

**STS-99  
Endeavour**

**SHUTTLE RADAR TOPOGRAPHY MISSION:  
PUTTING OUR PLANET ON THE MAP**

**KSC Release No. 1-00  
January 2000**

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The Space Shuttle Endeavour mission will chart a new course, using two antennae and a 200-foot-long mast protruding from its payload bay to produce unrivaled 3-D images of the Earth's surface.

The result of the Shuttle Radar Topography Mission could be close to 1 trillion measurements of the Earth's topography. Besides contributing to the production of better maps, these measurements could lead to improved water drainage modeling, more realistic flight simulators, better locations for cell phone towers, and enhanced navigation safety.

Just about any project that requires accurate knowledge of the shape and height of the land can benefit from the data. Some examples are flood control, soil conservation, reforestation, volcano monitoring, earthquake research, and glacier movement monitoring. The measurements, which once processed are expected to be accurate to within 50 feet, may be tailored to meet the needs of the military, civil, and scientific user communities, bettering the lives of people across the planet.

Other possible uses of the information include aiding the selection of locations for cellular phone towers and improving topographical maps for backpackers, firefighters and geologists.

The 11-day mission is a partnership between NASA and the Department of Defense's National Imagery and Mapping Agency (NIMA), together with the German and Italian space agencies. The U.S. military, the primary customer of the data gathered during the mission, will use the 3-D pictures, called visualizations, to help in mission planning and rehearsal, modeling and simulation.

Creating these 3-D images of the Earth's surface will require the first on-orbit use of a technique called single-pass radar interferometry. Radar beams will be bounced off the surface and received by two antennae -- one by the same radar antennae used to take radar images from the Shuttle's payload bay on STS-59 and STS-68, and another by a similar antenna at the end of the 60-meter mast extending from the payload bay.

Deploying the mast, which is two-thirds as long as the International Space Station, will be an accomplishment in itself. Extending the longest rigid structure ever flown in space -- stored accordion-style inside a canister attached to the side of the main antenna -- will require the first use of a new Shuttle piloting technique called the "flycast maneuver." The maneuver, practiced on STS-93, will help reduce structural loads on the mast.

Endeavour will be launched in an orbit with an inclination of 57 degrees to allow the entire land surface that lies between 60 degrees north and 56 degrees south latitude to be covered.

Radar imaging was used previously by NASA's uncrewed Magellan spacecraft to map the surface of Venus. A key advantage to radar technology is that it can "see" the Earth's surface through the clouds, which cover nearly 40 percent of the planet, and in darkness.

The crew will spend approximately 80 hours traveling 145 statute miles (126 nautical miles/233 kilometers) above the Earth, making observations.

During a minimum of 159 consecutive orbits, Endeavour will map 30-meter squares of the planet's surface at a time. In order to maintain the continuous observations, the crew will divide into a pair of three-person teams to conduct two work shifts of 12 hours each day. The resulting collection of information is expected to total 9.8 terabytes -- enough material to fill 15,000 compact discs. It will take scientists at least one year to process the massive volume of data recorded during the mission.

No spacewalks are planned during the mission. The crew, however, will be prepared for the possibility of as many as three spacewalks if it becomes necessary to deploy or retract parts of the radar systems manually. The crew's responsibilities include activating the payload, deploying and stowing the mast, aligning the inboard and outboard structures, monitoring payload flight systems, operating the on-board computers and recorders and handling any contingencies that arise.

The 97th Space Shuttle launch and the 14th flight of Endeavour will begin with a liftoff from Launch Pad 39A. Endeavour will ascend at a 57-degree inclination to the equator for direct insertion into orbit. The mission is scheduled for 11 days.

Landing is planned at Kennedy Space Center's Shuttle Landing Facility.

### **The Crew**

Commander Kevin R. Kregel is an experienced space flier who has been a pilot on two previous missions and a commander on another. During a distinguished career as a U.S. Air Force pilot, the New York native accumulated more than 5,000 flight hours in 30 different aircraft.

Kregel left active service in 1990 to join NASA as an aerospace engineer and instructor pilot, flying in the Shuttle Training Aircraft and conducting the initial flight test of the T-38 avionics upgrade aircraft. He entered the astronaut program in 1992. Kregel holds degrees in astronautical engineering and public administration.

Pilot Dominic Gorie (Cmdr., U.S. Navy) will make his second space flight since joining the astronaut program in 1995. He served the same role on STS-91, the final docking mission to the Russian space station Mir.

Gorie, who attended high school in Miami, earned numerous honors as a naval aviator and flew 38 combat missions during Operation Desert Storm. He has a master's degree in aviation systems. While awaiting his first Shuttle flight, he served as a spacecraft communicator in Mission Control for numerous missions.

Mission Specialist Janet L. Kavandi, Ph.D., also served on STS-91, her first space flight. She joined the space program in 1995 and worked in payload integration for the International Space Station before receiving her first flight assignment. The Missouri native has a doctorate in analytical chemistry.

During more than a decade of work as an engineer in industry, she contributed to a variety of projects, including Space Station, Lunar and Mars Base studies, Inertial Upper Stage, Advanced Orbital Transfer Vehicle, Get-Away Specials, Small Spacecraft, Air Launched Cruise Missile, Minuteman and Peacekeeper. Her work on pressure-indicating paints has resulted in two patents.

Mission Specialist Janice Voss, Ph.D., is the crew's most experienced member, having logged more than 909 hours in space on four previous missions. She earned a master's degree in electrical engineering from Massachusetts Institute of Technology in 1977 and obtained a doctorate in aeronautics/astronautics from MIT 10 years later.

Since she joined the astronaut program in 1991, her technical assignments have included working on Spacelab/Spacehab issues for the Astronaut Office Mission Development Branch and on robotics issues for the EVA/Robotics Branch. Her most recent mission, STS-94, was a completion of the shortened STS-83 flight.

Mission Specialist Mamoru Mohri, Ph.D., represents NASDA, the Japanese space agency, on his second space flight. He holds a doctorate in chemistry and has published more than 100 papers in the fields of material and vacuum sciences. He established himself as an expert in nuclear fusion during an academic career and was selected in 1980 to

participate in the first group of exchange scientists under the U.S./Japan Nuclear Fusion Collaboration Program.

Mohri served as a prime payload specialist on STS-47, a cooperative mission between the United States and Japan launched in 1992. He was selected to NASA's astronaut program in 1996.

Mission Specialist Gerhard P.J. Thiele, Ph.D., makes his first space flight as a representative of the European Space Agency (ESA). With a doctorate in environmental physics, he has written extensively on physical and chemical oceanography.

He served as an alternate payload specialist on the STS-55 Spacelab D-2 mission. Since 1994, Thiele has served as an active member of the International Academy of Astronautics Subcommittee on Lunar Development. He joined ESA in 1998.

### **Other Experiments**

The secondary objectives of the mission include crew support of EarthKAM, an ongoing experiment to provide middle school students with observations of the planet from space. EarthKAM stands for Earth Knowledge Acquired by Middle School Students, and it was first flown on STS-89. As part of the experiment, the crew will point a digital camera toward Earth. Students will use these images as part of their Earth Science lessons.

### **Related NASA Web Sites**

Mission and crew press kit: [www.shuttlepresskit.com/](http://www.shuttlepresskit.com/)

Mission and crew - Johnson Space Center: [spaceflight.nasa.gov/](http://spaceflight.nasa.gov/)

Shuttle countdown - Kennedy Space Center: [www.ksc.nasa.gov/shuttle/countdown/](http://www.ksc.nasa.gov/shuttle/countdown/)

Multimedia prelaunch guest presentation: [www-pao.ksc.nasa.gov/kscpao/briefing/](http://www-pao.ksc.nasa.gov/kscpao/briefing/)

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**January 1, 2000**

**1 a.m. EST**

**KSC Contact: George H. Diller**

**KSC Release No. 2-00**

## **KENNEDY SPACE CENTER CLEARS Y2K HURDLE**

The Kennedy Space Center made the transition into a new century without any "Y2K" difficulties. There were no issues, concerns, or problems and the change to Year 2000 at midnight was transparent to KSC computers and flight hardware. There were 24 people on duty at KSC from 7 p.m. Friday evening through 1 a.m. Saturday.

A limited staff will remain on duty through 5 p.m. on Saturday. Also, events will be monitored closely as KSC on Monday as personnel return to work and flight hardware and administrative computer systems are turned on for normal work.

KSC has been preparing for the Y2K event for almost two years and performed simulations during December as a trial to assure readiness for the transition.

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**January 27, 2000**  
**KSC Contact: Patti Beck**  
**KSC Release No. 3-00**

**Note to Editors:**  
**YEAR 2000 ANNUAL MEDIA BADGES READY FOR DISTRIBUTION**

The Kennedy Space Center Public Affairs' Year 2000 Annual Media Badges are ready for distribution to pre-approved, accredited media. If you made your request and it was not approved, the KSC Media Services Office will be contacting you. Otherwise, if you have submitted a request for accreditation, you may proceed to the Pass and Identification Building at Gate 2 on State Road 3 to pick them up at the times listed below. Each individual requesting a badge must sign for the badges personally. The badges will not be distributed from the Press Site, only from Gate 2.

Hours of distribution from Gate 2 Pass and Identification building are: Friday - Sunday, Jan. 28-30, 8 a.m. - 4:30 p.m. and on Monday, Jan. 31, 5 - 11:30 a.m.

If you have not yet submitted your request for a Year 2000 Annual Badge, please have your editor or publisher fax a request on company letterhead to 321/867-2692. The letter must include your full name, social security number, job title and date of birth. To qualify for an annual badge, media must expect to attend more than two KSC events throughout the year 2000. Your affiliation will be checked for security reasons.

The 1999 annual badges will be invalid as of Jan. 27, 2000.

If you have any questions or need further information regarding annual badges, please contact Patti Beck at (321) 867-2468.

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**January 7, 2000**  
**KSC Contact: Bruce Buckingham**  
**KSC Release No. 4-00**

**Note to Editors:**  
**MEDIA OPPORTUNITIES WITH STS-99 CREW SET FOR NEXT**  
**WEEK'S COUNTDOWN TEST**

The crew of Space Shuttle mission STS-99 will be at Kennedy Space Center next week for the Terminal Countdown Demonstration Test (TCDT).

The TCDT is held at KSC prior to each Space Shuttle flight, providing the crew of each mission an opportunity to participate in simulated countdown activities. The TCDT ends with a mock launch countdown culminating in a simulated main engine cut-off. The crew also spends time undergoing emergency egress training exercises at the pad and has an opportunity to view and inspect the payloads in the orbiter's payload bay.

The six-member crew of mission STS-99 is scheduled to arrive at KSC's Shuttle Landing Facility (SLF) Tuesday, Jan. 11, at 4 p.m. Media who wish to take part in this photo opportunity should be at the KSC Press Site by 3 p.m. for transport to the Shuttle Landing Facility.

Another photo opportunity with the crew is available the next day, Wednesday, at 10:15 a.m. when the crew is scheduled for training in the M113 armored personnel carrier. Media should report to the KSC Press Site at 9:30 a.m. for this event.

On Thursday, Jan. 13, news media representatives will have an opportunity to speak informally with and photograph the crew at Pad 39A. Media interested in participating in this question and answer session should be at the KSC Press Site by 12:30 p.m. Thursday for transport to the pad. This question and answer session will be a local media event only. However, the session will be covered live on NASA TV at about 1:30 p.m.

Friday morning, the entire crew will take part in simulated launch day events. Media interested in covering the crew walkout from the Operations and Checkout Building should be at the KSC Press Site by 6:45 a.m. Friday.

Once the crew is at the pad, they will enter the orbiter Endeavour fully suited for the final hours of the practice countdown, including the simulated Shuttle main engine ignition and cut-off. Following TCDT, the crew is scheduled to depart KSC for their homes in Houston for final flight preparations.

Endeavour on mission STS-99 is currently targeted for launch on Jan. 31 at 12:47 a.m. The flight is scheduled to last 11 days, 4 hours on the Shuttle Radar Topography Mission.

Crew members are: Commander Kevin Kregel; Pilot Dom Gorie; and Mission Specialists Janet Kavandi, Janice Voss, Mamoru Mohri of the Japanese Space Agency and Gerhard Thiele of the European Space Agency.

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**January 13, 2000**  
**KSC Contact: Lisa Malone**  
**KSC Release No. 5-00**

**KENNEDY SPACE CENTER TO HOST FIRST FLORIDA SPACE  
SUMMIT**

Center Director Roy Bridges will moderate a discussion on the future of space as it relates to the state of Florida. Kennedy Space Center's Visitor's Complex will be the stage for the first Florida Space Summit on Friday, Jan. 14 from noon to 2:30 p.m.

Participants include Senator Bob Graham, Rep. Dave Weldon, members of Florida's State government including Gov. Jeb Bush, NASA Administrator Dan Goldin, KSC Director Roy Bridges, 45th Space Wing Commander Brig. Gen. Donald Pettit and heads of aerospace companies. Bridges will moderate a discussion on the future of space as it relates to Florida.

News media representatives interested in attending the event may drive directly to the KSC Visitor's Complex. The event will be held at the Early Space Exploration Center, just south of the Rocket Garden. NASA media credentials aren't required. Seating inside the facility and parking spaces will be marked for news media. Video and audio tapes will be available after the event at the KSC News Center. Still photos also will be available through the Media Services Office and web site. This event will not be carried on NASA Television.

The event is open to the public.

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**January 18, 2000**

**KSC Contact: Patti Phelps**

**KSC Release No. 6-A-00**

## **NASA HONORS KENNEDY SPACE CENTER EMPLOYEES**

Kennedy Space Center (KSC) honored 52 of its civil service and contractor employees at a special Honoree Event held at the space center in December.

The KSC employees are among some 250 NASA and industry employees from around the country who were honored by top NASA and industry leaders for their significant contributions to the nation's space program.

The KSC employees attended a special reception in their honor, and were joined by astronauts and senior NASA and industry officials of the Space Shuttle and International Space Station team. They were given a VIP tour of Kennedy Space Center and participated in various briefings. They also watched the STS-103 launch of the Space Shuttle Discovery on Sunday, Dec. 19, from a special VIP viewing site. STS-103 was the third Space Shuttle flight dedicated to servicing the Hubble Space Telescope.

The Honoree Award is the highest form of recognition bestowed upon an employee by the NASA Space Flight Awareness Program. Recipients are selected for their professional dedication and outstanding achievement in support of the human spaceflight program.

Ten civil service employees were honored. They were Karon J. Buchner, Juan P. Calero, Kenneth A. Hale, Maxine S. Johnson, Ronnie R. Lawson, Lawrence D. Maggie, Kenneth L. Newton, James P. Niehoff, Jeffery G. Spaulding and Stephen J. Swichkow.

Boeing Space and Communications employees honored include Craig C. Catizone, Michel Hedrick, Carol A. Hoar, Thomas S. Livengood, Tara S. Miller, Janet C. Ruberto, Brian D. Scofield, Mitchell E. Sestile and Larry A. Wood.

Other contractor Honorees were Neil C. Yorio of Dynamac Corporation; David P. Floyd of Dynacs Engineering Co., Inc.; Kenneth A. Castner of Lockheed Martin Space Operations; Michael L. Kosiba of Wiltech Corporation; and Thomas M. Buchman, James L. Fisher, Gregory M. Hooper, Charles A. Malloy and Ricky D. O'Quinn of Space Gateway Support.

United Space Alliance employees honored were Albert A. Barbuscia, Tamora E. Blaue, Robert C. Brock, Martin L. Carlson, Larry A. Carr, Duc M. Chau, Vernon D. Cheney, Betty J. Clark, Kimberly S. Falzone, Michael W. Fowler, Terryson Fredricks, Mark A. Grinder, Barbara J. Harris, Bill Keenan of Hamilton Sundstrand, A United Technologies Company, Michael H. Olka, Keith F. Palmer of Olsten Staffing Services, Inc., Anil K. Patel, Rodney G. Pratt, Linda K. Smith, Hal L. Snow, Michael D. Stoner, Dale S. Walker, Judith R. Weaver and Judy A. Worrells.

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**January 18, 2000**

**KSC Contact: Patti Phelps**

**KSC Release No. 6-B-00**

## **LARRY MAGGIE HONORED FOR ROLE IN SPACE PROGRAM**

Larry Maggie, 1966 graduate of Mohawk High School, was among 52 Kennedy Space Center (KSC) employees who were honored recently for their exemplary work at the nation's spaceport.

At KSC, Maggie has served as a quality assurance specialist since May 1987. Maggie is responsible for assuring that Kennedy Space Center aerospace quality and reliability programs are implemented and maintained on the Space Shuttle program.

Maggie's other awards include the NASA Silver Snoopy Award in 1995, and the Army Achievement Medal in 1986.

Maggie resides in Cocoa, Fla. with his son Brock age 21 and daughter Audry age 17.

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The Honorees were given a VIP tour of Kennedy Space Center and attended a special reception. Honoring them were several astronauts and senior officials from NASA and the space industry. The Honorees were also taken to a special viewing area to watch the STS-103 launch of the Space Shuttle Discovery on Dec. 19.

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**January 18, 2000**

**KSC Contact: Patti Phelps**

**KSC Release No. 6-C-00**

## **MIKE KOSIBA HONORED FOR ROLE IN SPACE PROGRAM**

Mike Kosiba, University of Central Florida graduate was among 52 Kennedy Space Center (KSC) employees who were honored recently for their exemplary work at the nation's spaceport.

Kosiba received a bachelor of science in chemistry from University of Central Florida in 1977, and graduated from Rockledge High School in 1973. He is the son of Dr. Raymond and Pat Kosiba of Rockledge.

At Wiltech, a NASA contractor, Kosiba has served as a chemist since April 1996. He is responsible for performing chemical analysis of waste samples to determine hazardous characteristics in support of KSC waste disposal procedures, coordinating control functions for the environmental analysis section of the lab, and maintaining state and federal environmental certification for the lab.

Kosiba resides in Chulota, Fla. with his wife Brenda Stevens Kosiba and son Daniel age 5.

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**January 18, 2000**  
**KSC Contact: Patti Phelps**  
**KSC Release No. 6-D-00**

**KENNETH L. NEWTON HONORED FOR ROLE IN SPACE PROGRAM**

Kenneth L. Newton, current resident of Oviedo, Fla., was among 52 Kennedy Space Center (KSC) employees who were honored recently for their exemplary work at the nation's spaceport.

Newton received a bachelor of science in mechanical engineering from University of Florida in 1989 and graduated from Oak Ridge Senior High in 1982. He is the son of Nathaniel and Margret Newton of Orlando.

At NASA, Newton has served as a logistics operations engineer since September 1997. Newton is the lead for Laboratories IPT and Logistics Services. Previous awards include Vice President Al Gore's Hammer Award and the Center Director's Gold Quality Dollar Award.

Newton and his wife, Mary Evelyn Newton, have two children Kenneth age 7 and Kameron age 3.

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**January 18, 2000**

**KSC Contact: Patti Phelps**

**KSC Release No. 6-E-00**

## **KENNETH CASTNER HONORED FOR ROLE IN SPACE PROGRAM**

Kenneth Castner, graduate of Case Western Reserve University, was among 52 Kennedy Space Center (KSC) employees who were honored recently for their exemplary work at the nation's spaceport.

Castner received a bachelor of science in computer engineering from Case Western Reserve University in 1984, and graduated from Stow High School in 1979. He is the son of Thomas and Mary Kay Castner of Stow, Ohio.

At Lockheed Martin, a NASA contractor, Castner has served as a Checkout and Launch Control System (CLCS) lead designer since November 1997. He is the lead designer for the CLCS, a replacement software for the current Space Shuttle launch processing system.

Castner resides in Orlando, Fla. with his wife Leslie and three children Dana 8, Matt 6 and Julie 4.

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**January 18, 2000**

**KSC Contact: Patti Phelps**

**KSC Release No. 6-F-00**

## **NEIL YORIO HONORED FOR ROLE IN SPACE PROGRAM**

Neil Yorio, a native and current resident of Indian Harbour Beach, was among 52 Kennedy Space Center (KSC) employees who were honored recently for their exemplary work at the nation's spaceport.

Yorio received a bachelor of science in molecular biology from Florida Institute of Technology in 1988 and a master's degree in 1990. A graduate from Satellite High School in 1984, he is the son of Ralph and Connie Yorio of Indian Harbour Beach.

At Dynamac Corporation, a NASA contractor, Yorio has served as a research scientist since August 1991. Yorio is involved with the Advanced Life Support research at KSC. He is responsible for operating plant growth experiments to investigate the feasibility of using crop plants as part of an integrated life support system that produces food, revitalizes the atmosphere, purifies water and recycles waste for long duration missions.

Yorio and his wife Karen M. Yorio have one child Owen, who is 18 months old.

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**January 18, 2000**

**KSC Contact: Patti Phelps**

**KSC Release No. 6-G-00**

## **DAVID P. FLOYD HONORED FOR ROLE IN SPACE PROGRAM**

David P. Floyd, a Brevard County native, was among 52 Kennedy Space Center (KSC) employees who were honored recently for their exemplary work at the nation's spaceport.

Floyd received a bachelor of science in computer technology from University of Central Florida in 1986. A graduate from Merritt Island High School in 1980, he is the son of Lewis Floyd of Merritt Island and Agnes Hensley of Cocoa.

At NASA, Floyd has served as a senior software engineer since June 1987. Floyd is responsible for developing the Command and Control Software for the Hazardous Gas Detection System (HGDS), developing the Graphical User Interface and the Command and Control Software for the Ground Measurement System (GMS) and software modification and enhancement for the Hydrogen Umbilical Mass Spectrometer System.

Floyd and his wife Jennifer Schwalb Floyd currently reside in Cocoa Beach.

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**January 18, 2000**

**KSC Contact: Patti Phelps**

**KSC Release No. 6-H-00**

**MAXINE CRASNICK JOHNSON HONORED FOR ROLE IN SPACE PROGRAM**

Maxine Crasnick Johnson, native to Harrisburg, Pa., was among 52 Kennedy Space Center (KSC) employees who were honored recently for their exemplary work at the nation's spaceport.

