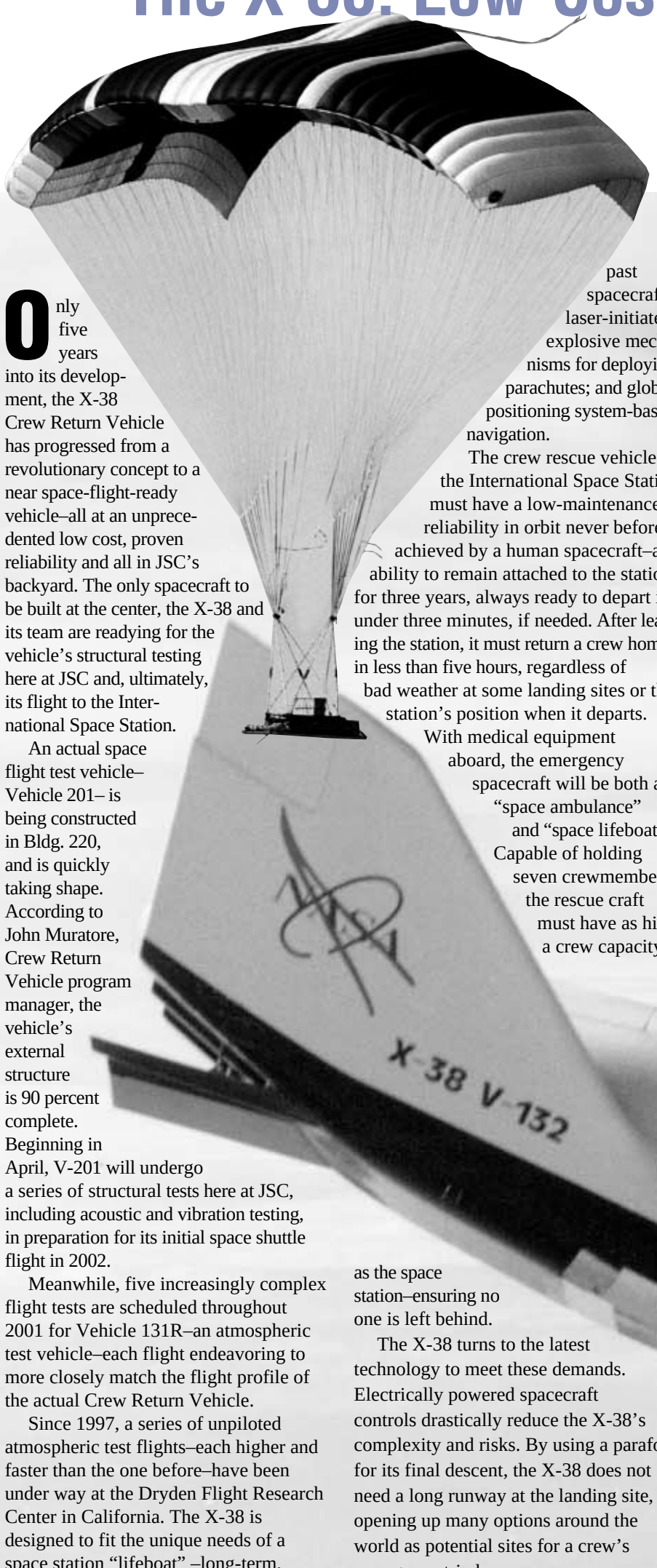
On the day of rendezvous, the shuttle will approach from behind and below the ISS. When the relative range to the ISS is approximately 2,000 feet, STS-102 Commander Jim Wetherbee will assume manual trajectory control until docking. At this time, the shuttle will transition to approach along the ISS +Rbar (the Rbar is the radius vector, with the origin at the ISS and positive toward the center or the Earth) until it reaches a range of 500 feet. At 500 feet on the +Rbar, the shuttle will initiate a 90-degree flyaround from the ISS +Rbar (below the ISS) to the +VBAR (in front of the ISS). This flyaround, known as the TORVA (Twice Orbit Rate to VBAR Approach), takes approximately 12 minutes to perform and the shuttle approaches from 500 feet to 300 feet during this phase.

The shuttle will continue its approach along the +VBAR and must stay within an 8-degree corridor once inside 250 feet. The approach corridor and relative range is measured from the ISS docking port to the shuttle docking port.

Previous ISS docking missions required docking to occur while passing over a Russian ground station so that commands could be uplinked to the ISS immediately after docking. Since a crew will be inhabiting the ISS, this ground command capability is no longer required, thereby eliminating the need to stop at 170 feet to set up conditions for a Russian ground station pass. The shuttle will stop for about five minutes at 30 feet to view the ISS docking target through the centerline camera and make any necessary attitude alignment adjustments before docking. The shuttle will then proceed along the +VBAR within a 5-degree corridor to dock to the PMA-2 docking port, traveling at slightly more than 1 inch per second at contact.