Johnson attended Tacoma and Steilacoom Community College in Tacoma, Wa., and graduated from William Penn High School in 1965. She is the daughter of Betty Johnson of Largo, Fla.

At NASA, Johnson has served as the secretary for Logistics Operations since July 1990. Johnson's responsibilities include administrative support to the Director by providing essential clerical and administrative support as the lead secretary over five others, as well as support to management to facilitate accomplishments or office missions, assigned programs and projects.

Johnson and her husband, Clyde Johnson, currently reside in Titusville, Fla.

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**January 18, 2000**

**KSC Contact: Patti Phelps**

**KSC Release No. 6-I-00**

## **KENNETH A. HALE HONORED FOR ROLE IN SPACE PROGRAM**

Kenneth A. Hale, graduate of University of Louisville, was among 52 Kennedy Space Center (KSC) employees who were honored recently for their exemplary work at the nation's spaceport.

Kenneth received a bachelor of science degree in engineering math and computer science in 1989 and graduated from St. Xavier High School in 1984. He is the son of Mr. and Mrs. John E. Hale of Louisville, Ky.

At NASA, Kenneth has served as a software engineer since June 1989. He is the NASA lead for Real-Time Control Application Software development for the Checkout and Launch Control System project.

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**January 18, 2000**  
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**KSC Release No. 6-J-00**

## **KARON J. BUCHNER HONORED FOR ROLE IN SPACE PROGRAM**

Karon J. Buchner, graduate of Rollins College, was among 52 Kennedy Space Center (KSC) employees who were honored recently for their exemplary work at the nation's spaceport.

Buchner received a bachelor of science degree in computer information systems in 1989 and graduated from Cocoa High School in 1972. She is the daughter of Mary E. Hamm of Canaveral Groves, Fla.

At NASA, Buchner has served as a program analyst since June 1971. She is the senior resource analyst for the International Space Station project at KSC. Her responsibilities include the integration of all KSC Space Station financial activities including budgets and monthly reporting, as well as maintaining computer systems that supports budgets, resources tracking and monthly analysis.

Buchner has two children, Jennifer 15 and Jason 13.

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**January 18, 2000**

**KSC Contact: Patti Phelps**

**KSC Release No. 6-K-00**

## **RONNIE LAWSON HONORED FOR ROLE IN SPACE PROGRAM**

Ronnie Lawson, graduate of University of Central Florida, was among 52 Kennedy Space Center (KSC) employees who were honored recently for their exemplary work at the nation's spaceport.

Lawson received a bachelor of science degree in electrical engineering in 1993 and graduated from Cocoa High School in 1976. He is the son of Lorene Lawson of Cocoa, Fla.

At NASA, Lawson has served as a communications and tracking lead for Space Station MEIT since September 1991. He is the lead RF communications engineer for the Space Stations Communications Systems. Responsibilities include developing test requirements, procedure development and test execution.

Lawson and his wife, Jill Elizabeth Lawson, currently reside in Rockledge and have two children, Zachary 8 and Hope 5.

The Honoree Award is the highest form of recognition bestowed upon an employee by the NASA Space Flight Awareness Program. The 52 employees selected were part of a contingent of some 250 NASA and contractor employees from throughout the space agency being honored for the professional dedication and outstanding achievement in support of the human spaceflight program.

The Honorees were given a VIP tour of Kennedy Space Center and attended a special reception. Honoring them were several astronauts and senior officials from NASA and the space industry. The Honorees were also taken to a special viewing area to watch the STS-103 launch of the Space Shuttle Discovery on Dec. 19.

Kennedy Space Center is the launch site and preferred landing site for NASA's Space Shuttles. STS-103 was the third shuttle flight dedicated to servicing the Hubble Space Telescope.

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**January 18, 2000**

**KSC Contact: Bruce Buckingham/Joel Wells**

**KSC Release No. 7-00**

## **LAUNCH DATE SET FOR SHUTTLE RADAR MAPPING MISSION**

NASA managers today announced that Space Shuttle Endeavour will launch no earlier than Jan. 31, on mission STS-99, pending resolution of an ongoing orbiter tile evaluation and completion of other planned open work.

Endeavour will spend 11 days in orbit making elevation measurements of the Earth's surface. The Shuttle Radar Topography Mission (SRTM) will use a measurement technique called interferometry to gather images of a large majority of the Earth's surface; military planners, aircraft designers, firefighters, weather forecasters and others will then have use of this information.

In order to gather these images, two antenna will be extended: one in the orbiter's payload bay and the other from the end of a mast extended 60 meters (197 feet) out from the Shuttle. This 60-meter mast will be the largest fixed structure ever flown in space. The resulting three-dimensional images will generate the most complete topographic map of the Earth's land surface ever produced.

"We are excited to undertake this first mission of 2000 and to utilize the SRTM aboard the Shuttle," said Space Shuttle Program Manager Ron Dittmore. "The team has done a thorough job preparing Endeavour for flight, and we're ready to start this new year as successfully as we ended the last year."

Endeavour's Jan. 31 launch window opens at 12:47 p.m. EST and extends for 2 hours, 2 minutes. Landing is set to occur at Kennedy Space Center on Feb. 11 at about 4:55 p.m.

Endeavour's crew consists of Commander Kevin Kregel; Pilot Dom Gorie; and Mission Specialists Janet Kavandi, Janice Voss, Mamoru Mohri of the Japanese space agency (NASDA) and Gerhard Thiele of the European Space Agency.

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**January 20, 2000**

**KSC Contact: Bruce Buckingham**

**KSC Release No. 8-00**

**Note to Editors:**

**NASA TAKES AMERICA'S LOVE FOR THE CAR TO NEW HEIGHTS**

On Friday, Jan. 21, NASA Administrator Dan Goldin will address J.D. Power and Associates International Automotive Roundtable. He will discuss how NASA and the auto industry are already collaborating today, but in the future the aerospace and auto industries will become increasingly intertwined.

Media interested in attending this event should be at the Hyatt Regency Orlando International Airport (Regency Ballroom), Orlando, FL, at 11 a.m.

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**January 21, 2000**

**KSC Contact: George H. Diller**

**KSC Release No. 9-00**

## **NEW PAYLOAD TRANSPORTERS ARRIVE AT KSC**

NASA's long wait for a pair of new transporters for Shuttle payload canisters finally ended as they arrived by barge on Monday, Jan. 17 from their manufacturer, the KAMAG Transporttechnik, GmbH, of Ulm, Germany. The transporters, which carry spacecraft and International Space Station elements from payload facilities to and from the launch pads and the orbiter hangars, completed the process of a long-term analysis for the need for payload transporters to support Space Shuttle programs well into the new millennium.

Now that the transporters have arrived at KSC, engineers and technicians are being trained on their operation and maintenance. Each payload canister transporter is 65 feet long, 22 feet wide and has 24 tires divided between its two axles. The transporter travels 10 miles per hour unloaded, 5 miles per hour when loaded and weighs up to 172,000 pounds when the canister with payloads rides atop. The transport can hold up to 500 gallons of diesel fuel.

The transporters will be "outfitted" to support Space Shuttle payload launch activities. The outfitting includes adding various subsystems to the transporters for monitoring the environment inside the canister during the payload moves. The four main subsystems for the transporter include electrical power, environmental control, instrumentation and communications, and fluids and gasses. The last of the two systems will be removed from the existing payload transporters, refurbished and installed on the new transporters. The other systems will be manufactured new.

"The addition of these new transporters will assure the long-term reliability for moving payload canisters," said Ira Kight, chief of ground system engineering division at NASA. "We are also happy that two of four subsystems can be reinstalled on the new transporters, which will considerably decrease cost and turnaround time."

The outfitting activities require considerable advanced planning to coordinate around the Space Shuttle launch schedule. Only one of the existing transporters can be taken out of service at one time so that a capability can be maintained for transporting International Space Station hardware and other payloads for installation into the Space Shuttle.

The first use for one of the new transporters is anticipated to occur this summer.

### **Background**

NASA, in August 1996, began a study that addressed the long-term decision to continue to operate or to replace the existing Payload Canister Transporter system, now 20 years old.

In the study, options included refurbishment of the existing transporters,

refurbishment of NASA's Advanced Solid Rocket Motor transporters to customize them for payload use, or doing a complete replacement of the existing payload transporters.

NASA issued a request for proposal from the Boeing Company (payload ground operations contractor at Kennedy Space Center) for a continuing reliable capability for transportation of the payload canisters.

Boeing and KAMAG, manufacturer of the existing canister transporters, met to discuss the possibility for refurbishment. However, during this discussion, the option of building new transporters similar to those to be used for the new Evolved Expendable Launch Vehicle (EELV) was discussed. Using this concept would result in a significant cost savings to NASA due to the small amount of redesign effort that would be required. Since the EELV program is a commercial venture, additional savings could also be realized by taking a commercial approach to the procurement process.

Boeing presented the concept to NASA management and the proposal was accepted in July 1998. Boeing issued a purchase order to KAMAG for the design and fabrication of two new Payload Canister Transporters, primarily intended to meet the requirements of the Space Shuttle program. Since that time, Boeing has been working with KAMAG developing a plan to customize the transporters and preparing the transporters for delivery to KSC.

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**January 21, 2000**  
**KSC Contact: Bruce Buckingham**  
**KSC Release No. 10-00**

## **CONFERENCE FEATURES NASA STUDIES FOR GROUNDWATER CLEANUP**

There is a "bakeoff" in the works at Kennedy Space Center but the judging is not about cakes and pies. It's about ways to "cook" the soil in an effort to clean up groundwater contamination.

An environmental research project involving the Department of Defense, Environmental Protection Agency, Department of Energy and NASA has been evaluating groundwater cleanup techniques at Launch Complex 34 on the Cape Canaveral Air Station. Concentrations of trichloroethylene solvent have been identified in the soil there as a result of cleaning methods for rocket parts during the Apollo Program in the 60s.

Officially known as the Interagency NDAPL Consortium (IDC), the group is studying three contamination cleanup technologies: Six Phase Soil Heating, Steam Injection and In Situ Oxidation with Potassium Permanganate. The study has been dubbed the remediation "bakeoff" because two of the methods involve applying heat to the contaminated soil, through electrical current and steam. The thermal technologies remove the contamination from the groundwater by changing the trichloroethylene from a liquid to a gas. Once the gas bubbles up to the surface, it can be vacuumed off and treated. The potassium permanganate technology uses chemically-bound oxygen to destroy the contaminant in place, producing nontoxic byproducts. All three methods may offer a way to remove the contaminants in months instead of decades.

On Jan. 25-26, more than 250 representatives from environmental and Federal agencies are expected to attend an open house/conference at the Early Space Exploration Conference Center, Kennedy Space Center Visitor Complex, to learn about these cleanup technologies and their possible application in other cities and states. The two-day conference will include technology demonstrations at Complex 34 and site tours.

**NOTE TO EDITORS:** Media interested in attending the presentations should arrive at the Early Space Exploration Conference Center at the Kennedy Space Center Visitor Complex by 8:45 a.m., Jan. 26. Arrangements will be made to escort the media to the Complex 34 groundwater cleanup site for demonstrations.

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**January 24, 2000**  
**KSC Contact: Bruce Buckingham**  
**KSC Release No. 11-00**

**KSC MARROW DONOR MEETS RECIPIENT DURING ANNUAL  
MARROW REGISTRATION KICK-OFF CEREMONY**

The KSC community is hosting the third annual Marrow Registration Drive Kick-off Ceremony on Friday, Jan. 28 at 9 a.m. at the NASA Training Auditorium. During the ceremony, KSC's first marrow donor, Ed Markowski, will meet the recipient of his marrow for the first time.

Markowski registered to become a potential donor during Kennedy Space Center's second marrow registration drive in 1997. Eight months later, Markowski received a letter from the American Red Cross advising him that he was a potential match for a 41-year-old man with chronic myelogenous leukemia. In January of 1999, Markowski donated his marrow, giving this man the gift of life. For the last year Markowski and his recipient have been communicating via letters exchanged through the American Red Cross. Due to regulations set forth by the National Marrow Donor Program (NMDP), neither Markowski nor the recipient was permitted to exchange his name or location for one year after the donation process.

"I am excited to finally meet my recipient face-to-face," said Markowski. "This meeting, on the center stage of the Training Auditorium where I first registered to become a donor, is a happy ending to this wonderful opportunity of helping save someone's life."

KSC Civil Service and Contractor teams are working with the American Red Cross to educate and recruit as many potential marrow donors as possible from KSC, Cape Canaveral Air Station (CCAS) and off-site facilities in Cape Canaveral. Through previous year's efforts, KSC has added approximately 1500 new potential marrow donors to the National Marrow Donor Program (NMDP) Registry.

Established in 1986, the NMDP assists patients in their search for compatible unrelated marrow donors. The NMDP operates through a network of hospitals, donor centers and recruitment groups that assist the NMDP in recruitment efforts. Currently, the NMDP Registry contains information on nearly 3.8 million volunteer potential donors. As of Oct. 31, 1999, the NMDP has facilitated more than nine thousand unrelated marrow transplants. Marrow transplants are the only real "cure" for many diseases such as leukemia and sickle cell anemia.

Only a small blood sample is required to register to become a potential marrow donor. Bone marrow is requested at a later time when a compatible match has been determined. Marrow compatibility between donor and recipient is an important part of a successful marrow transplant. We inherit our particular marrow characteristics in a similar way to how we inherit, skin, hair and eye color. For this reason, a patient has about a 25 percent chance of finding a match with a brother or sister. For patients without a compatible

sibling, the NMDP assists their search for an unrelated match.

Funding for the drive is being provided by the American Red Cross and by various KSC Contractor Organizations. The drive is scheduled on Feb. 15-18, in various locations at KSC, CCAS and Cape Canaveral.

For further information on the NMDP, call 1-800-MARROW-2 or visit the Web site at [www.marrow.org](http://www.marrow.org)

**NOTE TO EDITORS:** Media interested in viewing the kick-off ceremony and speaking with marrow donor Ed Markowski and the recipient of his marrow must report to the KSC Press Site by 8:30 a.m. on Jan. 28 to be escorted to the KSC Training Auditorium ceremony.

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**January 26, 2000**  
**KSC Contact: Bruce Buckingham**  
**KSC Release No. 12-00**

**Notice to Editors/News Directors:**  
**MISSION STS-99 EVENTS, KSC NEWS CENTER OPERATING**  
**HOURS SET**

News conferences, events and operating hours for KSC's News Center have been set for the Jan. 31 launch of the Space Shuttle Endeavour on Mission STS-99, the 97th launch in the Shuttle program. Launch on Jan. 31 is set for 12:47 p.m. at the opening of a 2-hour, 2-minute window. The conferences and events will be carried live on NASA Television unless otherwise noted, and originate from the KSC Press Site.

The six-member STS-99 crew is scheduled to arrive at KSC on Thursday, Jan. 27 at about 12 noon EST. News media representatives planning to cover the event must be at the News Center by 11 a.m. (in the event of a possible early crew arrival) for transportation to the Shuttle Landing Facility.

News media representatives with proper authorization may obtain STS-99 mission credentials at the Pass and Identification Building on State Road 3 (south of KSC) on Merritt Island during published times. (Credential and badging hours are listed below.)

In addition to daily 9 a.m. countdown status briefings, the pre-launch press conference will be held two days before launch and a Shuttle Radar Topography Mission (SRTM) science briefing will be held the day prior to liftoff.

-- end of general release --

**STS-99 BRIEFING & EVENTS SCHEDULE** *(all times are EST)*

*(All briefings are held inside the KSC Press Site auditorium and will be carried live on NASA TV unless otherwise noted)*

***12 p.m. Thursday, Jan. 27 ----- STS-99 Flight Crew Arrival (Live on NASA TV)***

**L-3 Days - Friday, Jan. 28**

(Launch countdown begins at 5:30 p.m.)

***9 a.m. ----- Countdown Status Briefing***

- Doug Lyons, NASA Test Director
- Scott Higginbotham, STS-99 Payload Manager
- Ed Priselac, Shuttle Weather Officer

**L-2 Days - Saturday, Jan. 29**

***9 a.m. ----- Countdown Status Briefing***

- Doug Lyons, NASA Test Director
- Scott Higginbotham, STS-99 Payload Manager
  - Ed Priselac, Shuttle Weather Officer

**4 p.m. ----- Pre-launch News Conference**

- Ron Dittmore, Shuttle Program Manager, JSC
- Dave King, Director of Shuttle Operations, NASA, Kennedy Space Center
- European Space Agency representative TBD
- NASDA representative TBD
- Captain Clif Stargardt, Staff Meteorologist, 45th Weather Squadron, USAF

**L-1 Day - Sunday, Jan. 30**

**9 a.m. ----- Countdown Status Briefing**

- Jeff Spaulding, NASA Test Director
- Scott Higginbotham, STS-99 Payload Manager
- Ed Priselac, Shuttle Weather Officer

**9:30 a.m. ----- Shuttle Radar Topography Mission Briefing**

- Dr. Ghassem Asrar, Associate Administrator for Earth Science, NASA HQ
- Lt. General James C. King, director of National Imagery and Mapping Agency
- Professor Achim Bachem, Member of the Executive Board of DLR

**L-0 Day - Monday, Jan. 31**

*(Tanking begins at about 4:30 a.m. Monday)*

**7 a.m. ----- NASA Television live launch programming begins**

**Launch Day Crew activities:**

*12:30 a.m. ----- Wake up (Blue team)*

*7:30 a.m. ----- Wake up (Red team)*

*\*8:22 a.m. -----Breakfast/Lunch (Crew Photo)*

*8:52 a.m. ----- Weather briefing*

*\*9:15 a.m. ----- Suit up photo*

*\*9:32 a.m. ----- Walkout*

*\*10:02 a.m. --- Arrive at pad*

*\*11:17 a.m. --- Close hatch*

***\*12:47 p.m. --- Launch of Endeavour***

*(\* Carried live on NASA TV)*

**Launch + 1 hour ----- Post-launch Press Conference**

- Bill Gerstenmaier, Shuttle Program Integration Manager, JSC
- Dave King, Director of Shuttle Operations, KSC

**(STS-99 MISSION STATUS BRIEFINGS WILL BE HELD DAILY THROUGHOUT THE MISSION. TIMES OF THESE BRIEFINGS ARE**

AVAILABLE IN THE NASA TV SCHEDULE AT:  
<http://www.spaceflight.nasa.gov/realdata/nasatv/schedule.html>)

**KSC News Center office hours for STS-99**

*(Times may be adjusted in real time depending on mission events and timelines.)*

Friday, Jan. 28 (*Launch minus 3 days*) ----- 8 a.m. - 6 p.m.  
Saturday, Jan. 29 (*Launch minus 2 days*) ----- 8 a.m. - 7 p.m.  
Sunday, Jan. 30 (*Launch minus 1 day*) ----- 8 a.m. - 8 p.m.  
Monday, Jan. 31 (*Launch Day*) *Flight day 1* ----- 12 a.m. - 7 p.m.  
Tues.- Fri., Feb.1-4 - *Flight days 2-5* ----- 8 a.m. - 4:30 p.m.  
Sat./Sun., Feb. 5-6 - *Flight days 6-7* ----- Office Closed  
Mon.-Thurs., Feb. 7-10 - *Flight days 8-11* ----- 8 a.m. - 4:30 p.m.  
Friday, Feb. 11 (*Landing day*) *Flight day 12* ----- 8 a.m. - 12 midnight

News media may obtain STS-99 mission credentials at the Pass and Identification Building at Gate 2 on State Road 3, Merritt Island, during the following times:

**Pass and Identification Hours**

L-4 / Thursday, Jan. 27 ----- 8 - 10:30 a.m.  
L-3 / Friday, Jan. 28 ----- 8 a.m. - 4:30 p.m.  
L-2 / Saturday, Jan. 29 ----- 8 a.m. - 4:30 p.m.  
L-1 / Sunday, Jan. 30 ----- 8 a.m. - 4:30 p.m.  
L-0 / Monday, Jan. 31 ----- 5 - 11:30 a.m.

News media with annual Shuttle credentials are reminded to sign the logbook at the query counter in the News Center.

**NEWS MEDIA ARE REQUIRED TO BE UNDER PUBLIC AFFAIRS ESCORT AT ALL TIMES WHILE AT KSC EXCEPT WHEN DRIVING TO THE NEWS CENTER OR THE COMPLEX 39 CAFETERIA.**

**NEWS MEDIA ARE ALLOWED AT THE PRESS SITE ONLY WHEN PUBLIC AFFAIRS PERSONNEL ARE ON DUTY AND THE NASA NEWS CENTER IS OPEN.**

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**January 26, 2000**  
**KSC Contact: Joel Wells**  
**KSC Release No. 13-00**

## **SHUTTLE MISSION STS-99 LAUNCH COUNTDOWN BEGINS JAN. 28**

NASA will begin the countdown for launch of Space Shuttle Endeavour on mission STS-99 Jan. 28, at 5:30 p.m. EST at the T-43 hour mark. The KSC launch team will conduct the countdown from Firing Room 3 of the Launch Control Center.

The countdown includes 24 hours and 17 minutes of built-in hold time leading to a launch time at 12:47 p.m. on Jan. 31. The launch window extends for 2 hours and 2 minutes.

STS-99 is the first Space Shuttle mission of 2000, the 14th flight of the orbiter Endeavour and the 97th flight overall in NASA's Space Shuttle program. STS-99 is scheduled to last 11 days, 4 hours, and 8 minutes with a planned KSC landing at 4:55 p.m. on Feb. 11.

Endeavour rolled out of Kennedy Space Center's Orbiter Processing Facility bay on Dec. 2, 1999, and mated with the external tank and solid rocket boosters in the Vehicle Assembly Building. The complete Shuttle stack was transported to Pad 39A on Dec. 13.

On mission STS-99, Endeavour and crew will capture the most accurate elevation measurements of the Earth's surface ever attained. Using a unique radar system dubbed Shuttle Radar Topography Mission (SRTM), STS-99 will glean valuable 3-D mapping images for application in many different fields. Besides enhancing map production capabilities, SRTM measurements could lead to improved military planning, water drainage modeling, flight simulator development, and navigation safety.