The X-38: Low-Cost, High-Tech Space Rescue

A Reliable Lifeboat and Ambulance for the International Space Station



Only five years into its development, the X-38 Crew Return Vehicle has progressed from a revolutionary concept to a near space-flight-ready vehicle–all at an unprecedented low cost, proven reliability and all in JSC's backyard. The only spacecraft to be built at the center, the X-38 and its team are readying for the vehicle's structural testing here at JSC and, ultimately, its flight to the International Space Station.

An actual space flight test vehicle–Vehicle 201– is being constructed in Bldg. 220, and is quickly taking shape. According to John Muratore, Crew Return Vehicle program manager, the vehicle's external structure is 90 percent complete. Beginning in April, V-201 will undergo a series of structural tests here at JSC, including acoustic and vibration testing, in preparation for its initial space shuttle flight in 2002.

Meanwhile, five increasingly complex flight tests are scheduled throughout 2001 for Vehicle 131R–an atmospheric test vehicle–each flight endeavoring to more closely match the flight profile of the actual Crew Return Vehicle.

Since 1997, a series of unpiloted atmospheric test flights–each higher and faster than the one before–have been under way at the Dryden Flight Research Center in California. The X-38 is designed to fit the unique needs of a space station "lifeboat" –long-term, maintenance-free reliability that is always in "turnkey" condition, ready to provide the crew a quick, safe trip home under any circumstance.

In addition to contributions from companies and NASA centers coast-to-coast, international space agencies are participating with the United States in the X-38's development. Contributions to the X-38 are being made by Austria, Germany, Belgium, Italy, The Netherlands, France, Spain, Sweden and Switzerland and 22 companies throughout Europe.

Pushing the Edge: Something New, Something Old

The X-38 couples a proven shape, taken largely from Air Force's X-24A project from the 1970s, with dozens of new technologies–the world's largest parafoil parachute; the first all-electric spacecraft controls; flight software developed in a quarter of the time required for past spacecraft; laser-initiated explosive mechanisms for deploying parachutes; and global positioning system-based navigation.

The crew rescue vehicle on the International Space Station must have a low-maintenance reliability in orbit never before achieved by a human spacecraft–an ability to remain attached to the station for three years, always ready to depart in under three minutes, if needed. After leaving the station, it must return a crew home in less than five hours, regardless of bad weather at some landing sites or the station's position when it departs.

With medical equipment aboard, the emergency spacecraft will be both a "space ambulance" and "space lifeboat." Capable of holding seven crewmembers, the rescue craft must have as high a crew capacity as the space station–ensuring no one is left behind.

The X-38 turns to the latest technology to meet these demands. Electrically powered spacecraft controls drastically reduce the X-38's complexity and risks. By using a parafoil for its final descent, the X-38 does not need a long runway at the landing site, opening up many options around the world as potential sites for a crew's emergency trip home.

Low-Maintenance Reliability: A Safe Trip Home in Minutes

Mission Scenario: Because of illness, a station emergency, or a lack of available transportation, the International Space Station crew enters an X-38 rescue craft and undocks–in less than three minutes, if necessary, or within 30 minutes under less pressing circumstances. Ground control provides landing site information, or, if needed, the entire descent could be performed without communications. Within three hours, the engines are fired to deorbit, and the deorbit module is then jettisoned. The rescue vehicle enters the atmosphere at an altitude of about 80 miles, traveling 18,000 miles per hour, half a world away from touchdown. As it descends, the wingless craft generates lift with its body and maneuvers to fly to the landing site. As air pressure increases, body flaps and rudders steer. At 23,000 feet, an 80-foot diameter drogue parachute deploys. As the craft stabilizes, the giant main parafoil begins it deployment and the drogue cuts away. The parafoil slowly opens in five stages to ensure a gentle descent. Winches pull on lines to steer the parafoil, in the same way a skydiver steers, to the landing site. Landing skids deploy and the craft touches down, dropping at less than five miles an hour with a forward speed of about 40 miles per hour.

Taking Flight: Testing Reduces Risks and Costs

An Unprecedented Efficiency: The X-38 project is developing a prototype rescue spacecraft for less than a tenth of the cost of past estimates for such a vehicle. Development of the X-38 through the flight of an unpiloted space vehicle in 2002 is estimated to cost about $150 million. Previous estimates for the development of other station rescue concepts have ranged as high as $2 billion. The estimated cost of the entire X-38 project, from development through the construction of four operational spacecraft, ground simulators, spare parts, landing site support facilities and control center capabilities, is less than $1 billion. To keep costs low, the X-38's innovative, high-tech development approach uses computerized design, automated fabrication and computerized, laser inspection of many components for the space test vehicle now under construction at JSC. Rather than seeking early commercial bids on the spacecraft's design, in-depth development and testing of the X-38 is being done largely "in house" by NASA civil servants. The unusual approach allows NASA personnel to gain a superior understanding of the design, costs, tests, and risks associated with the spacecraft before seeking commercial bids, increasing efficiency.