The STS-99 crew includes: Commander Kevin Kregel, Pilot Dom Gorie, Mission Specialists Janet Kavandi, Janice Voss, Mamoru Mohri, and Gerhard Thiele.

The crew is scheduled to arrive at KSC at about noon on Jan. 27. Their activities at KSC prior to launch will include crew equipment fit checks, medical examinations and opportunities to fly in the Shuttle Training Aircraft.

(end of general release)

### **COUNTDOWN MILESTONES**

\*all times are Eastern

#### **Launch -3 Days (Friday, Jan. 28)**

- Prepare for the start of the STS-99 launch countdown
- Perform the call-to-stations (5 p.m.)
- Countdown begins at the T-43 hour mark (5:30 p.m.)
- Begin final vehicle and facility close-outs for launch
- Check out back-up flight systems
- Review flight software stored in mass memory units and display systems

- Load backup flight system software into Endeavour's general purpose computers
- Begin stowage of flight crew equipment (8:30 p.m.)

### **Launch -2 Days (Saturday, Jan. 29)**

- Remove mid-deck and flight-deck platforms (1:30 a.m.)
- Activate and test navigational systems
- Complete preparations for loading of power reactant storage and distribution system
- Middeck and flight deck preliminary inspections complete (9:30 a.m.)

**Enter first built-in hold at T-27 hours for duration of 4 hours (9:30 a. m.)**

- Clear launch pad of all non-essential personnel
- Perform test of the vehicle's pyrotechnic initiator controllers (10:30 a.m.)

**Resume countdown (1:30 p.m.)**

- Begin operations to load cryogenic reactants into Endeavour's fuel cell storage tanks (1:30 – 9:30 p.m.)

**Enter 4-hour built-in hold at T-19 hours (9:30 p.m.)**

- Begin filling pad sound suppression system water tank
- Demate orbiter mid-body umbilical unit (10 p.m.)

### **Launch -1 Day (Sunday, Jan. 30)**

- Resume orbiter and ground support equipment close-outs
- Pad sound suppression system water tank filled (1:30 a.m.)

**Resume countdown (1:30 a.m.)**

- Start final preparations of the Shuttle's three main engines for main propellant tanking and flight
- Install mission specialists' seats in crew cabin begins (3:30 a.m.)
- Close-out the tail service masts on the mobile launcher platform

**Enter planned hold at T-11 hours for 12 hours, 57 minutes (9:30 a.m.)**

- Begin startracker functional checks (10:30 a.m.)
- Activate orbiter's inertial measurement units
- Activate the orbiter's communications systems
- Install film in numerous cameras on the launch pad (1:30 p.m.)
- Flight crew equipment late stow (2 p.m.)
- Move Rotating Service Structure (RSS) to the park position (6:30 p.m.)
- Perform ascent switch list

**Resume countdown (10:27 p.m.)**

- Fuel cell flow-through purge complete
- Activate the orbiter's fuel cells (11:37 p.m.)

### **Launch Day (Monday, Jan. 31)**

- Clear the blast danger area of all non-essential personnel
- Switch Endeavour's purge air to gaseous nitrogen (12:42 a.m.)

**Enter planned 1-hour built-in hold at the T-6 hour mark (3:27 a.m.)**

- Launch team verifies no violations of launch commit criteria prior to cryogenic loading of the external tank (3:30 a.m.)
- Clear pad of all personnel
- Chilldown of propellant transfer lines
- Begin loading the external tank with about 500,000 gallons of cryogenic propellants (about 4 a.m.)

**Resume countdown (4:27 a.m.)**

- Complete filling the external tank with its flight load of liquid hydrogen and liquid oxygen propellants (about 7 a.m.)
- Close-out crew and Final Inspection Team proceed to launch pad (about 7:15 a.m.)

**Enter planned 2-hour built-in hold at T-3 hours (7:27 a.m.)**

- Perform inertial measurement unit preflight calibration
- Align Merritt Island Launch Area (MILA) tracking antennas
- Perform open loop test with Eastern Range

**Resume countdown at T-3 hours (9:27 a.m.)**

- Crew departs Operations and Checkout Building for the pad (9:32 a.m.)
- Complete close-out preparations in the white room
- Check cockpit switch configurations
- Flight crew begins entry into the orbiter (about 10:02 a.m.)
- Astronauts perform air-to-ground voice checks with Launch and Mission Control
- Close Endeavour's crew hatch (about 11:17 a.m.)
- Begin Eastern Range final network open loop command checks
- Perform hatch seal and cabin leak checks
- Complete white room close-out
- Close-out crew moves to fallback area
- Primary ascent guidance data is transferred to the backup flight system

**Enter planned 10-minute hold at T-20 minutes (12:07 p.m.)**

- NASA Test Director conducts final launch team briefings
- Complete inertial measurement unit pre-flight alignments

**Resume countdown (12:17 p.m.)**

- Transition the orbiter's onboard computers to launch configuration
- Start fuel cell thermal conditioning
- Close orbiter cabin vent valves
- Transition backup flight system to launch configuration

**Enter planned 10-minute hold at T-9 minutes (12:28 p.m.)**

- Launch Director, Mission Management Team and NASA Test Director conduct

final polls for go/no go to launch

**Resume countdown at T-9 minutes (12:38 p.m.)**

- Start automatic ground launch sequencer (T-9:00 minutes)
- Retract orbiter crew access arm (T-7:30)
- Start mission recorders (T-6:15)
- Start Auxiliary Power Units (T-5:00)
- Arm SRB and ET range safety safe and arm devices (T-5:00)
- Start liquid oxygen drainback (T-4:55)
- Start orbiter aerosurface profile test (T-3:55)
- Start main engine gimbal profile test (T-3:30)
- Pressurize liquid oxygen tank (T-2:55)
- Begin retraction of the gaseous oxygen vent arm (T-2:55)
- Fuel cells to internal reactants (T-2:35)
- Pressurize liquid hydrogen tank (T-1:57)
- Deactivate SRB joint heaters (T-1:00)
- Orbiter transfers from ground to internal power (T-0:50 seconds)
- Ground Launch Sequencer go for auto sequence start (T-0:31 seconds)
- SRB gimbal profile (T-0:21 seconds)
- Ignition of three Space Shuttle main engines (T-6.6 seconds)
- SRB ignition and liftoff (T-0)

<b>SUMMARY OF BUILT-IN HOLDS FOR STS-99</b>			
<b>T-TIME</b>	<b>LENGTH OF HOLD</b>	<b>HOLD BEGINS</b>	<b>HOLD ENDS</b>
T-27 hours	4 hours	9:30 a.m. Sat.	1:30 p.m. Sat.
T-19 hours	4 hours	9:30 p.m. Sat.	1:30 a.m. Sun.
T-11 hours	12 hours, 57 minutes	9:30 a.m. Sun.	10:27 p.m. Sun.
T-6 hours	1 hour	3:27 a.m. Mon.	4:27 a.m. Mon.
T-3 hours	2 hours	7:27 a.m. Mon.	9:27 a.m. Mon.
T-20 minutes	10 minutes	12:07 p.m. Mon.	12:17 p.m. Mon.
T-9 minutes	10 minutes	12:28 p.m. Mon.	12:38 p.m. Mon.

<b>CREW FOR MISSION STS-99</b>	
<b>POSITION</b>	<b>NAME</b>
Commander (CDR)	Kevin Kregel
Pilot (PLT)	Dom Gorie
Mission Specialist (MS1)	Gerhard Thiele
Mission Specialist (MS2)	Janet Kavandi
Mission Specialist (MS3)	Janice Voss
Mission Specialist (MS4)	Mamoru Mohri

**SUMMARY OF STS-99 LAUNCH DAY CREW ACTIVITIES**  
**Monday, Jan. 31**

12:30 a.m.	Wake up Blue Team (PLT, MS3 and MS4)
1:00 a.m.	Blue Team breakfast
7:30 a.m.	Wake up Red Team (CDR, MS1 and MS2)
8:22 a.m.*	Blue Team lunch/Red Team breakfast and photo
8:52 a.m.	Weather briefing (CDR, PLT, MS2)
8:52 a.m.*	Don launch and entry suits (MS1, MS3 & MS4)
9:02 a.m.*	Don launch and entry suits (CDR, PLT, MS2)
9:32 a.m.*	Depart for Launch Pad 39A
10:02 a.m.*	Arrive at white room and begin ingress
11:17 a.m.*	Close crew hatch
12:47 p.m.*	Launch

\*Televised events (times may vary slightly)  
All times Eastern

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**January 26, 2000**

**KSC Contact: Bruce Buckingham/Denise Coleman**

**KSC Release No. 14-00**

## **LOCAL MIDDLE SCHOOL STUDENTS PARTICIPATE IN UPCOMING MISSION OF SPACE SHUTTLE ENDEAVOUR**

NASA has created one answer in assisting teacher's with an age-long quest to interest students about science, geography, mathematics and space. Students attending two local middle schools, Ronald McNair in Rockledge, FL, and Space Coast in Port St. John, FL, have been preparing to access a special camera on the Shuttle, called EarthKAM.

EarthKAM, a program sponsored by NASA and classrooms across the nation, enables students to take photographs of Earth from a camera flown on the Shuttle. An Electronic Still Camera (ESC) bracket-mounted to the overhead starboard window of the orbiter aft flight deck will allow the classrooms to observe various student-selected sites. Students work collectively and use interactive web pages to monitor the Shuttle's flight path. Within hours, classrooms can access the digital images on the web and use them to conduct their own investigation about Earth.

The Student Mission Operations Center will utilize round-the-clock efforts requiring students, teachers and parents to take turns manning the center. The Shuttle takes about 90 minutes to orbit the Earth, half of this time is daylight and half is dark. Because the camera only operates in daylight, students have about 45 minutes per orbit to take pictures and select new targets for each orbit.

"We are thrilled that we can offer this rare and unique opportunity to the students at Ronald McNair and Space Coast Middle Schools," said Denise Coleman, education outreach specialist at Kennedy Space Center. "This program allows students to take an active part in the space program at an early age, and we hope this exposure will encourage them to dream about being the scientists and astronauts of the future."

There have been four previous missions in which students captured more than 2,000 high-resolution digital images of Earth. The images were used in classroom projects to learn about science and geography, develop skills of investigation and image analysis, and learn how to use computers and the Internet.

The students and teachers will be attending the launch of Space Shuttle Endeavour, currently scheduled for Jan. 31, 2000 at 12:47 p.m., to watch as EarthKAM is launched into space giving them a personal, up-close view of the world we live in.

For more information about the EarthKAM program visit the web site at [www.earthkam.ucsd.edu](http://www.earthkam.ucsd.edu).

-- end --

**Note to Editors:** To schedule an interview with students participating in the project or to visit an EarthKAM classroom, please contact Denise Coleman at (321)867-4444.

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**January 29, 1999**  
**KSC Contact: George H. Diller**  
**KSC Release No. 15-00**

**SPACE SHUTTLE WEATHER LAUNCH COMMIT CRITERIA AND KSC END OF MISSION WEATHER LANDING CRITERIA**

The launch weather guidelines involving the Space Shuttle and expendable rockets are similar in many areas, but a distinction is made for the individual characteristics of each. The criteria are broadly conservative and assure avoidance of possibly adverse conditions. They are reviewed for each launch.

For the Space Shuttle, weather forecasts are provided by the U. S. Air Force Range Weather Operations Facility at Cape Canaveral beginning at Launch minus 3 days in coordination with the NOAA National Weather Service Space Flight Meteorology Group (SMG) at the Johnson Space Center in Houston. These include weather trends and their possible effects on launch day. A formal prelaunch weather briefing is held on Launch minus 1 day which is a specific weather briefing for all areas of Space Shuttle launch operations.

Launch weather forecasts, ground operations forecasts, and launch weather briefings for the Mission Management Team and the Space Shuttle Launch Director are prepared by the Range Weather Operations Facility. Forecasts which apply after launch are prepared by SMG. These include all emergency landing forecasts and the end of mission forecasts briefed by SMG to the astronauts, the Flight Director and Mission Management Team.

During the countdown, formal weather briefings occur approximately as follows:

- L-24 hr 0 min: Briefing for Flight Director and astronauts
- L-21 hr 0 min: Briefing for removal of Rotating Service Structure
- L-9 hr 00 min: Briefing for external tank fuel loading
- L-4 hr 30 min: Briefing for Space Shuttle Launch Director
- L-3 hr 55 min: Briefing for astronauts
- L-2 hr 10 min: Briefing for Flight Director
- L-0 hr 35 min: Briefing for launch and RTLS
- L-0 hr 13 min: Poll all weather constraints

The basic weather launch commit criteria on the pad at liftoff must be:

**Temperature:** Prior to external tank propellant loading, tanking will not begin if the 24 hour average temperature has been below 41 degrees.

After tanking begins, the countdown shall not be continued nor the Shuttle launched if:

- a.) the temperature exceeds 99 degrees for more than 30 consecutive minutes.
- b.) the temperature is lower than the prescribed minimum value for longer than 30 minutes unless sun angle, wind, temperature and relative humidity conditions permit recovery. The minimum temperature limit in degrees F. is specified by the table below and is a function of the five minute average of temperature, wind and humidity. The table becomes applicable when the observed temperature reaches 48 degrees. In no case may the Space Shuttle be launched if the temperature is 35 degrees or colder.

Wind Speed	Relative Humidity
------------	-------------------

(kts)	0-64%	65-74%	75-79%	80-89%	90-100%
0 - 1	48	47	46	45	44
2	47	46	45	44	43
3	41	41	41	40	39
4	39	39	39	39	38
5 - 7	38	38	38	38	38
8 - 14	37	37	37	37	37
>14	36	36	36	36	36

The above table can be used to determine when conditions are again acceptable for launch if parameters have been out of limits for thirty minutes or less. If longer than thirty minutes, a mathematical recovery formula of the environmental conditions is used to determine if a return to acceptable parameters has been achieved. Launch conditions have been reached if the formula reaches a positive value.

**Wind:** Tanking will not begin if the wind is observed or forecast to exceed 42 knots for the next three hour period.

For launch the wind constraints at the launch pad will vary slightly for each mission. The peak wind speed allowable is 30 knots. However, when the wind direction is between 100 degrees and 260 degrees, the peak speed varies for each mission and may be as low as 24 knots.

The upper atmosphere wind profile must conform to either one of two wind loading programs developed by the Johnson Space Center. This profile is determined by a series of Jimsphere wind balloon releases from Cape Canaveral Air Station. A final recommendation is made by the JSC Launch Systems Evaluation Advisory Team (LSEAT) to the KSC launch director at Launch minus 30 minutes. The Space Shuttle will not be launched within 30 minutes of the time a determination has been made that the upper wind profile will adversely affect the performance of the launch vehicle.

A downrange weather advisory shall be issued by the Shuttle Weather Officer to the Mission Management Team for their consideration if the wind in the solid rocket booster recovery area is forecast to exceed 26 knots during retrieval operations. Seas in excess of Sea State 5 (8-13 feet) may also be a factor considered by the Mission Management Team.

**Precipitation:** None at the launch pad or within the flight path.

**Lightning (and electric fields with triggering potential):**

- Tanking will not begin if there is forecast to be greater than a 20% chance of lightning within five nautical miles of the launch pad during the first hour of tanking. The launch director with the concurrence of the safety director may make an exception after consultation with the Shuttle Weather Officer.
- Do not launch if lightning has been detected within 10 nautical miles of the pad or the planned flight path within 30 minutes prior to launch. Launch may occur if the source of lightning has moved more than 10 nautical miles away from the pad or the flight path and a field mill, used to measure electric fields, is located within 5 nautical miles of the lightning flash.
- The one-minute average of the electric field mill network may not exceed -1 or +1 kilovolt per meter within five nautical miles of the launch pad or the lightning flash at any time within 15 minutes prior to launch. This field mill criteria becomes -1.5 or + 1.5 kilovolts per meter if there are no clouds within 10 nautical miles of the flight path except those which are transparent. Also excepted are clouds with tops below the 41 degrees F. temperature level that have not have been

previously associated with a thunderstorm, or associated with convective clouds having tops above the 14 degrees F. temperature level during the last three hours.

- Do not launch when lightning is observed and the cloud which produced the lightning is within 10 nautical miles of the flight path. Launch may not occur until 30 minutes has elapsed since the lightning flash, or the cloud has moved more than 10 nautical miles away.

**Clouds:** (types known to contain hazardous electric fields)

- Do not launch if any part of the planned flight path is through a layer of clouds any part of which is within 5 nautical miles is 4,500 feet thick or greater and the temperature of any part of the layer is between 32 degrees F. and -4 degrees F. Launch may occur if the cloud layer is a cirrus-like cloud that has never been associated with convective clouds, is located entirely at temperatures of 5 degrees F. or colder, and shows no evidence of containing water droplets.
- Do not launch through cumulus type clouds with tops higher than the 41 degree F. temperature level. Launch may occur through clouds as cold as 23 degrees F. if the cloud is not producing precipitation, and all field mills within 5 nautical miles of the flight path and at least one field mill within 2 nautical miles of the cloud center read between -100 volts per meter and +500 volts per meter.
- Do not launch 1.) through or within 5 nautical miles of the nearest edge of cumulus type clouds with tops higher than the 14 degree F level; 2) through or within 10 nautical miles of the nearest edge of cumulus clouds with tops higher than the -4 degrees F. level.
- Do not launch if the flight path is through any non-transparent clouds that extend to altitudes at or above the 32 degrees F. level which are associated with disturbed weather producing moderate or greater precipitation, or melting precipitation, within five nautical miles of the flight path.
- Do not launch through an attached anvil cloud. If lightning occurs in the anvil or the associated main cloud, do not launch within 10 nautical miles for the first 30 minutes after lightning is observed, or within 5 nautical miles from 30 minutes to 3 hours after lightning is observed.
- Do not launch if the flight path will carry the vehicle:
  - a.) through non-transparent parts of a detached anvil for the first three hours after the anvil detaches from the parent cloud, or the first four hours after the last lightning occurs in the detached anvil.
  - b.) within 10 nautical miles of non-transparent parts of a detached anvil for the first thirty minutes after the time of the last lightning in the parent or anvil cloud before detachment, or the detached anvil after its detachment.
  - c.) within 5 nautical miles of non-transparent parts of a detached anvil for the first three hours after the time of the last lightning in the parent or anvil cloud before detachment, or the detached anvil after detachment, unless there is a field mill within 5 nautical miles of the detached anvil reading less than 1,000 volts per meter for the last 15 minutes and a maximum radar returns from any part of the detached anvil within 5 nautical miles of the flight path have been less than 10 dBZ (light rain) for 15 minutes.
- Do not launch if the flight path will carry the vehicle through a thunderstorm or cumulonimbus debris cloud which is not transparent and less than three hours old. Launch may not occur within five nautical miles of these debris clouds unless: 1) for 15 minutes preceding launch there is at least one working field mill within five nautical miles of the debris cloud; 2) all electric field mill readings are between -1 kilovolt and + 1 kilovolt per meter within five nautical miles of the flight path; 3) no precipitation has been detected in the debris cloud (less than 10 dbz by radar) within 5

nautical miles of the flight path.

- Do not launch if the flight path will carry the vehicle through any cumulus cloud that has developed from a smoke plume while the cloud is attached to the plume, or for the first 60 minutes after the cumulus cloud detaches from the smoke plume.

**Supporting Table: KSC Seasonal Altitudes of Temperature Levels in thousands of feet**

January				July			
Temp	Low	Avg	High	Temp	Low	Avg	High
-4 F	21 Kft	24 Kft	26 Kft	-4 F	23 Kft	27 Kft	29 Kft
14	13	18	21	14	18	21	23
23	9	15	18	23	16	18	20
32	sfc	12	16	32	13	15	18
41	sfc	9	14	41	10	12	15

**Range Safety Cloud Ceiling and Visibility constraints:**

- Direct visual observation of the Shuttle is required through 8,000 feet. This requirement may be satisfied using optical tracking sites or a forward observer
- For cloud ceilings of any thickness between 6,000 feet and 8,000 feet the following conditions must be met for launch to occur:
  - a.) the vehicle integrity can be observed without interruption through 6,000 feet.
  - b.) all required Range Safety instrumentation is functioning properly
  - c.) the U.S. Air Force 45th Space Wing Commander approves the decision to proceed
- For cloud ceilings between 4,000 feet and 6,000 feet the following conditions must be met for launch to proceed:
  - a.) the thickness of the clouds must be less than 500 feet
  - b.) the vehicle integrity can be monitored by the Eastern Range airborne and/or the ground forward observers through 8,000 feet
  - c.) all required Range Safety instrumentation is functioning properly
  - d.) the U.S. Air Force 45th Space Wing Commander approves the decision to proceed

A "Good Sense Rule" is in effect for launch which states: "Even when constraints are not violated, if any other hazardous conditions exist, the launch weather officer will report the threat to the launch director. The launch director may hold at any time based on the instability of the weather."

**CONTINGENCY FLIGHT RULES**

Weather criteria for an emergency landing must be considered along with launch criteria since the possibility exists for a Return To Launch Site abort (RTL), landings at the Trans-Oceanic Abort Landing Sites (TAL), the Abort Once Around (AOA) sites and the first day Primary Landing Site (PLS). These forecasts are prepared by the NOAA National Weather Service Spaceflight Meteorology Group in Houston and briefed by them to the astronauts, Flight Director and Mission Management Team. All criteria refer to

observed and forecast weather conditions except for the first day PLS which is forecast weather only.