Put to the Test: Testing of the X-38 has been under way since 1995, when over 300 subscale flight tests of the parafoil and lifting body began. Large-scale flight testing began in 1997 when the first X-38 atmospheric test vehicle was flown on "captive carry" tests under the wing of a B-52 aircraft at NASA's Dryden Flight Research Center. The same vehicle flew in the first free flight tests in 1998. A second, more sophisticated test vehicle first flew in March 1999 and, in March 2000, completed a flight from 39,000 feet that intercepted the trajectory of a vehicle returning from space for the first time. At the U.S. Army's Yuma Proving Ground in Arizona, the X-38 team successfully tested the largest parafoil ever produced, 7,500 square feet, in February 2000. Flight tests that increase in complexity and altitude will continue through at least 2001 with two more X-38 atmospheric test vehicles, leading up to the first X-38 flight in space in the spring of 2002. The X-38 space test vehicle is already under construction at JSC. The unpiloted space vehicle will be carried to orbit in the payload bay of the space shuttle, released using the shuttle's robotic arm and then descend to landing.

A National and International Partnership: The X-38 draws upon talents and expertise coast to coast in the United States and throughout Europe. Led by JSC, NASA facilities include: flight testing at the Dryden Flight Research Center, CA; development of the Deorbit Propulsion System at the Marshall Space Flight Center in Huntsville, AL; tile manufacturing and launch processing at the Kennedy Space Center, FL; communications equipment from the Goddard Space Flight Center, MD; wind tunnel testing at the Langley Research Center, Hampton, VA; aerothermal analysis by the Ames Research Center, CA; and electromechanical actuator consultation from the Lewis Research Center, OH. In addition, the U.S. Army provides testing support at the Yuma Proving Ground, AZ; the U.S. Air Force has provided in-flight simulation support; and Sandia National Laboratories, NM, has provided parachute systems expertise.

Companies that have major roles in the project include: Scaled Composites, Inc., of Mojave, CA, construction of the atmospheric test vehicle aeroshells; Aerojet Gen Corp. of Sacramento, CA, construction of the space test vehicle's Deorbit Propulsion Module; Honeywell Space Systems, Houston, TX, development of the flight software; and Pioneer Aerospace, Inc., of Columbia, MS, fabrication of the parafoil. In addition, the German Space Agency and the European Space Agency play major roles. ■

X-38 By The Numbers

Length:	**30 feet**
Width:	**14.5 feet**
Cabin:	**438 cubic feet**
Mass:	**25,000 pounds**
Crew size:	**7**
Mission duration:	**Up to 3 years**
Launch time:	**As low as 3 minutes**

Deorbit Propulsion System

Length:	**6 feet**
Width:	**15.5 feet**
Mass:	**6,000 pounds**

Parafoil

Area:	**7,500 square feet**
Span:	**143 feet**
Deploy altitude:	**23,000 feet**

X-38 Technology:

Expanding the Envelope of Spacecraft Design

Electromechanical Actuators Small electric motors that weigh only 10 pounds — yet are powerful enough to move with five tons of force in a fraction of a second — replace complicated conventional hydraulic systems to power the X-38's flaps and rudders. Hydraulic systems account for up to 25 percent of the annual maintenance on commercial aircraft, and the electrical actuators on the X-38 serve as a forerunner for a technology that has the potential to make flight simpler and safer not only in space but also on Earth.

Laser-Initiated Pyrotechnics Never before used on a human spacecraft, the explosive charges that deploy the X-38's parachutes are fired using a system of fiber optics and lasers. Using light instead of electricity simplifies the system and reduces the potential for interference during the extended stays the X-38 will experience in orbit.

Landing Skids Rather than temperature-sensitive tires, the X-38 uses simple skids as landing gear, eliminating the need to watch inflation pressures, brakes, or other complex mechanisms during the years it spends in space.

Navigation The X-38 uses compact Global Positioning System and electronics technology for its primary navigation system — never before used as the primary navigation equipment on a human spacecraft. The GPS navigation system designed for the X-38 already has been flight-tested as a payload aboard the shuttle.

Lifting Body The X-38's special lifting body shape — a shape that creates lift so the craft can fly even though it has no wings — is a modified version of a shape tested by the Air Force in the late 1960s and early 1970s. The Air Force's previous testing has reduced the costs associated with the X-38. The lifting body shape gives the X-38 the capability to fly to a landing site during its descent, increasing the number of possible landing sites. Two movable fins and body flaps provide steering for the spacecraft as it descends into the atmosphere. The shape is compact enough to fit within the shuttle's payload bay for launch, but it is still large enough to hold a crew of seven.

Parafoil A 7,500-square-foot parafoil, the world's largest, allows the X-38 to have great flexibility to get a crew back to Earth quickly with dozens of potential landing sites available around the world, eliminating the need for a miles-long runway to accommodate high-speed landings similar to the space shuttle. Using the parafoil to glide to its final descent, the X-38 touches down at under 40 miles per hour and skids to a stop in only 150 feet. The giant X-38 parafoil, almost one and a half times as large as the wings of a 747 jumbo jet, may be a technology that finds other uses, on future spacecraft as well as on Earth for any need that requires precise landings, such as airdrops of humanitarian aid.