- For RTLS with redundant Microwave Landing System (MLS) capability and a weather reconnaissance aircraft, cloud coverage 4/8 or less below 5,000 feet and a visibility of 4 statute miles or greater are required. For AOA and PLS sites, cloud coverage 4/8 or less below 8,000 feet and a visibility of 5 statute miles or greater is required. For TAL sites, cloud coverage 4/8 or less below 5,000 feet and a visibility of 5 statute miles or greater are required.
- For landing on a hard surface runway without redundant Microwave Landing System (MLS) capability all sites require a ceiling not less than 10,000 feet and a visibility of at least 7 statute miles. Landing at night on a lake bed runway may occur if the ceiling is not lower than 15,000 feet and the visibility is 7 miles or greater with at least non-redundant MLS capability .
- For the RTLS site and TAL sites, no thunderstorms, lightning, or precipitation within 20 nautical miles of the runway, or within 10 nautical miles of the final approach path extending outward to 30 nautical miles from the end of the runway.
- An RTLS rule exception may be made for light precipitation within 20 nautical miles of the runway if the specific criteria listed below are met:
  - a.)** The tops of the clouds containing precipitation do not extend into temperature regions colder than 41 (F.); they have not been colder than 14 (F. ) within 2.5 hours prior to launch; the radar reflectivity is less than 30 dbz at all levels within and below the clouds.
  - b.)** Precipitation covers less than 10% of the area within 20 nautical miles of the runway, or multiple heading alignment circles are clear of showers.
  - c.)** The movement of the showers is observed to be consistent and no additional convective development is forecast.
  - d.)** Touchdown/rollout criteria and associated navigational aids meet the specified prelaunch go/no go requirements.

If showers exceed either parameter of part a.) above, an RTLS landing may still occur if a 2 nautical mile vertical clearance can be maintained from the top of any shower within 10 nautical miles of the approach paths.

- For RTLS and TAL sites, no detached opaque thunderstorm anvils less than three hours old within 15 nautical miles of the runway, or within 5 nautical miles of the final approach path extending outward to 30 nautical miles from the end of the runway.
- For AOA and PLS sites, no thunderstorms, lightning or precipitation within 30 nautical miles of the runway, or within 20 nautical miles of the final approach path extending to 30 nautical miles from the end of the runway.
- For RTLS and the TAL sites, no detached opaque thunderstorm anvil cloud less than 3 hours old within 15 nautical miles of the runway or within 5 nautical miles of the final approach path extending outward to 30 nautical miles from the end of the runway.
- For AOA and PLS sites, no detached opaque thunderstorm anvil cloud less than 3 hours old within 20 nautical miles of the runway or within 10 nautical miles of the final approach path extending to 30 nautical miles from the end of the runway.
- The RTLS crosswind component may not exceed 15 knots. If the astronaut flying weather reconnaissance in the Shuttle Training Aircraft executes the approach and considers the landing

conditions to be acceptable, this limit may be increased to 17 knots. For the TAL, AOA and PLS sites there is a night-time crosswind limit of 12 knots.

- **Headwind:** not to exceed 25 knots.
- **Tailwind:** not to exceed 10 knots average, 15 knots peak.
- **Turbulence:** conditions must be less than or equal to moderate intensity.

### **KSC END OF MISSION LANDING WEATHER FLIGHT RULES**

The end of mission landing weather forecast is prepared by the NOAA National Weather Service Spaceflight Meteorology Group in Houston for the astronauts, Flight Director and Mission Management Team. All criteria refer to observed and forecast weather conditions. Decision time for the deorbit burn is 70 - 90 minutes before landing. The weather criteria are:

- Cloud coverage of 4/8 or less below 8,000 feet and a visibility of 5 miles or greater required.
- The peak cross wind cannot exceed 15 knots, 12 knots at night. If the mission duration is greater than 20 days the limit is 12 knots, day and night.
- Headwind cannot exceed 25 knots.
- Tailwind cannot exceed 10 knots average, 15 knots peak.
- No thunderstorm, lightning, or precipitation activity is within 30 nautical miles of the Shuttle Landing Facility.
- Detached opaque thunderstorm anvils less than three hours old must not be within 20 nautical miles of the Shuttle Landing Facility, or within 10 nautical miles of the flight path when the orbiter is within 30 nautical miles of the runway.
- Turbulence must be less than or equal to moderate intensity.
- Consideration may be given for landing with a "no go" observation and a "go" forecast if at decision time analysis clearly indicates a continuing trend of improving weather conditions, and the forecast states that all weather criteria will be met at landing time.

### **WEATHER INSTRUMENTATION**

The weather equipment used by the forecasters to develop the launch and landing forecasts is:

- **Radar:** Launch forecasters located at Cape Canaveral Air Station and landing forecasters located in Houston can access displays from two different radar. One is located at Patrick Air Force Base south of Cocoa Beach. The other is located in Melbourne at the National Weather Service and is a NEXRAD Doppler radar. Each radar provides rain intensity and cloud top information out to a distance as far as 200 nautical miles. The NEXRAD radar can also provide estimates of total rainfall and radial wind velocities.
- **Field Mill Network:** Thirty-one advanced field mill sites around KSC and Cape Canaveral Air Station provide data on lightning activity and surface electric fields induced by charge aloft. This data helps forecasters determine when electric charge aloft may be sufficient to create triggered lightning during launch, and to determine when to issue and cancel lightning advisories and warnings.
- **Lightning Detection System:** Detects and plots cloud to ground lightning strikes within 125

nautical miles of the Kennedy Space Center. Location accuracy is optimum within 30 nautical miles. Locations of strikes are color coded according to time of occurrence.

- **Lightning Detection And Ranging (LDAR):** Developed by NASA at the Kennedy Space Center, LDAR plots intracloud, cloud to cloud and cloud to ground lightning in three dimensions within 100 nautical miles of the Kennedy Space Center. Location accuracy is very high within 25 nautical miles. LDAR data is important in determining the beginning and end of lightning conditions.
- **National Lightning Detection Network:** Plots cloud to ground lightning nationwide. Used to help ensure safe transit of the Space Shuttle orbiter atop the Shuttle Carrier Aircraft between Edwards Air Force Base in California and the Kennedy Space Center in Florida. It is also used to assess lightning beyond the 125 mile range of the Lightning Detection System.
- **Rawinsonde:** A balloon with a tethered instrument package which radios its altitude to the ground together with temperature, dewpoint and humidity, wind speed and direction, and pressure data. Rawinsondes reach altitudes exceeding 100,000 feet.
- **Jimsphere balloon:** A reflective balloon made of mylar tracked by radar which provides highly accurate information on wind speed and wind direction up to 60,000 feet.
- **Doppler Radar Wind Profiler:** Measures upper level wind speed and direction over Kennedy Space Center from approximately 10,000 feet to 60,000 feet. The data, received every 5 minutes, is used to ensure the upper winds used to calculate wind loads on the shuttle vehicle have not significantly changed between balloon soundings. If data from the Doppler Radar Wind Profiler indicates a possible significant change, another Jimsphere balloon is released.
- **Rocketsonde:** A 12-foot-tall instrumented rocket is launched on L-1 day which senses and transmits data on temperature, wind speed and direction, wind shear, pressure, and air density at altitudes between 65,000 feet and 370,000 feet. A four-inch in diameter solid rocket motor separates at an altitude of about 5,000 feet, after which an "instrumented dart" coasts to apogee.
- **Satellite Images and Data:** Provided directly to the satellite terminal at USAF Range Weather Operations and NOAA National Weather Service Space Flight Meteorology Group in Houston by the geostationary GOES weather satellites. In addition high resolution images are received from spacecraft in low earth orbit including both the NOAA and the Defense Meteorological Support Program (DMSP) polar orbiting satellites.
- **Meteorological Interactive Data Display System (MIDDS):** Integrates diverse weather data on a single display terminal-- satellite images, radar, computer generated graphics of surface and upper air map features, numerical weather models, current weather observations, data from meteorological towers, lightning strikes and field mill information.
- **Towers:** 33 meteorological towers are located on Kennedy Space Center and Cape Canaveral Air Station, including two at each launch pad and three at the Shuttle Landing Facility. In addition to wind, most towers are also instrumented with temperature, and moisture sensors. The 60-foot towers at the launch pads and the 33-foot towers at the Shuttle Landing Facility are closely monitored for launch and landing criteria. In addition, on the mainland, there is a network of 19 wind towers which extend outward an additional twenty miles. Tower data is an important short-term forecasting tool and also helps determine the direction and distance of toxic corridors in the event of a mishap.
- **Buoys:** Meteorological buoys are anchored 20, 110 and 160 nautical miles east-northeast of Cape Canaveral. These buoys relay hourly measurements via satellite of temperature, wind speed and direction, barometric pressure, precipitation, sea water temperature, and wave height and period. Buoy data is used for launch, landing, booster retrieval, and daily ground processing forecasts for the Kennedy Space Center and Cape Canaveral Air Station.

- **Solid Rocket Booster Retrieval Ships:** These vessels radio observed weather conditions and sea state from the booster impact area located up to 150 nautical miles downrange.
  - **Weather Reconnaissance Aircraft:** A T-38 jet and the Shuttle Training Aircraft are flown by a weather support astronaut.
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**February 4, 2000**  
**KSC Contact: Bruce Buckingham**  
**KSC Release No. 16-00**

**Notice to Editors/News Directors:**  
**MISSION STS-99 EVENTS, KSC NEWS CENTER OPERATING HOURS SET**

News conferences, events and operating hours for KSC's News Center have been set for the next launch attempt of the Space Shuttle Endeavour on Mission STS-99 on Feb. 11. This will be the 97th launch in the Shuttle program. Launch on Feb. 11 is set for 12:30 p.m. at the opening of a 2-hour, 10-minute window. The conferences and events will be carried live on NASA Television unless otherwise noted, and originate from the KSC Press Site.

The six-member STS-99 crew is scheduled to arrive at KSC on Monday, Feb. 7 at about 12 noon EST. News media representatives planning to cover the event must be at the News Center by 11 a.m. (in the event of a possible early crew arrival) for transportation to the Shuttle Landing Facility.

News media representatives with proper authorization may obtain STS-99 mission credentials at the Pass and Identification Building on State Road 3 (south of KSC) on Merritt Island during published times. (Credential and badging hours are listed below.)

In addition to daily 9 a.m. countdown status briefings, another pre-launch press conference will be held two days before launch.

-- end of general release --

**STS-99 BRIEFING & EVENTS SCHEDULE (REV. B)** (all times are EST)  
(All briefings are held inside the KSC Press Site auditorium and will be carried live on NASA TV unless otherwise noted)

***12 p.m. Monday, Feb. 7 ----- STS-99 Flight Crew Arrival (Live on NASA TV)***

**L-3 Days - Tuesday, Feb. 8**  
(Launch countdown begins at 5:30 p.m.)

***9 a.m. ----- Countdown Status Briefing***

- Doug Lyons, NASA Test Director
- Scott Higginbotham, STS-99 Payload Manager
- Ed Priselac, Shuttle Weather Officer

**L-2 Days - Wednesday, Feb. 9**

***9 a.m. ----- Countdown Status Briefing***

- Steve Altemus, NASA Test Director
- Scott Higginbotham, STS-99 Payload Manager
- Ed Priselac, Shuttle Weather Officer

**3 p.m. ----- Pre-launch News Conference**

- Ron Dittmore, Shuttle Program Manager, JSC
- Dave King, Director of Shuttle Operations, NASA, Kennedy Space Center
- Captain Clif Stargardt, Staff Meteorologist, 45th Weather Squadron, USAF

**L-1 Day - Thursday, Feb. 10**

**9 a.m. ----- Countdown Status Briefing**

- Jeff Spaulding, NASA Test Director
- Scott Higginbotham, STS-99 Payload Manager
- Ed Priselac, Shuttle Weather Officer

**L-0 Day - Friday, Feb. 11**

*(Tanking begins at about 4:15 a.m. Friday)*

**7 a.m. ----- NASA Television live launch programming begins**

**Launch Day Crew activities:**

*12:15 a.m. ----- Wake up (Blue team)*

*7:15 a.m. ----- Wake up (Red team)*

*\*8:00 a.m. ----- Breakfast/Lunch (Crew Photo)*

*8:35 a.m. ----- Weather briefing*

*\*9:00 a.m. ----- Suit up photo*

*\*9:15 a.m. ----- Walkout*

*\*9:45 a.m. --- Arrive at pad*

*\*11:00 a.m. --- Close hatch*

***\*12:30 p.m. --- Launch of Endeavour***

*(\* Carried live on NASA TV)*

**Launch + 1 hour ----- Post-launch Press Conference**

- Bill Gerstenmaier, Shuttle Program Integration Manager, JSC
- Dave King, Director of Shuttle Operations, KSC

(STS-99 MISSION STATUS BRIEFINGS WILL BE HELD DAILY THROUGHOUT THE MISSION. TIMES OF THESE BRIEFINGS ARE AVAILABLE IN THE NASA TV SCHEDULE AT:

<http://www.spaceflight.nasa.gov/realdata/nasatv/schedule.html>)

**KSC News Center office hours for STS-99**

*(Times may be adjusted in real time depending on mission events and timelines.)*

Tuesday, Feb. 8 (*Launch minus 3 days*) ----- 8 a.m. - 6 p.m.

Wednesday, Feb. 9 (*Launch minus 2 days*) ----- 8 a.m. - 7 p.m.

Thursday, Feb. 10 (*Launch minus 1 day*) ----- 8 a.m. - 8 p.m.

Friday, Feb. 11 (*Launch Day*) *Flight day 1* ----- 3 a.m. - 7 p.m.

Sat./Sun., Feb. 12-13 - *Flight days 2/3* ----- Office Closed

Mon./Fri., Feb. 14-18 - *Flight days 4/8* ----- 8 a.m. - 4:30 p.m.

Sat./Sun., Feb. 19-20 - *Flight days 9/10* ----- Office Closed

Monday, Feb. 21 (*Landing day*) *Flight day 11 (Holiday)* ----- TBD  
Tuesday, Feb. 22 (*Landing day*) *Flight day 12* ----- 8 a.m. - 12 midnight

News media may obtain STS-99 mission credentials at the Pass and Identification Building at Gate 2 on State Road 3, Merritt Island, during the following times:

**Pass and Identification Hours**

L-4 / Monday, Feb. 7 ----- 8 - 10:30 a.m.  
L-3 / Tuesday, Feb. 8 ----- 8 a.m. - 4:30 p.m.  
L-2 / Wednesday, Feb. 9 ----- 8 a.m. - 4:30 p.m.  
L-1 / Thursday, Feb. 10 ----- 8 a.m. - 4:30 p.m.  
L-0 / Friday, Feb. 11 ----- 5 - 11:30 a.m.

News media with annual Shuttle credentials are reminded to sign the logbook at the query counter in the News Center.

**NEWS MEDIA ARE REQUIRED TO BE UNDER PUBLIC AFFAIRS ESCORT AT ALL TIMES WHILE AT KSC EXCEPT WHEN DRIVING TO THE NEWS CENTER OR THE COMPLEX 39 CAFETERIA.**

**NEWS MEDIA ARE ALLOWED AT THE PRESS SITE ONLY WHEN PUBLIC AFFAIRS PERSONNEL ARE ON DUTY AND THE NASA NEWS CENTER IS OPEN.**

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**February 8, 2000**  
**KSC Contact: Joel Wells**  
**KSC Release No. 17-00**

## **COUNTDOWN BEGINS TODAY FOR THE SECOND LAUNCH ATTEMPT OF SHUTTLE MISSION STS-99**

NASA will begin the countdown for launch of Space Shuttle Endeavour on mission STS-99 Feb. 8, at 5:30 p.m. EST at the T-43 hour mark. The KSC launch team will conduct the countdown from Firing Room 3 of the Launch Control Center.

The countdown includes 24 hours of built-in hold time leading to a launch time at 12:30 p.m. on Feb. 11. The launch window extends for 2 hours and 10 minutes.

STS-99 is the first Space Shuttle mission of 2000, the 14th flight of the orbiter Endeavour and the 97th flight overall in NASA's Space Shuttle program. STS-99 is scheduled to last 11 days, 4 hours, and 8 minutes with a planned KSC landing at 4:38 p.m. on Feb. 22.

Endeavour rolled out of Kennedy Space Center's Orbiter Processing Facility bay on Dec. 2, 1999, and was mated with the external tank and solid rocket boosters in the Vehicle Assembly Building. The complete Shuttle stack was transported to Pad 39A on Dec. 13. Following a launch postponement on Jan. 31 due to bad weather, Shuttle workers replaced Endeavour's faulty master events controller No. 2 located in the aft engine compartment. With prelaunch preparations now complete, Endeavour stands ready for Friday's launch.

On mission STS-99, Endeavour and crew will capture the most accurate elevation measurements of the Earth's surface ever attained. Using a unique radar system dubbed Shuttle Radar Topography Mission (SRTM), STS-99 will glean valuable 3-D mapping images for application in fields ranging from military planning to back country recreation.

The STS-99 crew includes: Commander Kevin Kregel, Pilot Dom Gorie, Mission Specialists Janet Kavandi, Janice Voss, Mamoru Mohri, and Gerhard Thiele.

The crew returned to KSC at about noon on Feb. 7. Their activities at KSC prior to launch will include crew equipment fit checks, medical examinations and opportunities to fly in the Shuttle Training Aircraft.

(end of general release)

### **COUNTDOWN MILESTONES**

\*all times are Eastern

#### **Launch - 3 Days (Tuesday, Feb. 8)**

- Prepare for the start of the STS-99 launch countdown
- Perform the call-to-stations (5 p.m.)
- Countdown begins at the T-43 hour mark (5:30 p.m.)
- Begin final vehicle and facility close-outs for launch
- Check out back-up flight systems

- Review flight software stored in mass memory units and display systems
- Load backup flight system software into Endeavour's general purpose computers

### **Launch - 2 Days (Wednesday, Feb. 9)**

- Remove mid-deck and flight-deck platforms (1:30 a.m.)
- Activate and test navigational systems
- Complete preparations for loading of power reactant storage and distribution system
- Middeck and flight deck preliminary inspections complete (9:30 a.m.)

**Enter first built-in hold at T-27 hours for duration of 4 hours (9:30 a. m.)**

- Clear launch pad of all non-essential personnel
- Perform test of the vehicle's pyrotechnic initiator controllers (10:30 a.m.)

**Resume countdown (1:30 p.m.)**

- Begin operations to load cryogenic reactants into Endeavour's fuel cell storage tanks (1:30 – 9:30 p.m.)

**Enter 4-hour built-in hold at T-19 hours (9:30 p.m.)**

- Begin filling pad sound suppression system water tank
- Demate orbiter mid-body umbilical unit (10 p.m.)

### **Launch -1 Day (Thursday, Feb. 10)**

- Resume orbiter and ground support equipment close-outs
- Pad sound suppression system water tank filled (1:30 a.m.)

**Resume countdown (1:30 a.m.)**

- Start final preparations of the Shuttle's three main engines for main propellant tanking and flight
- Install mission specialists' seats in crew cabin begins (3:30 a.m.)
- Close-out the tail service masts on the mobile launcher platform

**Enter planned hold at T-11 hours for 12 hours, 40 minutes (9:30 a.m.)**

- Begin startracker functional checks (10:30 a.m.)
- Activate orbiter's inertial measurement units
- Activate the orbiter's communications systems
- Install film in numerous cameras on the launch pad (1:30 p.m.)
- Flight crew equipment late stow (2 p.m.)
- Move Rotating Service Structure (RSS) to the park position (6:30 p.m.)
- Perform ascent switch list

**Resume countdown (10:10 p.m.)**

- Fuel cell flow-through purge complete
- Activate the orbiter's fuel cells (11:20 p.m.)

### **Launch Day (Friday, Feb. 11)**

- Clear the blast danger area of all non-essential personnel
- Switch Endeavour's purge air to gaseous nitrogen (12:25 a.m.)

**Enter planned 1-hour built-in hold at the T-6 hour mark (3:10 a.m.)**

- Launch team verifies no violations of launch commit criteria prior to cryogenic loading of the external tank (3:15 a.m.)
- Clear pad of all personnel
- Chilldown of propellant transfer lines
- Begin loading the external tank with about 500,000 gallons of cryogenic propellants (about 4:10 a.m.)

**Resume countdown (4:10 a.m.)**

- Complete filling the external tank with its flight load of liquid hydrogen and liquid oxygen propellants (about 7:10 a.m.)
- Final Inspection Team proceed to launch pad

**Enter planned 2-hour built-in hold at T-3 hours (7:10 a.m.)**

- Perform inertial measurement unit preflight calibration
- Align Merritt Island Launch Area (MILA) tracking antennas
- Perform open loop test with Eastern Range

**Resume countdown at T-3 hours (9:10 a.m.)**

- Crew departs Operations and Checkout Building for the pad (9:15 a.m.)
- Complete close-out preparations in the white room
- Check cockpit switch configurations
- Flight crew begins entry into the orbiter (about 9:45 a.m.)
- Astronauts perform air-to-ground voice checks with Launch and Mission Control
- Close Endeavour's crew hatch (about 11 a.m.)
- Begin Eastern Range final network open loop command checks
- Perform hatch seal and cabin leak checks
- Complete white room close-out
- Close-out crew moves to fallback area
- Primary ascent guidance data is transferred to the backup flight system

**Enter planned 10-minute hold at T-20 minutes (11:50 a.m.)**

- NASA Test Director conducts final launch team briefings
- Complete inertial measurement unit pre-flight alignments

**Resume countdown (12 noon)**

- Transition the orbiter's onboard computers to launch configuration
- Start fuel cell thermal conditioning
- Close orbiter cabin vent valves
- Transition backup flight system to launch configuration

**Enter planned 10-minute hold at T-9 minutes (12:11 p.m.)**

- Launch Director, Mission Management Team and NASA Test Director conduct final polls for go/no go to launch

**Resume countdown at T-9 minutes (12:21 p.m.)**

- Start automatic ground launch sequencer (T-9:00 minutes)
- Retract orbiter crew access arm (T-7:30)
- Start mission recorders (T-6:15)
- Start Auxiliary Power Units (T-5:00)
- Arm SRB and ET range safety safe and arm devices (T-5:00)
- Start liquid oxygen drainback (T-4:55)
- Start orbiter aerosurface profile test (T-3:55)
- Start main engine gimbal profile test (T-3:30)
- Pressurize liquid oxygen tank (T-2:55)
- Begin retraction of the gaseous oxygen vent arm (T-2:55)
- Fuel cells to internal reactants (T-2:35)
- Pressurize liquid hydrogen tank (T-1:57)
- Deactivate SRB joint heaters (T-1:00)
- Orbiter transfers from ground to internal power (T-0:50 seconds)
- Ground Launch Sequencer go for auto sequence start (T-0:31 seconds)
- SRB gimbal profile (T-0:21 seconds)
- Ignition of three Space Shuttle main engines (T-6.6 seconds)
- SRB ignition and liftoff (T-0)

<b>SUMMARY OF BUILT-IN HOLDS FOR STS-99</b>			
<b>T-TIME</b>	<b>LENGTH OF HOLD</b>	<b>HOLD BEGINS</b>	<b>HOLD ENDS</b>
T-27 hours	4 hours	9:30 a.m. Wed.	1:30 p.m. Wed.
T-19 hours	4 hours	9:30 p.m. Wed.	1:30 a.m. Thurs.
T-11 hours	12 hours, 40 minutes	9:30 a.m. Thurs.	10:10 p.m. Thurs.
T-6 hours	1 hour	3:10 a.m. Fri.	4:10 a.m. Fri.
T-3 hours	2 hours	7:10 a.m. Fri.	9:10 a.m. Fri.
T-20 minutes	10 minutes	11:50 a.m. Fri.	12:00 p.m. Fri.
T-9 minutes	10 minutes	12:11 p.m. Fri.	12:21 p.m. Fri.