Life Support For reliability, the X-38's life support system uses proven, simple technologies: Lithium batteries already used on many shuttle-deployed satellites provide electricity. Active cooling of the cabin and electronics is provided by a sublimator technology first used on the Apollo lunar lander. Carbon dioxide is scrubbed from the cabin air using lithium hydroxide canisters that have operated virtually problem-free on all human spacecraft. The fire extinguishing system uses technology commonly found on advanced fighter aircraft. And the communications system is identical to technologies used on most NASA satellites. As a custom-built rescue craft, the X-38 can provide a normal sea-level pressure atmosphere for seven crewmembers for at least nine hours, twice as long as is required for a worst-case return to Earth.

Crew Cabin The station "lifeboat" will hold a crew of seven — the entire crew of the space station, ensuring no one is left behind in an emergency — and be capable of returning them to Earth automatically. The crew will be able to take over manual control of some functions, such as selecting a landing site and steering the parafoil during final descent. The crew will land in a supine position and be subjected to minimal forces during landing to protect any member that may be sick, injured or deconditioned from long exposure to weightlessness. The crewmembers can monitor the operation of an X-38 rescue vehicle and manually take over functions using color display screens and controls. The cabin is windowless; exterior views are provided to the crew by television cameras.

X-38 Operations Timeline Calendar

March 8, 2001
Entry Simulation 2 for Vehicle 201
JSC Mission Control Center, Houston, TX

March 13, 2001
7500-Square-Foot Parafoil Drop Test
Yuma Army Proving Grounds, Yuma, Az

April 5, 2001
Vehicle 201 Structures Test (13 weeks)
July 4, 2001
Building 13, JSC, Houston, TX

April 5, 2001
Free Flight 2 of Vehicle 131R
Dryden Flight Research Center
Edwards Air Force Base, CA

April 19, 2001
Entry Simulation 3 for Vehicle 201
JSC Mission Control Center, Houston, TX

June 6, 2001
Free Flight 3 of Vehicle 131R
Dryden Flight Research Center
Edwards Air Force Base, CA

July 18, 2001
7500-Square-Foot Parafoil Drop Test
San Nicholas Island, CA

August 13, 2001
Vehicle 201 Modal Test (5 weeks)
September 14, 2001
2001 Building 13, JSC, Houston, TX

August 23, 2001
Free Flight 4 of Vehicle 131R
Dryden Flight Research Center
Edwards Air Force Base, CA

October 16, 2001
7500-Square-Foot Parafoil Drop Test
Yuma Army Proving Grounds, Yuma, AZ

October 23, 2001
7500-Square-Foot Parafoil Drop Test
San Nicholas Island, CA

November 5, 2001
Vehicle 201 EMI Test (1 week)
November 16, 2001
Building 14, JSC, Houston, TX

November 19, 2001
Vehicle 201 Free Modal Test (8 weeks)
January 11, 2002
Building 13, JSC, Houston, TX

December 6, 2001
Free Flight 5 of Vehicle 131R
San Nicholas Island, CA

January 28, 2002
Vehicle 201 Acoustic Test (5 weeks)
March 01, 2002
Building 49, JSC, Houston, TX

February 21, 2002
Transonic Free Flight 6 of Vehicle 131R
Dryden Flight Research Center,
Edwards Air Force Base, CA

March 4, 2002
Vehicle 201 Thermal/Vacuum Test (3 weeks)
March 22, 2002
Building 32, JSC, Houston, TX

March 27, 2002
Ship Vehicle 201 to KSC
Kennedy Space Center, FL

August 15, 2002
Space Flight of Vehicle 201 Aboard
STS-118 (*Columbia*)
February 03, 2003
Kennedy Space Center, FL

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

JSC Tuesday announced crews for the Space Shuttle Approach and Landing Test (ALT), the initial flight test of the Shuttle Program. The ALT tests are scheduled to begin in mid-1977.

Two 2-man crews were named. They are: Fred W. Haise, Jr., commander, and Charles G. Fullerton, pilot; Joe H. Engle, commander, and Richard H. Truly, pilot. Both crews are scheduled to fly ALT missions with Haise and Fullerton making the first flight.

The ALT flights will be conducted at the NASA Dryden Flight Research Center in California. The Orbiter will be carried aloft to an altitude of about 25,000 feet atop a specially modified 747 aircraft. It will then be released allowing the crew to fly the Orbiter to the ground. Several unmanned and manned non-release flights will precede the initial "free flight" of the Orbiter.

1 9 8 6

A team of NASA and university scientists observing Comet Halley in December 1985 has made the first direct confirmation of water in a comet.

The discovery, the first definite detection of neutral water in any comet, lands new support to astronomers' widely held theory that comets are "dirty snowballs" composed primarily of frozen water. The theory was first developed by astronomer Fred

Whipple in 1951, but has only received indirect corroboration to date through discoveries of atoms such as oxygen and hydrogen, molecules such as OH and ions such as H20+, supposed to be the by-products of underlying ice.