<b>CREW FOR MISSION STS-99</b>	
<b>POSITION</b>	<b>NAME</b>
Commander (CDR)	Kevin Kregel
Pilot (PLT)	Dom Gorie
Mission Specialist (MS1)	Gerhard Thiele
Mission Specialist (MS2)	Janet Kavandi
Mission Specialist (MS3)	Janice Voss
Mission Specialist (MS4)	Mamoru Mohri

**SUMMARY OF STS-99 LAUNCH DAY CREW ACTIVITIES**  
**Friday, Feb. 11**

12:15 a.m.	Wake up Blue Team (PLT, MS3 and MS4)
12:45 a.m.	Blue Team breakfast
6:30 a.m.	Wake up Red Team (CDR, MS1 and MS2)
8:00 a.m.*	Blue Team lunch/Red Team breakfast and photo
8:35 a.m.	Weather briefing (CDR, PLT, MS2)
8:35 a.m.*	Don launch and entry suits (MS1, MS3 & MS4)
8:45 a.m.*	Don launch and entry suits (CDR, PLT, MS2)
9:15 a.m.*	Depart for Launch Pad 39A
9:45 a.m.*	Arrive at white room and begin ingress
11:00 a.m.*	Close crew hatch
12:30 p.m.*	Launch

\*Televised events (times may vary slightly)  
All times Eastern

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**February 21, 2000**  
**KSC Contact: Bruce Buckingham**  
**KSC Release No. 18-00**

**Note to Editors:**  
**ENDEAVOUR SCHEDULED TO LAND AT KSC COMPLETING MISSION STS-99**

The orbiter Endeavour is scheduled to land at Kennedy Space Center on **Tuesday, Feb. 22, at 4:50 p.m. EST** completing its 11-day STS-99 mission that was launched from KSC Feb. 11, 2000.

Landing at KSC's Shuttle Landing Facility (SLF) is slated to occur on orbit 180 at mission elapsed time 11 days, 4 hours, 6 minutes. Deorbit burn will occur at about 3:53 p.m. EST.

**Two KSC landing opportunities Tuesday are: 4:50 p.m. and 6:22 p.m.**

Managers have decided to call up the back-up landing location at Edwards Air Force Base (EAFB), CA, for a possible landing there on Tuesday. **One landing opportunity exists at EAFB on Tuesday at 7:48 p.m. EST.**

If managers must keep Endeavour in orbit an additional day, two landing opportunities are available Wednesday at KSC and two at EAFB.

**KSC Wednesday landing times are: 4:33 p.m. and 6:04 p.m. EST.**

**EAFB Wednesday landing times are: 5:58 p.m. and 7:30 p.m. EST.**

This landing of Endeavour will mark the 50th landing at KSC in the history of Space Shuttle flight. It will be the 21st consecutive landing at KSC and the 28th in the last 29 shuttle flights. Endeavour is currently on the 97th Space Shuttle mission in the history of the program.

[landing weather forecast](#)

**SLF and KSC Ground Operations**

The Shuttle Landing Facility was built in 1975. It is 300 feet wide and 15,000 feet long with 1,000-foot overruns at each end. The strip runs northwest to southeast and is located about 3 miles northwest of the 525-foot tall Vehicle Assembly Building.

Once the orbiter is on the ground, safing operations will commence and the flight crew will prepare the vehicle for post-landing operations. The Crew Transport Vehicle (CTV) will be used to assist the crew, allowing them to leave the vehicle and remove their launch and re-entry suits easier and quicker.

The CTV and other KSC landing convoy operations have been "on-call" since the launch of Endeavour Feb. 11. The primary functions of the Space Shuttle recovery convoy are to provide immediate service to the orbiter after landing,

assist crew egress, and prepare the orbiter for towing to the Orbiter Processing Facility.

Convoy vehicles are stationed at the SLF's mid-point. About two hours prior to landing, convoy personnel will don SCAPE suits, or Self-Contained Atmospheric Protective Ensemble, and communications checks are made. A warming-up of coolant and purge equipment is conducted and nearly two dozen convoy vehicles are positioned to move onto the runway as quickly and as safely as possible once the orbiter coasts to a stop. When the vehicle is deemed safe of all potential explosive hazards and toxic gases, the purge and coolant umbilical access vehicles move into position at the rear of the orbiter.

Following purge and coolant operations, flight crew egress preparations will begin and the CTV will be moved into position at the crew access hatch located on the orbiter's port side. A physician will board the Shuttle and conduct a brief preliminary examination of the astronauts. The crew will then make preparations to leave the vehicle.

Following departure from the SLF, the crew will be taken to their quarters in the O&C Building, meet with their families and undergo physical examinations. The crew is scheduled to depart for JSC Wednesday morning.

If Endeavour lands at Edwards, an augmented KSC convoy team will be on-site to safe the vehicle, disembark the crew and move the orbiter to the Mate/Demate Device. The turnaround team will be deployed to Edwards by charter aircraft on landing day.

About 3½ hours after Endeavour lands at KSC, the orbiter will be towed to the Orbiter Processing Facility for post-flight deservicing.

-- end --

**NOTICE TO EDITORS: The KSC press site will be open Tuesday, Feb. 22, from 8 a.m. to 10 p.m. Accredited news media wishing to view Endeavour's landing should be at the KSC press site prior to 4 p.m. Tuesday for transport to the SLF.**

**Properly accredited news media requiring badges can pick them up at the Pass and Identification Office on State Road 3, south of KSC, from 12:30 – 4 p.m. Tuesday.**

**Additional specific information regarding landing photo opportunities, post-landing press conferences and KSC News Center operational hours is available at the KSC News Center and can be reached by calling 321-867-2468.**

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**February 22, 2000**  
**KSC Contact: Bruce Buckingham**  
**KSC Release No. 19-00**

**Note to Editors:**  
**SKIN CANCER PREVENTION PROGRAM TO KICK-OFF AT KSC**

On Thursday, Feb. 24 at 11 a.m., KSC Center Director Roy Bridges will kick-off a Skin Cancer Prevention Program at Kennedy Space Center as one more health facet to reduce employee illnesses and the damaging effects related to skin cancer. This initiative, begun by NASA Administrator Dan Goldin, was created in response to his concern for employees increased risk of excessive and prolonged sun exposure due to the location of many NASA Centers in the sunbelt.

This "Solar Safe" campaign focuses on reducing risks, early detection and health education about skin cancer, and will include program components such as personal UV cards to quantify exposure, screenings, educational material and appropriate protective measures.

NASA Astronaut Jeffrey Ashby, who lost his wife to skin cancer, will make a special guest appearance and presentation. Other representatives will be available to answer questions concerning the program components and various health issues regarding skin cancer awareness and prevention. Experts attending include, Eliza Perry, chairman of the board for the American Cancer Society and Julie Meyer, ARNP, representing the Oncology Nursing Society. Dr. Richard Granstein, Cornell University Medical, Donna Stein, director of public education and Dr. Shelly Sekula, Baylor College of Medicine, will be on-hand from the American Academy of Dermatology. Representatives will also be available from the Moffitt Cancer Center and the NASA Occupational Health Program.

**Program Schedule**

- 11 a.m. - Welcome, Introduction  
David Tipton, M.D., NASA  
William Barry, M.D., NASA
- 11:05 a.m. - Opening Remarks  
KSC Director Roy Bridges
- 11:15 a.m. - Personal Testimony  
Astronaut Jeff Ashby
- 11:25 a.m. - Risk Factors, Pathogenesis, Diagnosis  
Richard Granstein, M.D., American Academy of Dermatology
- 11:35 a.m. - Treatment and Prevention  
Shelley Sekula, M.D., American Academy of Dermatology
- 11:45 a.m. - Community Outreach  
Eliza Perry, RN, American Cancer Society, Chairman of the Board,

Florida

11:55 a.m. - Closing and Presentations

David Tipton, M.D.

William Barry, M.D.

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**NOTE TO EDITORS:** Media interested in attending this event should arrive at the KSC Press site by 10:30 a.m. for transportation to the Operations and Checkout Building. For accreditation, call 321-867-2468.

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**March 3, 2000**

**KSC Contact: Bruce Buckingham/Carol Cavanaugh**

**KSC Release No. 20-00**

## **FIRST ROBOTS INVADE KENNEDY SPACE CENTER**

The invasion is near. Where are your teenagers? They have escaped to Kennedy Space Center and are practicing to be NASA's future engineers.

Students from all over the country will gather for the FIRST (For Inspiration and Recognition of Science and Technology) regional competition at the Kennedy Space Center Visitor Complex on March 9-11 from 9 a.m. – 3 p.m. each day in the Rocket Garden. Teams of high school students will come to test the limits of their imagination using robots they have designed to compete in a technological battle against other school's robots.

Thirty teams are scheduled to compete in the Southeast Regional, with 16 of the Florida teams co-sponsored by NASA and KSC contractors. Brevard County high schools participating are: Astronaut, Bayside, Cocoa Beach, Eau Gallie, Melbourne, Melbourne Central Catholic, Palm Bay, Rockledge, Satellite, and Titusville.

"We are thrilled to join forces with the FIRST organization again this year," said KSC Director Roy Bridges. "It is in NASA's best interest to increase the future supply of robotics engineers. It is inspiring to see these bright, young students get so involved and excited about the science and engineering that goes into building their team's robot."

This three-day competition closely resembles a high-energy sporting competition complete with announcers, yelling cheerleaders, and encouraging fans. Students arrive at the Kennedy Space Center Visitor Complex for a day of practice, inspections and final machine work, with the next two days devoted to fierce, action-packed robotics competition.

Preparation for the competition is a six-week, intense program bringing together students and engineers to collectively brainstorm, design, construct and test their "champion robot." FIRST supplies each team with a kit of assorted parts to create a robot to compete in two-minute contests.

Founded in 1989 by New Hampshire entrepreneur and inventor Dean Kamen, FIRST is a non-profit organization that brings together an alliance of business, education and government organizations through innovative programs to inspire today's youth in the areas of science, engineering and technology.

Additional information is available at the FIRST web site: <http://www.usfirst.org>

- end -

**Note to Editors:** Media interested in attending the event can go directly to the KSC Visitor Complex Rocket Garden anytime between 8 a.m. and 5 p.m. on the days of the event. Please sign-in at the media table located near the stage.

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**March 13, 2000**  
**KSC Contact: Bruce Buckingham**  
**KSC Release No. 21-00**

## **KENNEDY SPACE CENTER EMPLOYEES HELP SAVE LIVES**

**The results are in. A total of 1,174 Kennedy Space Center, Cape Canaveral Air Force Station and Patrick Air Force Base (PAFB) employees joined the National Marrow Donor Program (NMDP) at KSC's third annual registration drive held earlier this year.**

**During the registration drive from Feb. 15-29, a high number of employees came out to potentially save a person's life by signing up for the opportunity to donate life-saving bone marrow. These volunteers each had a small sample of blood taken, which was later typed and the information stored anonymously on the NMDP Registry. The bone marrow of a registered donor can be requested at a later time if a compatible match has been determined. A bone marrow transplant from a healthy person is often the only hope of cure for people diagnosed with leukemia and other blood-borne diseases.**

**"We have an outstanding group of employees who are concerned with the health and safety of people other than themselves," said KSC Director Roy Bridges. "I could not be happier with the employee turnout for this year's Marrow Registration Drive."**

**More than 250 NASA employees responded, which is the best turnout of all companies involved based on percentage population of company employees. Minorities made up 18.5 percent of those who registered for NASA. This enrollment is crucial due to the shortage of minorities on the National Registry. A total of 31 percent of all NASA employees have joined the NMDP during KSC drives.**

**This year NASA garnered partners to help all organizations disseminate more information to many more employees, giving everyone the chance to join NMDP in one consolidated event. This partnership includes agreements between the DoD, C.W. Bill Young Marrow Donor Center, the American Red Cross Southern Region, NASA and PAFB.**

**For more information on the NMDP, call 1-800-MARROW-2 or visit the Web site at: [www.marrow.org](http://www.marrow.org)**

**-- end --**

March 16, 2000

KSC Contact: Bruce Buckingham/Carol Cavanaugh

KSC Release No. 22-00

#### **KSC ANNOUNCES FIRST ROBOTICS COMPETITION AWARD WINNERS**

Students from all over Brevard County gathered last weekend at the FIRST (For Inspiration and Recognition of Science and Technology) regional robotics competition at the Kennedy Space Center Visitor Complex to win the top prize by having their robot and team crowned the champion.

Teams were composed of a pair of two alliances working together to beat the other alliance by scoring the most points in a two-minute match. An alliance scores points by placing yellow and black balls in their goal, and by positioning their robot in designated areas at the end of each match.

"We were excited to host the FIRST Robotics Competition for the second year," said KSC Deputy Director Jim Jennings. "It was contagious to see these students jump, yell and cheer their team's robot on to victory. We look forward to the possibility of having these students come back to work for Kennedy Space Center as engineers."

Local students from Voltage, the South Brevard FIRST Team, took honors for Rookie All Star, and the Space Coast FIRST Team was named Most Photogenic. Voltage was a combined effort of students from six high schools in Brevard County - Bayside, Eau Gallie, Melbourne, Melbourne Central Catholic, Palm Bay and Satellite, - and four businesses besides KSC. The Space Coast team comprised students from Rockledge and Cocoa Beach high schools plus support from NASA and two businesses. Students from Astronaut and Titusville high schools also competed on the Boeing team called ComBBat.

The overall winners were: Benilde-St. Margaret's School with Baxter Engineering from Mountain Home, Ark.; Lakewood and Osceola high schools from St. Petersburg, Fla., with Baxter Healthcare of Tampa Bay; and Williamson Career & Technology Center from Anderson, S.C., with KSC and Robert Bosch Corp.

Additional information is available at the FIRST web site: <http://www.usfirst.org>

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March 17, 2000  
KSC Contact: George H. Diller  
KSC Release No. 23-00

**Note to Editors/News Directors:  
IMAGE SPACECRAFT ON DELTA II ROCKET TO BE LAUNCHED MARCH 25**

The launch of the Imager for Magnetopause-to-Aurora Global Exploration (IMAGE) for NASA and the Southwest Research Institute aboard a Boeing Delta II rocket is scheduled to occur on Saturday, March 25 from NASA's Space Launch Complex 2 at Vandenberg Air Force Base, CA. The launch window extends from 12:34:43 - 12:42:43 p.m. PST, a duration of eight minutes.

The IMAGE satellite is the first spacecraft dedicated to imaging the Earth's magnetosphere, a region of space controlled by the Earth's magnetic field that contains extremely tenuous plasmas of both solar and terrestrial origin. IMAGE employs a variety of imaging techniques to "see the invisible" and to produce the first comprehensive global images of plasma in the inner magnetosphere. Within a day of acquiring the data, images from each of the eight instruments will be available to the entire space science community through the Internet.

The spin-stabilized IMAGE satellite will be placed into an elliptical orbit over the poles, completing an orbit of the earth every 14.5 hours. During the course of the two-year primary mission, this orbit will afford the spacecraft a sweep twice through all local time zones. It also maximizes the amount of time the orbit's high point is at higher latitudes affording the best perspective for global imaging.

**ACCREDITATION**

News media desiring accreditation for the launch of IMAGE should fax their request on news organization letterhead to:

Bruce Buckingham  
NASA Vandenberg Resident Office  
Vandenberg Air Force Base, CA  
FAX: 805/605-3380

Delta/IMAGE access badges will be issued upon entry to Vandenberg Air Force Base and will be valid for the prelaunch news conference on L-1 day and for launch day.

For further information on launch accreditation call 321/867-2468. Beginning March 23 call the NASA Delta/IMAGE News Center at Vandenberg Air Force Base 805/605-3051.

Media are required to be under Air Force Public Affairs escort at all times while on Vandenberg Air Force Base. For further assistance, contact Master Sergeant Tyler Foster, USAF 30th Space Wing Public Affairs Office at 805/606-3595.

**PRELAUNCH NEWS CONFERENCE**

The prelaunch news conference will be held on Friday, March 24 at 11 a.m. PST in the main conference room of the NASA Vandenberg Resident Office, Building 840, Vandenberg Air Force Base, CA. Participants will be:

- Chuck Dovale, NASA Launch Director, Kennedy Space Center, FL
- Rich Murphy, Boeing Mission Director, The Boeing Company
- Frank Volpe, IMAGE Project Manager, Goddard Space Flight Center, Greenbelt, MD
- Dr. James L. Burch, IMAGE Principal Investigator, Southwest Research Institute, San Antonio, TX
- Captain Joe Kurtz, USAF Launch Weather Officer, 30th Weather Squadron,

## Vandenberg Air Force Base, CA

Media desiring to cover the prelaunch news conference should meet at the south gate of Vandenberg Air Force Base on California State Road 246. Departure for the NASA Vandenberg Resident Office at Building 840 will be at 10:45 a.m.

### REMOTE CAMERAS

Media desiring to establish sound-activated remote cameras at the launch pad will depart from the main gate of Vandenberg Air Force Base at 1 p.m. for SLC-2.

### LAUNCH DAY PRESS COVERAGE

On launch day, March 25, media covering the Delta/IMAGE launch should be at the main gate located on California State Road 1 at 11 a.m. to be escorted to the press site located on north Vandenberg Air Force Base. After launch, media will be escorted back to the main gate. A post-launch news conference will not be held.

### NASA TELEVISION, VOICE CIRCUITS, WEBCAST

NASA Television will carry the prelaunch news conference starting at 11 a.m. PST on Friday, March 24. A two-way question and answer capability will be available from NASA field centers. On launch day, Saturday, March 25, NASA TV coverage of the countdown will begin at 11 a.m. PST and continue through spacecraft separation at approximately 56 minutes into flight.

NASA Television is carried on GE-2, transponder 9C located at 85 degrees West longitude. "Audio only" of IMAGE coverage on NASA TV will be available on the "V" circuits that may be reached by dialing 321/867-1220, 1240, 1260, 7135, 4003, 4920.

The launch of IMAGE will also be webcast via the NASA-KSC Home Page at <http://www.ksc.nasa.gov>.

The Delta/IMAGE News Center at the NASA Vandenberg Resident Office will be staffed beginning Thursday, March 23 and may be reached at 805/605-3051. A recorded status report will also be available starting at that time by dialing 805/734-2693.

-- end --

March 20, 2000  
KSC Contact: Bruce Buckingham  
KSC Release No. 24-00

#### **KENNEDY SPACE CENTER SELECTS NEW FOOD SERVICE CONCESSIONAIRE**

Lackmann Culinary Services of Woodbury, N.Y., was awarded Kennedy Space Center's (KSC) food service concession agreement on Thursday, March 16.

This concession agreement includes the operation and management of the KSC Food Service Program consisting of seven separate food service units, two mobile service units and a central warehouse. Lackmann will provide chefs on staff in the Headquarters and Operations & Checkout Buildings, and the Space Station Processing Facility and Complex 39 cafeterias.

"We at NASA look forward to a very positive relationship with Lackmann Culinary Services," said Jan Pirkle, contracting officer at NASA. "The additions and changes will provide outstanding selection and service to our employees."

Enhanced quality and selection of food will include fresh vegetables, home-made soups and chili, new beverage options such as LaTourraine Coffee and Arizona Tea, and a "Lighter by Choice" menu. The new menu featuring gourmet salads and a fresh fruit bar will among the first noticeable upgrades.

The deli will offer Boars Head deli meat and featured value meals daily. "La Pomodoro" will be in selected cafeterias providing pizza by the slice and various pasta selections.

Along with the menu changes come new signage, uniforms and décor as well as dining room furniture re-configurations.

Concession Agreement begins April 1, 2000. The potential exists for the Concession Agreement to continue through March 31, 2010 if three two-year options periods are extended.

Proposed future benefits for employees include pizza delivery, a credit card program, and a drive-thru convenience store.

Four companies competed for the concession agreement.

-- end --

**March 22, 2000  
KSC Contact: George Diller  
KSC Release No. 25-00**

**Notice to Editors/News Directors:  
SPACE SHUTTLE ATLANTIS TO ROLL OUT TO LAUNCH PAD 39A ON SATURDAY**

**The Space Shuttle Atlantis is scheduled to roll out to Kennedy Space Center's Launch Pad 39A this Saturday, March 25.**

**The 3-mile trip will begin at about 7 a.m. from the Vehicle Assembly Building, marking a major milestone in the final preparations for launch of the next Shuttle mission, STS-101, currently targeted for no-earlier-than April 17, 2000.**

**Accredited news media interested in covering a planned photo opportunity of roll out must contact the KSC Public Affairs Office before close of business this Friday. Media who need accreditation should contact the Public Affairs Office and make arrangements to pick up a press badge prior to the close of business on Friday. Badges cannot be picked up on Saturday morning.**

**Based on a 7 a.m. roll out time on Saturday, media should plan to be at the KSC News Center at 6 a.m. However, it is suggested that media call the KSC recorded status line (321-867-2525) for the latest updates.**

**-- end --**

April 4, 2000  
KSC Contact: Bruce Buckingham  
KSC Release No. 26-00

**Note to Editors:  
MEDIA OPPORTUNITIES WITH STS-101 CREW SET FOR THIS WEEK'S COUNTDOWN  
TEST**

The crew of Space Shuttle mission STS-101 will be at Kennedy Space Center this week for the Terminal Countdown Demonstration Test (TCDT).