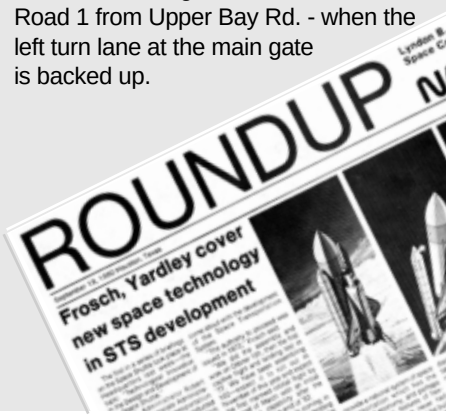
"This is our first direct confirmation that neutral water is the dominant molecular species in a comet," explained Dr. Michael Mumma, head of the Planetary Systems Branch, Goddard Space Flight Center, Greenbelt, Md. The observations were made using a University of Arizona telescope aboard NASA's Kuiper Airborne Observatory, a modified C-141 Starlifter.

1 9 9 1

JSC Security Operations Branch Chief Bob Gaffney can't explain it, but JSC employees apparently would rather wait in line at the center's main gate than drive right in through the next NASA Road 1 gate.

Security began opening the second NASA Road 1 gate at 6:45 a.m. about three weeks ago in an effort to alleviate early morning traffic tie-ups at the main gate.

Gaffney encourages drivers to break out of their early morning habit and use the Third Street gate - across NASA Road 1 from Upper Bay Rd. - when the left turn lane at the main gate is backed up.


ROUNDUP
Frosch, Yardley cover new space technology in STS development

Applications due for NASA Exchange-JSC Scholarship

The NASA Exchange-JSC maintains a college scholarship fund to provide financial assistance for dependents of JSC employees (civil service or reimbursable detailee) to attend college. This year, the Exchange Council intends to award two scholarships.

Scholarship support of up to $4,000 will be provided in the amount of $400 per academic semester, $250 per academic quarter, and $200 per summer session, or as the Exchange Council shall determine. The amount, however, will not exceed $1,000 in any one year.

The scholarship program is open to students who will graduate from public, parochial, or private high school in 2001 or students who are currently enrolled in college and in good academic standing. An applicant must have a high school grade average of 2.5 on a 4.0 scale, or the equivalent.

Applicants must be dependents of JSC employees and other NASA employees permanently stationed at JSC who have been employed at NASA for at least two years as of Jan. 1, 2001. Dependents of JSC personnel who during the year previous to the application were medically retired or deceased and who otherwise would have met these qualifications are also eligible for consideration. For purposes of this program, the "dependent" of a JSC employee is defined as a student for which the employee claims an exemption on his or her federal income tax or who is a natural, adopted, or foster child for which the employee furnished the majority of support.

High school students will be expected to furnish a transcript of their high school grades and a record of their scores on the Scholastic Achievement Test or the American College Test with their applications, or as soon thereafter as they become available, but not later than Mar. 30. College students will be expected to furnish their most recent transcript of college grades with the applications as well as a transcript of high school grades and SAT or ACT scores.

Applicants will be evaluated on the basis of academic achievement, financial need, and involvement in school or community activities. The scholarship winners may pursue any course of study leading to a recognized degree at any accredited college in the country.

Application forms and the students' scholastic records will be evaluated by the JSC Scholarship Committee, composed of at least one member of the NASA Exchange-JSC, one JSC employee at division chief level or higher, and one representative of the Human Resources Office. All applicants will be notified by mail of the results by approximately May 15.

Application forms and agreements for the scholarship are available in Bldg. 1, Rm. 457. Contact Laura Wright (281-483-1812) for the forms or Debra Johnson (281-483-4157) for additional information. To be considered for this year's program, completed forms must be returned no later than Mar. 30 in a sealed envelope to: D. L. Johnson, JSC Scholarship Committee, Mail Code BA, Johnson Space Center, Houston, TX 77058. ■

Fourth annual Conference on International Space Station Utilization set for October

Plan to participate in the next Conference on International Space Station Utilization and exchange ideas and information with your research colleagues, as well as station technical and management personnel.

More than 150 scientists and engineers will present papers on the research capability and research initiatives to take place on the International Space Station. The objective is to provide the premier setting for extensive dialogue between space station users and space station providers. The research fields include biomedicine; fundamental biology; biotechnology; materials, fluids, and combustion research; space science; Earth science; and fundamental physics. Basic, applied, and commercial research will be included, as well as other innovative commercial activities. There will be an Exhibit Hall of International Space Station research and utilization hardware and related services and capabilities.

Make plans to present a paper, supply an exhibit, or just come, listen, and share ideas with your colleagues as well as space station personnel.

The conference will be held Oct. 15-18 at the new Kurt Debus Conference Center at the KSC Visitors Complex, Kennedy Space Center, Florida. ■

The call for papers is now available on the Web at: http://www.aiaa.org/calendar/index.hfm?cal=1&cfp=1

The abstract deadline is March 1.

HOUSTON: WE HAVE A BOOK-SIGNING RECEPTION

Chris Kraft and Robert Gilruth oversee the pre-launch phase of Apollo 5 in the Manned Spacecraft Center's Mission Control Center on Jan. 22, 1968.

The Arts Alliance Center at Clear Lake and STAR Books will host a book-signing reception for Chris Kraft, former JSC director and NASA's first flight director, from 4 p.m. to 7 p.m. on March 7. The event will take place at the Arts Alliance Center at Clear Lake, 2000 NASA Road 1, directly across from JSC.

"Flight: My Life in Mission Control" is the story of one man's mission and an entire country's destiny in Kraft's personal and historic view of the U.S. space program.

Books will be available one week before the reception in two locations: STAR Books (located inside the Arts Alliance Center) and Jeremy's Books (567 W. Bay Area Blvd.). Numbered tickets will be given out with book purchase receipts to ensure steady traffic flow during the autograph session on March 7. Proceeds from sales will benefit TAACCL art programs. For more information, call 281-335-7777.

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	$9.25
(JSC civil service employees free.)	
Postage Stamps (book of 20)	$6.80

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.

Focus on Safety

Administrator's message emphasizes safety as NASA's primary core value

In a letter sent last month to officials in charge of NASA Headquarters Offices, directors of NASA centers and the director of the Jet Propulsion Laboratory, NASA Administrator Daniel Goldin called on members of senior management to commit themselves and their organizations to "heightened awareness and constant vigilance concerning health and safety."

"We will not compromise the safety and health of our people and property, nor harm the environment," writes Goldin. "NASA's Agency Safety Initiative is aimed at strengthening NASA's capabilities so that safety permeates every aspect of NASA work, and we routinely incorporate safety and health principles and practices into our daily decision-making processes and lives. I strongly believe that promoting and maintaining safety for the public, our astronauts, our employees, and our high-value assets is a prerequisite for NASA's success as an Agency."

Goldin asked senior officials to review the NASA safety policy with all personnel and commit themselves and their organizations to health and safety, requesting that each submit a written report signifying that this assignment has been met.

According to JSC Deputy Director Bill Parsons, the rigorous process involved in obtaining Voluntary Protection Program certification through the Occupational Safety and Health Administration improved the center's safety program. "We had a great safety program in place, a highly respected program within JSC, but we weren't getting where we wanted to be. We viewed VPP as a way to benchmark our safety program and identify changes we could make. In the process of obtaining VPP certification we found out how good it is and, more importantly, we found ways to improve it."

In May 1999, following a two-week on-site audit, OSHA representatives recommended the center for VPP Star work site status.

According to Parsons, the International Organization for Standardization or ISO standards have helped the effort to gain VPP status by placing increased awareness on the importance of continuous improvement in all processes. "Using quality management systems, we should constantly evaluate all that we do across the center to improve all elements including our safety program."

In closing, Goldin noted that "communication is essential to safety" and that there will be "zero tolerance" for retaliation at NASA for raising safety concerns. "NASA has established a procedure that encourages any employee (or contractor) to raise any issue of safety concern to his or her supervisor at any time. If that concern is not addressed at this level, the employee should raise it to higher levels of management to ensure that safety risks are taken seriously and addressed." All employees, Goldin notes, have a responsibility to report any unsafe conditions "even if there are perceived consequences."

Under VPP, OSHA requires JSC to have a system for employees to report hazards and encourages employees to report "near miss" incidents or "close calls." Employees have been doing both for years through the JSC Close Call System.

A close call is an event where someone almost gets hurt. It provides an opportunity to fix a problem before someone does get hurt. Close calls, like injuries, result from hazards (conditions that have the potential to hurt someone) and unsafe behaviors. If the problems that cause close calls can be fixed, injuries can be prevented. If a hazard can be fixed before a close call happens, even better.

To report a close call or hazard, use JSC Form 1257, which is available online or on posters in JSC buildings. You are encouraged to fix the problem yourself and report your action on the close call form. ■

White Sands Test Facility's Engineering Department wins New Mexico Roadrunner Quality Award

By Cheerie R. Patneaude

Alan Spencer, Honeywell Technology Solutions Inc. Engineering Department manager, announced that his department has been selected as a winner in the annual New Mexico Quality awards in the Roadrunner category.

Committee members were: Candy Brown, Joe Capollo, Art Corella, Tim Dobson, Cecilia Fischer, Holger Fischer, Karen Giese, Hoyt Inman, Ken Lambert, Frank Mathis, Ed Moritz, Donna Nelson, Moira Romansky, Ken Schaaf, Alan Spencer, Ruby Steele and William Weed. Special members were HTSI Program Manager Bob Baker, Mike Hallock, David Hirsch and Barry Plante.

The three categories for the Quality New Mexico awards are: the Piñon, where "a serious commitment to use total quality concepts and principles" is employed; the Roadrunner, where "commitment and implementation of total quality principles can demonstrate significant progress in building sound and notable progress," and the New Mexico Zia Quality Award, where an applicant "has demonstrated through their practice and achievements, the highest level of quality excellence." The award is based upon the Malcolm Baldrige National Quality Award created by Public Law 100-107 and is named after Malcolm Baldrige, Secretary of Commerce 1981-1988. Baldrige's managerial excellence contributed to long-term improvement in efficiency and effectiveness of government.