The TCDT is held at KSC prior to each Space Shuttle flight, providing the crew of each mission an opportunity to participate in simulated countdown activities. The TCDT ends with a mock launch countdown culminating in a simulated main engine cut-off. The crew also spends time undergoing emergency egress training exercises at the pad and has an opportunity to view and inspect the payloads in the orbiter's payload bay.

The seven-member crew of mission STS-101 is scheduled to arrive at KSC's Shuttle Landing Facility (SLF) Wednesday, April 5, at 12:30 p.m. Media who wish to take part in this photo opportunity should be at the KSC Press Site by 11:30 a.m. for transport to the SLF.

On Thursday, April 6, news media representatives will have an opportunity to speak informally with and photograph the crew at Pad 39A. Media interested in participating in this question and answer session should be at the KSC Press Site by 12:30 p.m. for transport to the pad. This question and answer session will be a local media event only. However, the session will be covered live on NASA TV at about 1:30 p.m.

Friday morning, the entire crew will take part in simulated launch day events. Media interested in covering the crew walkout from the Operations and Checkout Building should be at the KSC Press Site by 6:45 a.m. Friday.

Once the crew is at the pad, they will enter the orbiter Atlantis fully suited for the final hours of the practice countdown, including the simulated Shuttle main engine ignition and cut-off. Following TCDT, the crew is scheduled to depart KSC for their homes in Houston for final mission preparations.

Atlantis on mission STS-101 is targeted for launch from Kennedy Space Center on April 24 at about 4:15 p.m. The flight is scheduled to last 9 days, 19 hours and will feature the second Shuttle docking to the International Space Station.

Crew members are Commander James Halsell; Pilot Scott Horowitz; and Mission Specialists Mary Ellen Weber, Jeffrey Williams, James Voss, Susan Helms and Yuri Usachev of the Russian Space Agency.

-- end --

April 5, 2000  
KSC Contact: Bruce Buckingham  
KSC Release No. 27-00

**NEW, IMPROVED ATLANTIS SET FOR APRIL 24 LAUNCH TO STATION**

Following a review of flight readiness, Space Shuttle managers today confirmed April 24 as the launch date for Atlantis on a mission that will continue the development of the orbiting International Space Station and usher in a new era of Shuttle improvements.

Atlantis' liftoff is planned for approximately 4:15 p.m. EDT, within a 10-minute launch window. The precise launch time and window could vary slightly and will be established about 24 hours ahead of liftoff to optimize the Shuttle's performance.

"Atlantis' last flight in space was a visit to the Mir space station," Space Shuttle Program Manager Ron Dittemore said. "Since then, Atlantis has had more than 100 modifications and improvements made, making it the most up-to-date Shuttle ever."

In recognition of Easter weekend, provisions will be made for launch team personnel to honor family and personal obligations.

Atlantis' mission on STS-101 will be the first flight of a new Shuttle "glass cockpit" and more than a dozen other Shuttle improvements. Atlantis will dock with the International Space Station and the seven-member crew will unload more than a ton of cargo, performing several maintenance tasks onboard to ensure the station remains in good condition as its orbital assembly continues later this year. The crew also will conduct one spacewalk to perform work on the exterior of the station.

Atlantis is planned to spend almost six days docked with the station before returning to Earth with a landing planned at Kennedy Space Center at 11:23 a.m. EDT May 4.

-- end --

April 6, 2000  
KSC Contact: Bruce Buckingham  
KSC Release No. 28-00

#### **KSC FERTILIZER-PRODUCING SYSTEM INSTALLED AT SHUTTLE PAD**

The next Space Shuttle mission will be devoted to the continued growth of the International Space Station. In an indirect way, the mission also will contribute to the growth of citrus trees here on Earth.

A system for converting vapors from the Shuttle's hypergolic oxidizer into fertilizer was installed at Launch Pad 39A in early March. Already in use, it received its first major test during pre-launch hypergolic loading operations for STS-101.

"It's good to see something you've been a part of go to completion," said Clyde Parrish, the NASA/KSC engineer who devised the system. "We are happy to see this all come together and operate like we expected and as the tests indicated it would."

The Space Shuttle uses nitrogen tetroxide as the oxidizer for the hypergolic propellant in its on-orbit reaction control system. When the oxidizer is transferred from ground storage tanks into the Shuttle storage tanks - and during maintenance operations - some nitrogen tetroxide vapor develops as a by-product. Kennedy Space Center has used a "scrubber" system since the 1980s to capture the toxic vapor, preventing it from escaping into the atmosphere.

The Improved Nitrogen Tetroxide Scrubber system traps the vapor in water and then uses hydrogen peroxide to produce nitric acid. The addition of another compound, potassium hydroxide, converts the nitric acid into potassium nitrate, a commercial fertilizer.

Plans call for the resulting fertilizer to be used on the orange groves that KSC leases to outside companies. Parrish said the fertilizer will replace 10 percent of the amount purchased at KSC, resulting in an annual savings of approximately \$20,000. Equally important, the conversion process eliminates KSC's second largest source of toxic waste and saves about \$60,000 on disposal costs.

The installation of the scrubber follows a five-year process of development and production. The concept arose from consulting work Parrish did in the 1970s involving chemical separations. NASA/KSC engineer Dale Lueck contributed plans for a hydrogen peroxide controller and Dynacs Engineering Co. produced the scrubber system under the direction of the NASA Instrumentation Lab. It was installed by United Space Alliance.

Parrish said the system automatically transfers the fertilizer produced during loading or maintenance operations into a trailer stationed nearby. Once the trailer has been filled, the fertilizer will be taken to its destination.

Parrish estimated that preparations for STS-101 will produce enough fertilizer to fill two 1000-gallon trailers.

"The system is designed so that when you start the scrubbing operations it automatically comes on and controls the process," Parrish said. "Its operation is essentially transparent to the workers. It automatically offloads the scrubber sump to the trailers. No one needs to worry about it until the receiving trailer is full."

Hypergolic propellants - those that generate power through chemical reactions - produce emissions not only in flight preparations at the pad but also in maintenance operations at other locations, including the Orbiter Processing Facility and the Hypergolic Maintenance Facility in KSC's industrial area. Scrubbers are in place wherever hypergolic propellants are used. Once the new control system at the pad

proves successful, KSC may develop and install similar devices on its other scrubbers. The new system reduces emissions to 10 percent or less of the previous levels.

The innovation also has commercial potential. Parrish noted that many industries - including power plants and metal finishing operations - use processes that produce oxides of nitrogen. Should KSC license the technology to businesses, the resulting royalties would make the system even more financially beneficial.

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April 7, 2000  
KSC Contact: Bruce Buckingham  
KSC Release No. 29-00

#### **ASTRONAUT, SENIOR KSC MANAGER SHRIVER DEPARTS NASA**

Veteran Shuttle astronaut and senior Space Shuttle manager Loren J. Shriver has announced his departure from NASA/Kennedy Space Center effective March 31, 2000. Shriver has since been named the deputy program manager of operations for NASA's prime contractor for the Shuttle program, United Space Alliance in Houston, TX.

Shriver served as the deputy director for launch and payload processing at KSC, since Aug. 17, 1997. In this capacity, he provided executive leadership, strategic planning, and direction for Kennedy's agency-assigned responsibilities as the center of excellence for launch and payload processing systems which encompasses Space Shuttle processing and launch; payload processing, including the preparation of International Space Station elements; payload carriers; and expendable launch vehicles.

"I will really miss Loren. He provided extraordinary leadership in his broad areas of responsibility," said KSC Director Roy Bridges. "All of us at KSC wish him well and look forward to seeing him often. He will bring tremendous knowledge and capabilities to USA's Shuttle program management team."

Shriver has held key Shuttle management positions at Kennedy for the past seven years and was previously the Space Shuttle program manager for launch integration, since May 14, 1993. In this capacity, he was responsible for final Shuttle preparation, mission execution, and return of the orbiter to Kennedy following landings at Edwards Air Force Base, Calif. From October 1992, he served as deputy chief of the astronaut office at the Johnson Space Center in Houston.

"I had a great tour at KSC and learned an awful lot about the operations that happen down here. There is nothing like being here and experiencing the actual ground processing taking place. I will be able to apply all that I learned in my new job," Shriver said. "I'll miss everybody."

Selected as an astronaut by NASA in January 1978, he was assigned as pilot for the first Department of Defense Space Shuttle mission, STS-10, in 1982. That mission was canceled, but he subsequently flew on three space flights: a Department of Defense mission, STS-51C, in 1985; the Hubble Space Telescope deployment mission, STS-31, in 1990; and the mission to release the European Retrievable Carrier (EURECA) satellite, STS-46, in 1992. Altogether, he logged over 386 hours in space.

His accomplishments have earned him numerous awards including the United States Air Force Distinguished Flying Cross, the Defense Superior Service Medal, the Defense Meritorious Service Medal, the Air Force Meritorious Service Medal, and the Air Force Commendation Medal. His NASA honors include the NASA Distinguished Service Medal, the NASA Outstanding Leadership Medal, three NASA Space Flight Medals, the American Astronautical Society 1990 Flight Achievement Award, and the American Institute of Aeronautics and Astronautics Haley Space Flight Award for 1990.

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April 10, 2000  
KSC Contact: Bruce Buckingham  
KSC Release No. 30-00

#### **NASA/KSC EMPLOYEE INDUCTED INTO TECHNOLOGY HALL OF FAME**

**Pamela Bookman, a NASA/Kennedy Space Center employee, recently joined the United States Space Foundation's Space Technology Hall of Fame.**

**Bookman, marketing program manager for new technologies in KSC's Technology Programs and Commercialization Office, was inducted for her role in the transfer and marketing of a product originally developed by a private company for the space program. Sun Coast Chemicals of Daytona Beach, Fla., sells many products based on X-1R Crawler Track Lube, an advanced lubricant used for the giant crawler-transporters that deliver the Space Shuttle to the launch pad.**

**"That's what we do in our office - transfer technology and try to help companies be successful in their ventures," Bookman said. "It's a win-win situation for NASA as well as for the company."**

**Bookman was officially inducted on April 6 at the 16th National Space Symposium in Colorado Springs, Colo. Joining her were Richard H. Beck and Daniel A. Drake, employees of NASA contractor United Space Alliance and the co-developers of the lubricant.**

**The Hall of Fame honors innovators who have transformed technology originally developed for the space program into commercial products. Bookman's induction marked the first time since 1990 that a KSC employee has been recognized by the foundation.**

**Beck and Drake helped formulate a lubricant used on the pins connecting the one-ton tractor tread belts of the crawler, which itself weighs six million pounds. The crawler, designed for the Apollo program in the 1960s, carries the Space Shuttle three miles from the Vehicle Assembly Building to the launch pad.**

**During that trek, lubricants must withstand pressures as high as 12 million pounds, the combined weight of the Space Shuttle and its Mobile Launcher Platform. The lubrication is used to reduce wear and noise and to lengthen component life.**

**The lubricant, biodegradable and non-toxic, arose from an Environmental Protection Agency finding that the previous lubricant was environmentally unacceptable. The resulting product, X-1R Crawler Track Lube, has been featured in NASA's Spinoff magazine as an example of successful technology transfer to the private sector.**

**KSC received a commemorative plaque in recognition of the employees' inductions.**

**"There's a lot of competition from across the country, so we're very pleased to win it," Bookman said.**

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April 10, 2000  
KSC Contact: Bruce Buckingham/Eric Dirschka  
KSC Release No. 31-00

**KENNEDY SPACE CENTER HOSTS FOURTH ANNUAL BREVARD COUNTY YOUTH ENVIRONMENTAL SUMMIT, ECO-TREK 2000**

Kennedy Space Center Visitor Complex will host Brevard County middle school students on April 19 for a daylong environmental summit, Eco-Trek 2000. Students will share results of their team projects, or "explorations," on how the space program helps protect our natural resources. The top four teams will receive plaques for display at their schools, but the real excitement will be about the flown pieces of Shuttle tile and tire that go to each of the members of the top teams.

Eco-Trek is an interactive learning experience for middle school students and their teachers. The event serves to create a platform for individual and shared knowledge of environmental responsibility, and to increase the students' sensitivities of how Brevard County fits into the global environmental picture.

Teams of up to ten students from each participating middle school prepare projects focusing on one of four categories: Earth's Inhabitants, Land, Water, and Atmosphere and Space. The projects are judged and awards are presented during an afternoon awards ceremony.

"KSC's commitment to environmental stewardship, to application of space science, as well as encouragement of science and technology in education during the new millennium make this a 'natural' for NASA support," said Eric Dirschka, co-chair for the event and NASA logistics environmental coordinator.

Students will have an exciting, education-packed day devoted solely to the space program's contributions to environmental monitoring and research. The morning will include sessions by environmental specialists and NASA researchers featuring topics such as, "The Use of Satellite Technology to Enhance Marine Research," "Wildlife Preservation at the Kennedy Space Center," and the NASA Electronic Theater. During the afternoon, students from the top four teams will have the opportunity to present their winning projects.

Participating Brevard County teams include students from Central, Cocoa Beach, DeLaura, Edgewood, Explorer, Hoover, Jackson, Jefferson, Johnson, Madison, McNair, Southwest and Stone Middle Schools.

For more information about Eco-Trek 2000, contact Eric Dirschka at 321-861-1498.

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April 10, 2000  
KSC Contact: George Diller  
KSC Release No. 33-00

## **MISSION TO AMERICA'S REMARKABLE STUDENTS (MARS) SET FOR FLIGHT ON STS-101**

The next flight of the Space Shuttle will help plant seeds of knowledge in young minds by carrying plant seeds into space.

The manifest for STS-101 includes a Getaway Special Canister, or "gascan," a special container designed to carry small, autonomous payloads. The container will transport the MARS ("Mission to America's Remarkable Students") Payload, which consists of 20 tubes filled with materials chosen by schools from the United States and Canada.

"The idea was that the schools would have the freedom to pick whatever Space Life Sciences experiment they wanted, as long as it fit inside the constraints of the tube and our safety experts agreed it was safe to fly," said Dennis Chamberland of the Kennedy Space Center Biomedical Office.

The MARS experiment arose after Goddard Spaceflight Center's Small Shuttle Payloads office notified the KSC office of an opportunity to fly a Getaway Special experiment on the Space Shuttle. Following approval from NASA Headquarters for the project, each school was invited to design a payload that dealt specifically with Space Life Sciences.

The 20 schools - ranging from elementary to high school - worked independently on their projects. Most of them decided to fill their tubes with seeds, though the types vary widely and include sunflower, watermelon, loquat, radish, green bean, weeping sand palm, daisy, soy bean, turnip and poppy. Other materials also were placed into the tubes: freeze-dried bacteria, freeze-dried brine shrimp, plastic samples, soil, and yeast.

The plastic tubes, each approximately the size of a portable coffee container, were loaded and carefully sealed in a clean environment at Kennedy Space Center. Technicians then fitted the tubes into the "gascan" cylinder, which was bolted to an interior wall of the Space Shuttle Atlantis' payload bay. MARS will fly as a passive payload, one that is not manipulated during flight and doesn't have any automatic functions.

Following nearly 10 days in space aboard Atlantis, the tubes will be removed from their canister in a controlled environment at KSC's Orbiter Processing Facility and returned to the respective schools. Supervising teachers will then use the materials for classroom investigations and projects. STS-101, the third mission to the International Space Station, is scheduled to launch April 24 at KSC.

Eight of the other participating schools are from Central Florida: Suntree Elementary and Longleaf Elementary (Melbourne), Cocoa Beach Christian School, Golfview Elementary (Rockledge), Oak Park Elementary (Titusville), Teague Middle School (Altamonte Springs), Southwest Junior High (Palm Bay) and Brevard Homeschool Co-Op (Cocoa). The remainder include schools from Florida, Indiana, Oklahoma, Michigan, California and Canada.

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## **STS-101 ATLANTIS**

### **NEWLY UPGRADED SHUTTLE TO DOCK WITH INTERNATIONAL SPACE STATION**

**KSC Release No. 34-00  
April 2000**

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Space Shuttle Atlantis - the most updated Space Shuttle ever to fly with more than 100 new modifications, including a state-of-the-art "glass cockpit" - will dock with the International Space Station, setting the stage for the arrival of the Russian-made Zvezda service module this summer.

Zvezda, scheduled for launch in July, will serve as the early living quarters and lab space for the first long-duration crews to reside aboard the Station beginning in the fall.

The Atlantis crew will perform maintenance tasks on board the Station and deliver approximately one ton of a variety of logistics and supplies to the orbiting outpost. Maintenance tasks will include replacing up to four new batteries and associated electronics in the Russian Zarya control module.

Four cooling fans, three fire extinguishers, 10 smoke detectors and an on-board computer will also be installed on Zarya. In addition, a suspect radio frequency power distribution box will be replaced on Unity's six-sided docking node.

Equipment includes personal clothing and hygiene gear, medical and exercise equipment, computer equipment and printers, and hardware for the Station's Ku-band communication system. Also to be delivered: a centerline camera for Unity's common berthing mechanisms to which other Station components will be attached.

After docking, one six-and-a-half hour spacewalk is planned. The Russian "Strela" cargo boom, which will assist in further station assembly and outfitting, will be installed on the outside of Zarya, and a faulty radio antenna on the Unity will be replaced.

The International Space Station represents a global partnership of 16 nations. The million-pound Space Station will include six laboratories and provide more space for research than any spacecraft ever built. Internal volume of the Space Station will be roughly equal to the passenger cabin volume of a 747 jumbo jet.

More than 40 space flights and multiple space vehicles - the Space Shuttle, the Russian Soyuz rocket, the Russian Proton rocket, the European Space Agency's Ariane 5 and the Japanese H-II rocket - will deliver the various Space Station components to Earth orbit. Assembly of the more than 100 components will require a combination of human spacewalks and robot technologies. When the ISS is completed, an international crew of up to seven will live and work in space for durations of three to six months.

STS-101 will also feature the first flight of the new Shuttle "glass cockpit," technically called the Multifunction Electronic Display Subsystem. This new system replaces obsolete instruments and three monochrome computer screens with 11 full-color graphical displays. The new cockpit weighs less, uses less electricity, provides more backup instruments and sets the stage for a future "smart cockpit" now in development for the Shuttle.

After a 10-month refurbishment period, Atlantis' more than 100 new modifications include: an airlock relocated to the payload bay to prepare for Station assembly flights; an updated communications system; installation of several weight reduction enhancements; additional protection for the cooling system; and strengthening of the crew cabin floor.

STS-101 will take flight with the 98th Shuttle launch. The 21st flight of Atlantis will begin with a liftoff from Launch

Pad 39A. Atlantis will ascend at a 51.6-degree inclination to the equator for direct insertion into orbit. The mission is scheduled for ten days.

Landing is planned for Kennedy Space Center's Shuttle Landing Facility.

### **The Crew**

Commander James Halsell Jr. (Col., USAF), a veteran of four space flights, has logged over 1,021 hours in space. He was pilot on STS-65 and STS-74 and was mission commander on STS-83 and STS-94. From February-August 1998, he served as NASA Director of Operations at the Yuri Gagarin Cosmonaut Training Center in Star City, Russia.

The Louisiana native graduated first in his test pilot school class and has performed test flights in F-4, F-16 and SR-71 aircraft. He has a bachelor of science degree in engineering from the United States Air Force Academy, a master of science degree in management from Troy University, and a master of science degree in space operations from the Air Force Institute of Technology. He became an astronaut in July 1991.

Pilot Scott Horowitz (Lt. Col., USAF), Ph.D., has flown as pilot on two other missions, STS-75 and STS-82. Born in Philadelphia, Horowitz considers Thousand Oaks, Calif., to be his hometown.

Horowitz has a bachelor of science degree in engineering from California State University at Northridge and master of science and doctorate degrees in aerospace engineering from Georgia Institute of Technology. He served as a research scientist in the aerospace industry and was a professor for two universities. During his Air Force career, Horowitz served as a T-38 instructor pilot, an F-15 fighter pilot and a test pilot for A-7s and T-38s. Horowitz began his astronaut training in August 1992.

Mission Specialist Susan J. Helms (Lt. Col., USAF) is veteran of three space flights, STS-54, STS-64 and STS-78. She was born in Charlotte, N.C., but considers Portland, Ore., to be her hometown.

Helms has a bachelor of science degree in aeronautical engineering from the U.S. Air Force Academy and a master of science degree in aeronautics and astronautics from Stanford University. As a flight test engineer, Helms has flown in 30 different types of U.S. and Canadian military aircraft. She became an astronaut in July 1991.

Mission Specialist Yuri Vladimirovich Usachev is a cosmonaut for the Russian Aviation and Space Agency. During his two stays aboard the Russian space station Mir, Usachev logged 376 days in space and performed six spacewalks. This is his first Space Shuttle flight.

Usachev was born in Donetsk, Rostov on Don Region, Russia, and has a degree in engineering from Moscow Aviation Institute. Upon graduation, he went to work for Energia, participating in groups working with EVA training, future construction in space, public relations and ergonomics. He was chosen as a cosmonaut candidate in 1989.

Mission Specialist James S. Voss (Col., USA, ret.) is a veteran of three space flights. He flew as a mission specialist on STS-44 and STS-53 and was the Payload Commander on STS-69. He was born in Cordova, Ala., but considers Opelika, Ala., to be his home.