"We ... congratulate all the businesses and organizations for their Roadrunner and Piñon Recognition. These organizations play a major role in energizing New Mexico's economy, competitiveness and quality of life," said Quality New Mexico President Julia Gabaldon.

NASA Manager Joe Fries said of the award, "Congratulations to each of you for a well-deserved recognition, and I thank you for your part in making WSTF what it is today."

Moira Romansky, committee member, said that the effort to apply for the Roadrunner Award, "was a terrific learning experience. Candy Brown, Alan Spencer, and Donna Nelson helped us focus on our processes with their incredible experience in auditing and reviewing other applications. Without their expertise, we would not have focused on the many details needed for our process application, which gave us the chance to be accepted. And special thanks needs to be given to Ken Schaaf for keeping us on course throughout the process."

About the process, Spencer said his department had to "demonstrate a measurable progress in improvement" from the Piñon award that his department received last year. "We focused on a critical few points in relationship to the criteria: leadership and strategic planning. We looked at where we had started, then at where we are now." Of the overall improvements in the department's customer satisfaction, Spencer said, "We wanted to maintain our current workload, yet grow with new opportunity."

To achieve this end, Spencer looked at the difference between customer expectations as compared to the Engineering Department's customer satisfaction. In most instances, the department had considerable room for improvement. Another critical aspect of the award was the department's attention to its financial performance to the institutional budget. "In 1996, we missed the budget target by 5 percent, but in 2000, we only missed by .22 percent."

Human Resources was an area of critical importance in winning the award. Spencer measured employee turnover and advancement and training opportunities. "In our industry, 12 percent of the workforce leave their company for a variety of reasons, but for the Engineering Department, employee turnover rested at a scant 5 percent, promotions accounted for an additional 3 percent," he said.

HTSI Program Manager Bob Baker said, "The improvement in quality measured by the Malcolm Baldrige criteria is a measurable improvement in quality for our site." Baker believes that the "process for applying is an all-encompassing effort that looks at vision, strategic planning, and performance." He continued, "the Baldrige Criteria for Quality lays the issues out on the table and forces you to focus on the customer feedback, then use this data to make decisions." Baker understood the Roadrunner award to be a "tremendous effort and made us realize we did have a way of measuring our progress and balancing our internal customer's satisfaction with our external customer's needs."

Spencer's advice to employees and employers is "to understand your customer's customer. It is not enough to understand the direct recipient of your work." He believes that the White Sands Test Facility has a unique situation. "Here, NASA is the stakeholder of the resources, the capital, and equipment. Yet, we must realize that our internal customers have to satisfy their own NASA customers; therefore, we must know and understand the needs of our customer's customer."

Employees' satisfaction in their own work must be paramount. "Employees who are comfortable in their jobs and feel needed are employees who respond better and faster to their customer." Spencer correlated this statement with the analogy of the waiter who works at a nice restaurant with a good chef and a great atmosphere, but who extends lousy service to the customer because of the waiter's bad day, which leads to the customer having a less-than-perfect dinner. "A good manager would have recognized the problem immediately and taken action to keep the customer's satisfaction," Spencer said. ■

The Quality New Mexico Roadrunner Application Committee worked diligently on the criteria submitted for the award.

DATES & DATA

February 18-24

National Engineers Week: JSC's observance of National Engineers Week is a voluntary education outreach activity when civil service and contractor engineers and other aerospace employees visit K-12 schools within 50 miles of JSC to engage students in hands-on math and science experiences to help improve student interest in engineering, technology, science, and mathematics, which may lead to increased enrollment figures in the engineering fields. For more information go to http://www4.jsc.nasa.gov/scripts/eweek/index.cfm

February 23

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.

February 28

Spaceteam Toastmasters meet: The Spaceteam Toastmasters meet Feb. 14, 21 and 28, at 11:30 a.m. at United Space Alliance, 600 Gemini. For more information, contact Patricia Blackwell at 281-280-6863.

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

March 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.

Communicators meet: The Clear Lake Communicators, a Toastmasters International club, meet March 1, 8, 15, 22 and 30 at 11:30 at Wyle Laboratories, 1100 Hercules, Suite 305. For details contact Allen Prescott at (281) 282-3281or Richard Lehman at (281) 280-6557.

March 2

Chess Club meets: The Space City Chess Club meets each Friday evening, March 2, 9, 16, 23 and 31, from 5:30 p.m. to 9 p.m. at the Clear Lake United Methodist Church, 16335 El Camino Real, Rm. 423. All skill levels are welcome. For more information, call James Mulberry at x39287 or James Termini at x32639.

March 5

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.

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.

March 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 more information contact Ann Dorris at x38620.

March 7

Spaceteam Toastmasters meet: The Spaceteam Toastmasters meet March 7, 14, 21 and 28 at 11:30 a.m. at United Space Alliance, 600 Gemini. For more information contact Patricia Blackwell at (281) 280-6863.