Voss earned a bachelor of science degree in aerospace engineering from Auburn University and a master of science degree in aerospace engineering sciences from the University of Colorado in 1974. He has worked at the Johnson Space Center since November 1984 and was selected as an astronaut candidate by NASA in June 1987. Voss and Williams will conduct the space walk on the fourth day of the STS-101 mission.

Mission Specialist Mary Ellen Weber, Ph.D., has made one previous spaceflight, STS-70. She was born in Cleveland, but Bedford Heights, Ohio, is her hometown.

Weber has a bachelor of science degree in chemical engineering from Purdue University and a Ph.D. in physical chemistry from the University of California at Berkeley. She worked in research and development in the computer chip industry before being selected for astronaut training in 1992.

Mission Specialist Jeff Williams (Lt. Col., USA) will be making his first space flight. He was born in Superior, Wis., but considers Winter, Wis., to be his hometown.

Williams has a bachelor of science degree in applied science and engineering from the U.S. Military Academy, a master of science degree in aeronautical engineering from the U.S. Naval Postgraduate School and a master of arts degree in national security and strategic studies from the U.S. Naval War College. Williams, who served as a test pilot, has logged approximately 2,000 hours in more than 50 different aircraft. He was selected for an Army assignment at Johnson Space Center in 1987 and for astronaut training by NASA in May 1996.

#### **Related NASA Web Sites**

Mission and crew press kit: [www.shuttlepresskit.com/](http://www.shuttlepresskit.com/)

Mission and crew - Johnson Space Center: [spaceflight.nasa.gov/](http://spaceflight.nasa.gov/)

Shuttle countdown - Kennedy Space Center: [www.ksc.nasa.gov/shuttle/countdown/](http://www.ksc.nasa.gov/shuttle/countdown/)

Multimedia prelaunch guest presentation: [www-pao.ksc.nasa.gov/kscpao/briefing/](http://www-pao.ksc.nasa.gov/kscpao/briefing/)

April 11, 2000  
KSC Contact: Bruce Buckingham  
KSC Release No. 35-00

## **KENNEDY SPACE CENTER PREPARES FOR FREEZE**

The Cryogenics Testbed Facility, a new venture in technology and research collaboration, will be unveiled at a ribbon cutting ceremony on Friday, April 14 at 11:30 a.m.

James Fesmire of the Engineering Development Directorate at NASA has envisioned this unique facility since 1994. Cryogenic and high vacuum techniques and technology are being used more widely all around the world. Kennedy Space Center, to better apply cryogenics to our lives in the fields of medicine, biology, food, computers, industry, rocket propulsion and the spaceports of the future, has created the Cryogenics Testbed.

"The goal of the facility is to establish the Cryogenics Testbed at Kennedy Space Center as a main resource for cryogenics and cryogenic engineering," said Fesmire. "It's often said that it's a long way from the laboratory to the marketplace. In a similar way, it's a big jump from the laboratory to outer space. That niche is the testbed. We aim to fill the gap by bringing together under one virtual roof the elements of research, engineering, operations and industry."

NASA, Air Products and Chemicals, Inc. and the University of Florida partnered with Dynacs Engineering Co. to set in motion the development of the Cryogenics Testbed. The State of Florida invested \$750,000 for facility design and construction. NASA contributed \$1.56 million for test support equipment. Dynacs invested \$20,000 for start-up and marketing. Air Products and Chemicals, Inc. and the University of Florida offered consulting support and analysis to Dynacs as they created a business model for customers desiring such services. NASA and Dynacs Engineering Co. will jointly manage the facility.

KSC's Cryogenics Testbed facilities include the Cryogenics Test Laboratory, Liquid Nitrogen Flow Test Area, Hazardous Test Area and the Launch Equipment Test Facility. There are four technology focus areas, or core lines of work, that are linked to key targets of the long-range strategic initiatives of NASA. They include thermal insulation systems, cryogenic components, propellant process systems, and low temperature applications.

"The Cryogenics Testbed Facility is another good example of our progress as a Spaceport Technology Center," said KSC Director Roy Bridges. "This facility will help us advance and commercialize technology in the field of cryogenics."

Speakers for the ceremony will include: KSC Director Roy D. Bridges; Brian E. Chase, district director for U.S. Congressman Dave Weldon; Susan Fleming, Department of Community Affairs with the Florida Energy Office; Frank Kinney, executive director of Technology Research and Development Authority; Dr. Norman Fitz-Coy, professor of aerospace engineering at the University of Florida; Thomas Portland, vice president of Air Products and Chemicals, Inc.; and Ramen P. Singh, president and CEO of Dynacs, Inc.

The special facility was made possible under a jointly funded agreement between Dynacs Engineering Co., Florida Department of Community Affairs and the Technological Research and Development Authority.

Near term activities of the Testbed include outfitting of the facility, conducting core research and developing key projects for aerospace and industry interests. Potential aerospace areas include exploration initiatives, future vehicles, Space Shuttle

**upgrades, energy efficient storage, transfer, and use of cryogens and cryogenic propellants on Earth and in space.**

**-- end --**

April 17, 2000  
KSC Contact: Patti Phelps  
KSC Release No. 36A-00

#### **EIGHT KSC WORKERS HONORED BY NASA ASTRONAUT**

Eight NASA/KSC employees were recently presented with NASA's prestigious Silver Snoopy Award for service to the Space Shuttle astronauts.

Perry L. Becker, Shuttle Processing Directorate; Cristina Guidi, Office of the Associate Director for Advanced Development and Shuttle Upgrades; Brian E. Luther, Shuttle Processing Directorate; Bob R. Pirkle, Procurement Office; Marie B. Reed, Shuttle Processing Directorate; Jorge E. Rivera, Shuttle Processing Directorate; Rosamund L. Rock, Public Affairs Office; and Lori L. Weller, Joint Performance Management Office, were presented awards at Kennedy Space Center in March by astronaut Jerry Ross.

Becker, an experimental facilities technician, was commended for being involved in developing the long-range planning for modifications and upgrades to the crawler-transporters. "Your knowledge of the system's capabilities and the expertise required in resolving system problems have been instrumental in ensuring the crawlers continually support the major milestones," said astronaut Ross.

Guidi was recognized for her key role and contributions to the Ground Operations Safety Probabilistic Risk Analysis Team. This project took the first step towards a new process for KSC to assess ground systems and processes. "You researched the data and creatively analyzed and documented your assessments to deliver a very high quality product," Ross told Guidi.

Luther, a Space Shuttle Main Engine avionics engineer, was honored for consistently providing sound technical leadership and guidance, in particular during a recent display test for STS-103. "You determined that the control listed did not match the Boeing automated wire list. Your attention to detail found an error that had been overlooked since the first Shuttle launch," said astronaut Ross.

Pirkle, a contract specialist for the Operations Support Office, was recognized for outstanding efforts to support Kennedy Space Center during the preparedness period for Hurricane Floyd. "Under pressing circumstances, you were extremely instrumental in acquiring the iridium phones for senior management. You remained on center when all other employees had evacuated to wait until the phones arrived," said Ross to Pirkle.

Reed was awarded a Silver Snoopy for her extensive technical and project manager contributions to the KSC Operational Television (OTV) Modernization Project. "You have met the challenges of supporting the \$33 million modernization project, which is an integrated approach to upgrading the entire KSC Video System to support more than 200 OTV cameras," said astronaut Ross.

Rivera, an aerospace engineer, has made several substantial contributions to enhancement of the external tank systems. "Your efforts led to installation of cameras inside the gaseous oxygen vent hood, allowing visual inspection of ice buildup during fueling operation, and also the drive-on scales for weighing the external tank. The changes will result with significant work reductions," Ross said to Rivera.

Rock, a public relations specialist, was recognized for coordinating special tours, briefings and launch/landing activities for guests, including congressional representatives, royalty and foreign dignitaries. "Your can-do attitude and your ability to establish strong working relationships with your fellow workers are a tribute

to your professionalism, effectiveness and your uncanny ability to motivate others," said astronaut Ross.

Weller, a customer service specialist, was awarded a Silver Snoopy for her contribution to the successful joint venture that culminated in the Joint Base Operations and Support Contract. "You pioneered the effort to create a joint U.S. space launch site which is customer oriented, economical, global in outlook, and truly competitive in placing payloads into Earth orbit," Ross told Weller.

Snoopy, of the comic strip "Peanuts," has been the unofficial mascot of NASA's astronaut corps since the earliest days of human space flight. The Silver Snoopy Award was created by the astronauts to honor persons who contribute most to the safety and success of human space flight.

The award is presented to no more than one percent of the space center's work force each year. Recipients are given a silver pin depicting the famous beagle wearing a space suit. All the pins have flown on a previous Space Shuttle mission. The awardees also received a framed certificate and a congratulatory letter signed by the presenting astronaut.

-- end --

April 17, 2000  
KSC Contact: Patti Phelps  
KSC Release No. 36B-00

**PERRY L. BECKER HONORED BY NASA ASTRONAUT**

Perry L. Becker, a native of Louisville, Ky., and graduate of the University of Louisville, was recently presented with NASA's prestigious Silver Snoopy Award for service to the Space Shuttle astronauts.

Born in Louisville, Becker graduated from Butler High School in 1982. After completing his undergraduate work at Louisville, he completed his M.B.A from Florida Institute of Technology in Melbourne, Fla. His parents, George and Darlys Becker, reside in Louisville, Ky.

Becker lives in Merritt Island, Fla., and is married to the former Leslie A. Fuelling.

Astronaut Jerry Ross presented the award to Becker on March 17 at Kennedy Space Center. Becker, a lead system engineer responsible for design, sustaining engineering operations, and maintenance of various Shuttle transportation equipment and launch pad support systems, joined Kennedy Space Center in 1988.

Becker was commended for being involved in developing the long-range planning for modifications and upgrades to the crawler-transporters. "Your knowledge of the system's capabilities and the expertise required in resolving system problems have been instrumental in ensuring the crawlers continually support the major milestones," said astronaut Ross.

Snoopy, of the comic strip "Peanuts," has been the unofficial mascot of NASA's astronaut corps since the earliest days of human space flight. The Silver Snoopy Award was created by the astronauts to honor persons who contribute most to the safety and success of human space flight.

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April 17, 2000  
KSC Contact: Patti Phelps  
KSC Release No. 36C-00

**MARIE B. REED HONORED BY NASA ASTRONAUT**

Marie B. Reed, a native of New Orleans, La., and graduate of the University of Louisiana, was recently presented with NASA's prestigious Silver Snoopy Award for service to the Space Shuttle astronauts.

Astronaut Jerry Ross presented the award to Reed on March 17 at Kennedy Space Center. Reed, a project manager for Shuttle Development Projects, has worked at Kennedy Space Center since September 1988.

Reed was awarded a Silver Snoopy for her extensive technical and project manager contributions to the KSC Operational Television (OTV) Modernization Project. "You have met the challenges of supporting the \$33 million modernization project, which is an integrated approach to upgrading the entire KSC Video System to support more than 200 OTV cameras," said astronaut Ross.

Born in New Orleans, La., Reed graduated from Mercy Academy in 1982. Her parents, Raymond and Mary Baumann, currently reside there.

Reed lives in Cocoa, Fla. with husband Brent and son, Gordon, age 5.

Snoopy, of the comic strip "Peanuts," has been the unofficial mascot of NASA's astronaut corps since the earliest days of human space flight. The Silver Snoopy Award was created by the astronauts to honor persons who contribute most to the safety and success of human space flight.

The award is presented to no more than one percent of the space center's work force each year. Recipients are given a silver pin depicting the famous beagle wearing a space suit. All the pins have flown on a previous Space Shuttle mission. The awardees also received a framed certificate and a congratulatory letter signed by the presenting astronaut.

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April 17, 2000  
KSC Contact: Patti Phelps  
KSC Release No. 36D-00

**JORGE E. RIVERA HONORED BY NASA ASTRONAUT**

Jorge E. Rivera, a native of Bayamon, Puerto Rico, and graduate of the University of Puerto Rico, was recently presented with NASA's prestigious Silver Snoopy Award for service to Space Shuttle astronauts.

Astronaut Jerry Ross presented the award to Rivera on March 17 at Kennedy Space Center. Rivera is the senior lead engineer for the external tank group, and is responsible for assisting in the planning and coordination of technical activities of a group of 10-16 professional engineers. He joined Kennedy Space Center in 1981.

Rivera has made several substantial contributions to enhancement of the external tank systems. "Your efforts led to installation of cameras inside the gaseous oxygen vent hood, allowing visual inspection of ice buildup during fueling operation, and also the drive-on scales for weighing the external tank. The changes will result with significant work reductions," said astronaut Ross.

Rivera lives in Titusville, Fla. He is married to the former Mayra Ayala and has two children, Patricia, 19, and Beatriz, 17.

Snoopy, of the comic strip "Peanuts," has been the unofficial mascot of NASA's astronaut corps since the earliest days of human space flight. The Silver Snoopy Award was created by the astronauts to honor persons who contribute most to the safety and success of human space flight.

The award is presented to no more than one percent of the space center's work force each year. Recipients are given a silver pin depicting the famous beagle wearing a space suit. All the pins have flown on a previous Space Shuttle mission. The awardees also received a framed certificate and a congratulatory letter signed by the presenting astronaut.

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April 18, 2000  
KSC Contact: Bruce Buckingham  
KSC Release No. 37-00

## **COMMAND AND CONTROL TECHNOLOGIES CORPORATION GRADUATES FROM FLORIDA/NASA BUSINESS INCUBATION CENTER**

The Florida/NASA Business Incubation Center will officially graduate one of its largest tenants - Command and Control Technologies Corporation - on Thursday, April 20, 2000 after a three-year successful stay at the facility.

The eighth firm to graduate in the short history of the Florida/NASA Business Incubation Center (FNBIC), Command and Control Technologies (CCT) provides high technology computer products and system development services to the commercial and government aerospace market. The keynote speaker at the graduation ceremony will be KSC's Associate Director for Advanced Development & Shuttle Upgrades JoAnn Morgan.

"I love seeing this [success] because anytime a person or group has an idea for a company, can take the idea, find customers and turn it into a success - this is what our country is about, having the freedom to do that," said Morgan. "And the success of the FNBIC is good for NASA because it creates entrepreneurial spirit, another partner in the space community and growth in the community."

Established in 1996, FNBIC is managed through a joint partnership of Florida's Technological Research and Development Authority, NASA Kennedy Space Center and Brevard Community College (BCC). The center nurtures and helps accelerate the success of technology-based, small businesses in Brevard County. Tenants must be technology product oriented or be commercializing a NASA technology.

Located on BCC's Titusville, FL campus, FNBIC provides affordable space and shared office equipment and services, thereby reducing many of the costs associated with establishing and operating a small business. FNBIC also provides access to a business network of professionals, including bankers, lawyers and accountants, who provide free consultation on the issues surrounding the launch of a business. In addition, they provide access to many NASA and other technologically based resources that help each tenant grow and prosper.

In the past three years, FNBIC has graduated seven firms, with products or technologies ranging from professional services, auto shop and repair software, to daycare software to monitor children at the daycare center from home or office.

CCT joined the Incubator as a visionary, three-man company in February 1997. The co-founders had worked together for 15 years at McDonnell Douglas and decided to launch their own high-tech, small business via the FNBIC. Now three years later, CCT boasts 20 employees and a 350 percent increase in sales from the launch of the company. They currently have approximately 25 proposals out in the market, which could ultimately mean hiring 15-20 more employees by the end of the year.

Among its successes, CCT adapted a spacecraft ground-processing program known as the Control Monitor Unit for use in the commercial sector. CCT markets the technology under the name Command and Control Toolkit™.

CCT has assisted in upgrading the Space Shuttle launch control system. NASA and CCT are using the technology for creating new Space Shuttle checkout and launching products and procedures. And CCT looks to long-term commercial use of the Toolkit, such as its use to design a low-cost spaceport control system for the operational launch facility in Alaska. Other possible uses are the remote monitoring of mobile operations, such as offshore oil platforms, and remote land operations.

**"Being an Incubator tenant opened many doors for us with local economic development organizations, various contractors and divisions within KSC, who truly wanted to see us succeed," said Kevin Brown, vice president of business development for CCT.**

**Brown has become a crusader for the program, telling anyone who is thinking of launching a high-tech business "to give these guys a try. With the resources that the FNBIC provides, it is absolutely worth it," he said.**

**Along with CCT, FNBIC currently has seven other tenants plus four off-site businesses that use some of the resources available at the center.**

**NOTE TO EDITORS: The graduation event takes place at 3 p.m. on April 20 at the Florida/NASA Business Incubation Center, Brevard Community College, 1311 N. Highway U.S. 1, Titusville, Fla. Media interested in attending must contact Adrienne Collins or Monica Roberts at 321-383-5200.**

**-- end --**

April 19, 2000  
KSC Contact: Bruce Buckingham  
KSC Release No. 38-00

Notice to Editors/News Directors:  
**MISSION STS-101 EVENTS, KSC NEWS CENTER OPERATING HOURS SET**

News conferences, events and operating hours for KSC's News Center have been set for the April 24 launch of the Space Shuttle Atlantis on Mission STS-101, the 98th launch in the Shuttle program. Launch on April 24 is set for about 4:15 p.m. at the opening of a five-minute window. The conferences and events will be carried live on NASA Television unless otherwise noted, and originate from the KSC Press Site.

The seven-member STS-101 crew is scheduled to arrive at KSC on Friday, April 21 at about 3 p.m. EDT. News media representatives planning to cover the event must be at the News Center by 2 p.m. (in the event of a possible early crew arrival) for transportation to the Shuttle Landing Facility.

News media representatives with proper authorization may obtain STS-101 mission credentials at the Pass and Identification Building on State Road 3 (south of KSC) on Merritt Island during published times. (Credential and badging hours are listed below.)

In addition to daily 9 a.m. countdown status briefings, an International Space Station briefing and pre-launch press conference will be held two days before launch. The full briefing schedule is listed below.

-- end of general release --

**STS-101 BRIEFING & EVENTS SCHEDULE** *(all times are EDT)*  
*(All briefings are held inside the KSC Press Site auditorium and will be carried live on NASA TV unless otherwise noted)*

**L-3 Days - Friday, April 21**  
(Launch countdown begins at 7 p.m.)

**9 a.m. ----- Countdown Status Briefing**

- Steve Altemus, NASA Test Director
- Richard Kuhns, KSC Payload Manager
- Ed Priselac, Shuttle Weather Officer

**3 p.m. ----- STS-101 Flight Crew Arrival (Live on NASA TV)**

**L-2 Days - Saturday, April 22**

**9 a.m. ----- Countdown Status Briefing**

- Doug Lyons, NASA Test Director
- Richard Kuhns, KSC Payload Manager
- Ed Priselac, Shuttle Weather Officer

**10 a.m. ----- International Space Station Briefing**

- Bob Cabana, ISS Manager for International Operations, JSC
- Valeri Alaverdov, First Deputy General Director, Rosaviakosmos
- Alain Dubeau, MSS Project Manager, CSA
- Ian Pryke, Director of ESA Washington Office
- Masaaki Komatsu, Director, NASDA KSC Office

**4 p.m. ----- Pre-launch News Conference**

- Ron Dittmore, Shuttle Program Manager, JSC
- Tommy Holloway, ISS Program Manager, JSC
- Dave King, Director of Shuttle Processing, NASA, Kennedy Space Center
- Captain Clif Stargardt, Staff Meteorologist, 45th Weather Squadron, USAF

**L-1 Day - Sunday, April 23**

**9 a.m. ----- Countdown Status Briefing**

- Jeff Spaulding, NASA Test Director
- Richard Kuhns, KSC Payload Manager
- Ed Priselac, Shuttle Weather Officer

**L-0 Day - Monday, April 24**

***(Tanking begins at about 7 a.m. Monday)***

**10 a.m. ----- NASA Television live launch programming begins**

**Launch Day Crew activities:**

3:15 a.m. ----- Wake up  
 3:45 a.m. ----- Breakfast  
 9 a.m. ----- Lunch  
 \*11:17 a.m. ----- Snack (Crew Photo)  
 11:47 a.m. ----- Weather briefing  
 \*12:05 p.m. ----- Suit up photo  
 \*12:27 p.m. ----- Walkout/depart for pad  
 \*12:57 p.m. ----- Arrive at pad  
 \*2:12 p.m. ----- Close hatch  
 \*4:15 p.m. --- Launch of Atlantis  
 (\* Carried live on NASA TV)

**Launch + 1 hour ----- Post-launch Press Conference**

- Bill Gerstenmaier, Launch Integration Manager, JSC
- Dave King, Director of Shuttle Processing, KSC

**NOTE:** STS-101 MISSION STATUS BRIEFINGS WILL BE HELD DAILY THROUGHOUT THE MISSION. TIMES OF THESE BRIEFINGS ARE AVAILABLE IN THE NASA TV SCHEDULE AT: <http://www.spaceflight.nasa.gov/realdata/nasatv/schedule.html>

**KSC News Center office hours for STS-101**

*(Times may be adjusted in real time depending on mission events and timelines.)*

Friday, April 21 (Launch minus 3 days) ----- 8 a.m. - 4:30 p.m.  
 Saturday, April 22 (Launch minus 2 days) ----- 8 a.m. - 7 p.m.  
 Sunday, April 23 (Launch minus 1 day) ----- 8 a.m. - 7:30 p.m.  
 Monday, April 24 (Launch Day) Flight day 1 ----- 6 a.m. - 8 p.m.  
 Tues.- Fri., April 25-28 - Flight days 2/5 ----- 8 a.m. - 4:30 p.m.  
 Sat./Sun., April 29-30 - Flight days 6/7 ----- TBD  
 Mon.-Wed., May 1-3 - Flight days 8/10 ----- 8 a.m. - 4:30 p.m.  
 Thursday, May 4 (Landing day) Flight day 11 ----- 8 a.m. - 8 p.m.