Astronomy seminar: The JSC Astronomy Seminar Club will meet at noon March 7, 14, 21 and 28, in Bldg. 31, Rm. 248A. For more information contact Al Jackson at x35037.

March 8

Airplane club meets: The Radio Control Airplane Club meets at 7 p.m. at the Clear Lake Park building. For more information contact Bill Langdoc at x35970.

GILRUTH CENTER NEWS

Sign-up policy:

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

Gilruth badges:

Required for use of the Gilruth Center. Employees, spouses, eligible dependents, NASA retirees and spouses may apply for photo identification badges from 7:30 a.m.-9 p.m. Monday-Friday and 9 a.m.-2 p.m. Saturdays. Cost is $12. Dependents must be between 16 and 23 years old.

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

Nutrition intervention program: This is a free seven-week program designed to provide an understanding of the role diet and nutrition play in health. The program includes a series of lectures and private consultations with a dietitian. You will learn how to use dietary vitamins, minerals and herbal nutriceuticals for optimizing health. Classes are held on Wednesdays from 4 p.m. to 5 p.m. For details call Tammie Labiche, registered dietitian, at (281) 483-2980.

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

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

Weight safety: Required course for employees wishing to use the Gilruth weight room. Pre-registration is required. Cost is $5. Annual weight room use fee is $105. The cost for additional family members is $58.

Exercise: Low-impact class meets from 5:15-6:15 p.m. Mondays and Wednesdays. Cost is $24 for eight weeks.

Step/bench aerobics: Low-impact cardiovascular workout. Classes meet from 5:25-6:25 p.m. Tuesdays and Thursdays. Cost is $40 for eight weeks.

Cardio-Kickboxing: Medium impact. Learn basic kicking and punching. Tuesday and Thursday 5:30 p.m. - 6:30 p.m. Cost is $40 for eight weeks.

Yoga stretching: Stretching class of low-impact exercises designed for people of all ages and abilities in a Westernized format. Meets Thursdays 5-6 p.m. Cost is $40 for eight weeks. Call Darrell Matula, instructor, at x38520 for more information.

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

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

Aikido: Martial arts class for men and women. Beginners meet Monday 6:30 - 7:30 p.m and Wednesdays 5 - 6 p.m. Advanced students meet Tuesday and Wednesday 5 - 6:30 p.m. No special equipment is needed. Aikido teaches balance and control to defend against an opponent without using force. Classes run monthly. Cost is $45 per month. Visit a class for more information.

NASA BRIEFS

NASA EXERCISES DELTA II CONTRACT OPTION FOR NOAA-N

NASA today announced it is exercising a contract option for a Delta II vehicle to launch NOAA-N for the National Oceanic and Atmospheric Administration (NOAA). The spacecraft is currently planned for launch in January 2003, from Vandenberg Air Force Base, CA. This firm-fixed-price option is covered under the NASA Medium Light (MED-LITE) launch service contract (NAS5-32933), awarded by the agency on Feb. 27, 1996, to McDonnell Douglas Corp. of Huntington Beach, CA, a subsidiary of The Boeing Company.

The goals of NOAA-N after its launch into polar orbit are to take images and measurements of the Earth's atmosphere, cloud cover and surface, as well as to monitor the proton and electron fluxes near the Earth. The satellite can store and transmit the data from its instruments. NOAA-N will also be capable of receiving, processing and re-transmitting data from free-floating balloons, buoys, and remote automatic-observation stations around the globe, as well as detecting and re-transmitting search-and-rescue distress signals.

NOAA-N is managed by the Polar Operational Environmental Satellite Program at NASA's Goddard Space Flight Center and is a cooperative effort among NASA, NOAA, the United Kingdom and France. The launch service and launch management are the responsibility of NASA's Kennedy Space Center in Florida.

WEBSITE SHOWS HUMAN SIDE OF SPACE STATION

Visit NASA's new "Personal Space" Web site and get up-close and personal with International Space Station team members like STS-98 astronaut Robert Curbeam.

Other featured space station team members include:

- Kathy Laurini, an American mother of three who lives and works on the Automated Transfer Vehicle project in the Netherlands;
- Takayoshi Nishikawa, a triathlete who prepared and conducted the training program for station astronaut candidates at the Japanese Space Agency (NASDA);
- Dino Brondolo, an avid winemaker who spent the last nine years building Multipurpose Pressurized Logistics Modules for the Italian Space Agency;
- Alain Dubeau, manager of the Canadian Space Station Program, whose inch-worm-like "Canada Arm" robot arm will aid future station construction;
- Sylvie Beland, also of the Canadian Space Agency, whose job is to ensure all Canadian hardware, including the famous robot arm, and flight-support equipment arrive at the station safely; and
- The Expedition One crew–two Russians and an American–the first humans to take up long-term residence on the International Space Station.

"Personal Space" uses Flash technology to combine video vignettes, photos and other text and visual content into an interactive presentation.

The site is located at: http://space-flight.nasa.gov/snapshots.html

SPACE CENTER Roundup

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