News media may obtain STS-101 mission credentials at the Pass and Identification Building at Gate 2 on State Road 3, Merritt Island, during the following times:

**Pass and Identification Hours**

L-3 / Friday, April 21 ----- 8 a.m. - 1:30 p.m.  
 L-2 / Saturday, April 22 ----- 8 a.m. - 3 p.m.  
 L-1 / Sunday, April 23 ----- CLOSED (call 321-867-2468)  
 L-0 / Monday, April 24 ----- 8 a.m. - 3 p.m.

News media with annual Shuttle credentials are reminded to sign the logbook at the query counter in the News Center.

**NEWS MEDIA ARE REQUIRED TO BE UNDER PUBLIC AFFAIRS ESCORT AT ALL TIMES WHILE AT KSC EXCEPT WHEN DRIVING TO THE NEWS CENTER OR THE COMPLEX 39 CAFETERIA.**

**NEWS MEDIA ARE ALLOWED AT THE PRESS SITE ONLY WHEN PUBLIC AFFAIRS PERSONNEL ARE ON DUTY AND THE NASA NEWS CENTER IS OPEN.**

-- end --

April 20, 2000  
KSC Contact: Joel Wells  
KSC Release No. 39-00

## SHUTTLE MISSION STS-101 LAUNCH COUNTDOWN SET TO BEGIN

NASA will begin the countdown for launch of Space Shuttle Atlantis on mission STS-101 April 21, at 7 p.m. EDT at the T-43 hour mark. This mission marks the 3rd Shuttle flight to the International Space Station. The KSC launch team will conduct the countdown from Firing Room 1 of the Launch Control Center.

The countdown includes 26 hours and 12 minutes of built-in hold time leading to a preferred launch time at about 4:15 p.m. on April 24. The launch window opens at 4:12 p.m. and extends for 10 minutes until 4:22 p.m. A preferred launch time will be determined during the T-9 minute built-in hold based on the orbital location of the International Space Station (ISS).

Mission STS-101 is the 21st flight of the orbiter Atlantis and the 98th flight overall in NASA's Space Shuttle program. STS-101 is scheduled to last 9 days, 20 hours and 27 minutes with a planned KSC landing at 12:42 p.m. on May 4.

This is Atlantis' first flight since it returned to KSC from a maintenance down period in Palmdale, CA, on Sept. 27 of 1998. After spending only 2 months in KSC's Orbiter Processing Facility (OPF), Atlantis was moved to the Vehicle Assembly Building (VAB) for storage on Dec. 10, 1998. It remained there through Feb. 8, 1999. Processing then resumed in the OPF until July 26 when the orbiter was again placed in VAB storage. Atlantis returned to the OPF Sept. 24 to complete processing for STS-101. Atlantis rolled of the OPF to be mated with the external tank and solid rocket boosters in the VAB. The entire Space Shuttle stack rolled out to Launch Pad 39A March 25 to undergo final launch preparations.

On mission STS-101, the seven-member flight crew will prepare ISS for the arrival of the Russian-made Zvezda service module. The mission includes a single space walk to complete maintenance on the outpost and astronauts will also transfer a variety of supplies and logisitics.

The STS-101 crew includes: Commander Jim Halsell, Pilot Scott Horowitz, Mission Specialists Susan Helms, Yuri Usachev, James Voss, Mary Ellen Weber and Jeff Williams.

(end of general release)

### COUNTDOWN MILESTONES

\*all times are Eastern

#### Launch - 3 Days (Friday, April 21)

- Prepare for the start of the STS-101 launch countdown
- Perform the call-to-stations (6:30 p.m.)
- Countdown begins at the T-43 hour mark (7 p.m.)
- Begin final vehicle and facility close-outs for launch
- Check out back-up flight systems
- Review flight software stored in mass memory units and display systems
- Load backup flight system software into Atlantis' general purpose computers

#### Launch - 2 Days (Saturday, April 22)

- Remove mid-deck and flight-deck platforms (3 a.m.)
- Activate and test navigational systems
- Middeck and flight deck preliminary inspections complete (8:30 a.m.)

- Complete preparation to load power reactant storage and distribution system (10 a.m.)

Enter first built-in hold at T-27 hours for duration of 4 hours (11 a. m.)

- Clear launch pad of all non-essential personnel
- Perform test of the vehicle's pyrotechnic initiator controllers (noon)

Resume countdown (3 p.m.)

- Begin operations to load cryogenic reactants into Atlantis' fuel cell storage tanks (3 p.m. – 11 p.m.)

Enter 4-hour built-in hold at T-19 hours (11 p.m.)

- Begin filling pad sound suppression system water tank
- Demate orbiter mid-body umbilical unit

#### Launch - 1 Day (Sunday, April 23)

- Resume orbiter and ground support equipment close-outs
- Pad sound suppression system water tank filling complete

Resume countdown (3 a.m.)

- Start final preparations of the Shuttle's three main engines for main propellant tanking and flight
- Install mission specialists' seats in crew cabin begins (5 a.m.)
- Close-out the tail service masts on the mobile launcher platform

Enter planned hold at T-11 hours for 13 hours, 22 minutes (11 a.m.)

- Begin star tracker functional checks (12 noon)
- Activate orbiter's inertial measurement units
- Activate the orbiter's communications systems
- Install film in numerous cameras on the launch pad (3:30 p.m.)
- Flight crew equipment late stow (4 p.m.)
- Move Rotating Service Structure (RSS) to the park position (8 p.m.)
- Perform ascent switch list
- Fuel cell flow-through purge complete (midnight)

#### Launch Day (Monday, April 24)

Resume countdown (12:22 a.m.)

- Activate the orbiter's fuel cells (1:32 a.m.)
- Clear the blast danger area of all non-essential personnel
- Switch Atlantis' purge air to gaseous nitrogen (2:37 a.m.)

Enter planned 6-hour built-in hold at the T-6 hour mark (5:22 a.m.)

- Launch team verifies no violations of launch commit criteria prior to cryogenic loading of the external tank
- Clear pad of all personnel
- Chilldown of propellant transfer lines
- Begin loading the external tank with about 500,000 gallons of cryogenic propellants (about 7:22 a.m.)

Resume countdown (7:22 a.m.)

- Complete filling the external tank with its flight load of liquid hydrogen and liquid oxygen propellants (about 10:22 a.m.)
- Final Inspection Team proceed to launch pad

Enter planned 2-hour built-in hold at T-3 hours (10:22 a.m.)

- Perform inertial measurement unit preflight calibration
- Align Merritt Island Launch Area (MILA) tracking antennas
- Perform open loop test with Eastern Range

Resume countdown at T-3 hours (12:22 p.m.)

- Crew departs Operations and Checkout Building for the pad (12:27 p.m.)
- Complete close-out preparations in the white room
- Check cockpit switch configurations
- Flight crew begins entry into the orbiter (about 12:57 p.m.)
- Astronauts perform air-to-ground voice checks with Launch and Mission Control
- Close Atlantis' crew hatch (about 2:12 p.m.)
- Begin Eastern Range final network open loop command checks
- Perform hatch seal and cabin leak checks
- Complete white room close-out
- Close-out crew moves to fallback area
- Primary ascent guidance data is transferred to the backup flight system

Enter planned 10-minute hold at T-20 minutes (3:02 p.m.)

- NASA Test Director conducts final launch team briefings
- Complete inertial measurement unit pre-flight alignments

Resume countdown (3:12 p.m.)

- Transition the orbiter's onboard computers to launch configuration
- Start fuel cell thermal conditioning
- Close orbiter cabin vent valves
- Transition backup flight system to launch configuration

Enter planned 40-minute hold at T-9 minutes (3:23 p.m.)

- Launch Director, Mission Management Team and NASA Test Director conduct final polls for go/no go to launch

Resume countdown at T-9 minutes (4:03 p.m.)

- Start automatic ground launch sequencer (T-9:00 minutes)
- Retract orbiter crew access arm (T-7:30)
- Start mission recorders (T-6:15)
- Start Auxiliary Power Units (T-5:00)
- Arm SRB and ET range safety safe and arm devices (T-5:00)
- Start liquid oxygen drainback (T-4:55)
- Start orbiter aerosurface profile test (T-3:55)
- Start main engine gimbal profile test (T-3:30)
- Pressurize liquid oxygen tank (T-2:55)
- Begin retraction of the gaseous oxygen vent arm (T-2:55)
- Fuel cells to internal reactants (T-2:35)
- Pressurize liquid hydrogen tank (T-1:57)
- Deactivate SRB joint heaters (T-1:00)
- Orbiter transfers from ground to internal power (T-0:50 seconds)
- Ground Launch Sequencer go for auto sequence start (T-0:31 seconds)
- SRB gimbal profile (T-0:21 seconds)
- Ignition of three Space Shuttle main engines (T-6.6 seconds)
- SRB ignition and liftoff (T-0)

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<b>SUMMARY OF BUILT-IN HOLDS FOR STS-101</b>			
<b>T-TIME</b>	<b>LENGTH OF HOLD</b>	<b>HOLD BEGINS</b>	<b>HOLD ENDS</b>

T-27 hours	4 hours	11 a.m. Sat.	3 p.m. Sat.
T-19 hours	4 hours	11 p.m. Sat.	3 a.m. Sun.
T-11 hours	13 hours, 22 minutes	11 a.m. Sun.	12:22 a.m. Mon.
T-6 hours	2 hours	5:22 a.m. Mon.	7:22 a.m. Mon.
T-3 hours	2 hours	10:22 a.m. Mon.	12:22 p.m. Mon.
T-20 minutes	10 minutes	3:02 p.m. Mon.	3:12 p.m. Mon.
T-9 minutes	40 minutes	3:23 p.m. Mon.	4:03 p.m. Mon.

<b>CREW FOR MISSION STS-101</b>	
<b>POSITION</b>	<b>NAME</b>
Commander (CDR)	Jim Halsell
Pilot (PLT)	Scott Horowitz
Mission Specialist (MS1)	Mary Ellen Weber
Mission Specialist (MS2)	Jeffrey Williams
Mission Specialist (MS3)	James Voss
Mission Specialist (MS4)	Susan Helms
Mission Specialist (MS5)	Yuri Usachev

<b>SUMMARY OF STS-101 LAUNCH DAY CREW ACTIVITIES</b> <b>Monday, April 24</b>	
3:15 a.m.	Wake up
3:45 a.m.	Breakfast
9:00 a.m.	Lunch
11:17 a.m.*	Snack and crew photo
11:47 a.m.	Weather briefing (CDR, PLT, MS2)
11:47 a.m.	Don launch and entry suits (MS1, MS3 & MS4)
11:57 a.m.*	Don launch and entry suits (CDR, PLT, MS2)
12:27 a.m.*	Depart for Launch Pad 39A
12:57 p.m.*	Arrive at white room and begin ingress
2:12 p.m.*	Close crew hatch
4:15 p.m.*	Launch

**\*Televised events (times may vary slightly)**

**All times Eastern**

**-- end --**

April 2000  
KSC Contact: George Diller  
KSC Release No. 40-00

## RECEIVING SPACE SHUTTLE ASTRONAUT VOICE COMMUNICATIONS

Space Shuttle air-to-ground communication is transmitted on one of two designated S-band frequencies. Because the S-Band voice is digitized, it is unintelligible. When the orbiter is above the horizon, air-to-ground voice on the UHF band can be heard either on 259.7 MHz or 296.8 MHz. However these frequencies are primarily used only during launch and landing. It will, of course, be necessary to know if and when the Space Shuttle will be above the horizon at your location. Unless you are near a NASA tracking station, you will hear only the "downlink," or one side of the conversation, which will be the astronauts talking to ground controllers.

On some missions, the Space Shuttle's orbital inclination is 28.45 degrees, meaning the orbiter travels no farther north in the U.S. than the latitude of Cape Canaveral, the Canary Islands in the Atlantic Ocean region or Midway Island in the Pacific, which limits geographical voice coverage. However, flights which rendezvous with the International Space Station and many scientific Space Shuttle missions have higher inclinations, ranging between 39 degrees and 57 degrees. At these inclinations, voice may be heard as far north as the Gulf of Alaska, Hudson Bay in Canada, and the Hebrides in Scotland.

During all Space Shuttle flights, air-to-ground voice (both uplink and downlink) and video from the orbiter are transmitted on NASA Television which is a C-band satellite transmission on GE-2, Transponder 9C, (3880.0 MHz). This is a geostationary satellite with an orbital location of 85 degrees West. Audio only is also available on 6.8 MHz. GE-2 can be received in all 50 states and much of Canada, Mexico and the Caribbean. While the Space Shuttle is in orbit, this system is always broadcasting. The signal is not encoded, or scrambled, and may be picked up with a home satellite receiver. Some cable television companies carry it, at least on a limited basis. NASA Television is also available on a continuous basis on two direct satellite-to-home broadcast systems, Dish Network and DirectTV.

The Space Shuttle on-orbit communications through the Tracking and Data Relay Satellite (TDRS) system uses S-band and K-band. This is encoded and also transmitted digitally, so it is not possible for a home satellite system to receive air-to-ground voice or television from TDRS.

The Amateur Radio Club at the Goddard Space Flight Center in Greenbelt, Maryland, WA3NAN, retransmits the air-to-ground Space Shuttle communications on shortwave frequencies. The best reception on each frequency will vary based on the time of day. The frequencies are:

- 3.860 MHz
- 7.185 MHz
- 14.295 MHz
- 21.395 MHz
- 28.650 MHz

Some amateur radio organizations retransmit NASA Television or mission audio. As an example, an amateur radio FM transmitter, located on Merritt Island near Gate 2 at the Kennedy Space Center, retransmits Space Shuttle air-to-ground communications on 146.94 MHz. Mission Audio is also transmitted by the amateur radio club at the Goddard Space Flight Center on frequency 147.45 MHz, and by the club at the Johnson Space Center in Houston on 146.64 MHz. The signals can be received for about 25 miles. An amateur television transmitter (ATV) in Cocoa, Fla., retransmits NASA Television on 421.25 MHz. This can be received with a normal cable-ready

television set on Channel 57 by using an external antenna. The signal can be received for at least 20 miles.

Transmitters of various power on other frequencies are provided by local amateur radio organizations in cities around the country. A list of amateur retransmissions of audio or video/audio from NASA TV is available on the World Wide Web at <http://amsat.org/amsat/sarex/shutfreq.html>

Some Space Shuttle missions also carry amateur radio transmitters called SAREX (Shuttle Amateur Radio Experiment). As the schedule permits, amateur radio operators can have their call sign confirmed directly by an astronaut. When the flight crew is busy, a "computer packet module" will automatically transmit a computer message. For further information on the SAREX program frequencies, contact the American Radio Relay League, 225 Main Street, Newington, CT 06111, (860) 594-0200. A SAREX Worldwide Web Page from the NASA Goddard Space Flight Center may be found at [http://www.nasa.gov/sarex/sarex\\_mainpage.html](http://www.nasa.gov/sarex/sarex_mainpage.html)

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April 21, 2000  
KSC Contact: Joel Wells  
KSC Release No. 41-00

## KSC RESOURCEFULNESS KEEPS ATLANTIS ON TRACK FOR APRIL 24 LAUNCH

With only two weeks remaining in Space Shuttle Atlantis' tight processing schedule, Shuttle managers asked the KSC workforce to change out a critical Shuttle component. The 320-pound power drive unit for the orbiter's rudder/speed brake had failed a routine test, but replacing it would be anything but routine.

A team of KSC work planners, engineers and technicians assembled on April 10 to finalize the strategy for a task that they had never before executed at the launch pad. Disconnecting the bulky power drive unit with Atlantis in a vertical orientation posed the threat of air intrusion into the orbiter's hydraulic system – an unacceptable condition for flight. Successful replacement required a tremendous amount of coordination. Cryogenic development, heavy lift operations, new work procedures and seven straight days of effort rested squarely on the shoulders of KSC's workforce along with the standard launch preparations that remained.

"We weren't that worried about each technical task," explained Ed Mango, NASA Shuttle project engineer. "I think the most challenging part of this job was integrating the multiple tasks into one smooth plan."

The rudder/speed brake is hinged to the orbiter's vertical tail and allows the ship's commander or pilot to control right and left yaw, as well as air speed during critical entry and landing maneuvers. The hydraulic power drive unit or PDU is located inside the tail, at the base of the hinge, and its job is to push a system of drive shafts and mechanical actuators. The PDU rotates the two-ply rudder/speed brake panels together for orbiter yaw control and flares them apart for air speed control. Without a good PDU, the rudder/speed brake will not function.

"It became clear that the part had to be changed out in order to fly, so we asked the team to develop a safe plan and to take their time implementing it," said Dave King, KSC Director of Shuttle Processing. "With safety as our foremost goal, our folks made every effort to meet the scheduled launch date."

While NASA and United Space Alliance flow managers labored over the PDU replacement plan, engineers at KSC's Cryogenic Testbed Facility had to prove that a crucial part of that plan would work. To prevent air intrusion into the hydraulic system, workers would have to freeze the six titanium hydraulic lines that lead to and from the PDU before removing it. In only three days, KSC's cryogenic test team designed, fabricated and tested a copper manifold used to freeze the PDU lines. Testing confirmed the feasibility of the process and proved that it would not harm flight hardware.

"After the first test, I had no doubt that we would be successful," said Andreas Dibbern, NASA hydraulic systems engineer. "But our excitement grew as each step brought us closer to accomplishing something that we had never done before."

Once the concept was proven, engineers at the launch pad wrapped the 6-foot long, 1/4-inch diameter copper lines around the 5/8-inch diameter PDU hydraulic lines on Shuttle Atlantis. With liquid nitrogen flowing through the copper manifold at -320 degrees F, a 4-inch plug of fluid was frozen solid inside each line in only minutes. Workers could now disconnect the 2 feet long by 2 feet wide by 2 feet high PDU from the ship.

The burden then shifted to a team of technicians and heavy equipment operators who actually removed the faulty unit and replaced it with one that had been pulled

from Shuttle Columbia at Boeing's processing facility in Palmdale, CA. Managers mobilized a 250-ton crane, a 40-ton crane, and two cherry pickers capable of lifting about four workers each at Launch Pad 39A.

"We deal with heavy lift operations all the time - including lifting the orbiter. So we didn't perceive this effort as a problem at all," recounted Fred Pearson, vertical operations manager for United Space Alliance. "From the crane operators to the technicians, I have a very experienced crew. We just all came together to execute the plan. The system engineers really removed a lot of obstacles and made our job much easier."

On April 12 at about 7:30 p.m., with workers positioned on the pad surface preparing ground support equipment, crane operators at the ready, supervisors and safety personnel on the Mobile Launcher Platform, and technicians in the cherry pickers, more than 16 people were postured to support. The actual PDU replacement took less than 4 hours and electrical/mechanical connections were completed the next day.

Test engineers in Firing Room No. 1 of KSC's Launch Control Center conducted a retest of the Shuttle's entire hydraulic system on April 15 and 16. Testing confirmed that the power drive unit had been replaced successfully with no air intrusion. Shuttle engineers at Johnson Space Center led a thorough evaluation of the initial PDU failure and determined that it was not a constraint for this flight. Additional PDU testing may be required prior to other flights. The failure and consequences will be fully evaluated at the prelaunch Mission Management Team Review scheduled for Saturday. The launch of the Space Shuttle Atlantis on mission STS-101 remains scheduled for April 24 at about 4:15 p.m. EDT.

**NOTE TO EDITORS:** Video of the PDU replacement effort and interviews with related personnel is available at the KSC Press Site. Still photos are also available at the Press Site or at Publishers Photo Corner on KSC's website at [www.ksc.nasa.gov](http://www.ksc.nasa.gov)

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**April 22, 2000  
KSC Contact: Bruce Buckingham  
KSC Release No. 42-00**

**KEY ROADS INTO KSC CLOSED FOR SHUTTLE LAUNCH APRIL 24**

**Prior to the launch of the Space Shuttle Atlantis on mission STS-101, State Road 405 and State Road 3 going into the Kennedy Space Center, will be closed to the general public.**

**Closure of these roads will begin Sunday, April 23 from 8 p.m. through launch of Atlantis, currently scheduled for 4:15 p.m. Monday, April 24. Only badged personnel will be allowed access during these times.**

**Persons with NASA launch guest placards will be permitted to enter beginning at 9 a.m. Monday.**

**-- end --**

April 28, 2000  
KSC Contact: George Diller  
KSC Release No. 43-00

#### **LAUNCH OF GOES-L WEATHER SATELLITE SCHEDULED FOR MAY 3**

The launch of the GOES-L weather satellite for NASA and the National Oceanic and Atmospheric Administration (NOAA) aboard a Lockheed Martin Atlas IIA rocket (AC-137) is scheduled for Wednesday, May 3. Liftoff is targeted to occur at the opening of a launch window that extends from 2:27 - 5:53 a.m. EDT, a duration of three hours and 27 minutes. Launch will occur from Pad A at Complex 36 on Cape Canaveral Air Force Station.

GOES-L is the fourth spacecraft to be launched in the new advanced series of geostationary weather satellites for NOAA. The spacecraft is a three-axis internally stabilized weather satellite that has the dual capability of providing pictures while performing atmospheric sounding at the same time. Once in orbit the spacecraft will be designated GOES-11 and will complete check-out in time for availability during the 2000 hurricane season.

#### **NASA/NOAA Pre-launch Press Conference**

The pre-launch press conference will be held at the NASA-KSC News Center on Monday, May 1 at 11:30 a.m. EDT. Participating in the briefing will be:

Gerry Dittberner, GOES Program Manager, NOAA  
Chuck Dovale, NASA Launch Director, Kennedy Space Center  
Adrian Laffitte, Director, Atlas Launch Operations, Lockheed Martin  
Martin Davis, GOES Project Manager, NASA Goddard Space Flight Center  
William Proenza, Director, NOAA National Weather Service, NOAA Southern Region  
James Sardonja, Launch Weather Officer, 45th Weather Squadron, USAF

No post-launch news conference is planned.

#### **Press Coverage**

There will be a tower-rollback photo opportunity for accredited news media. Press representative should be at the Gate 1 Pass and Identification Building on Cape Canaveral Air Force Station located on State Road 401 at 10:45 p.m., May 2. Departure for Launch Complex 36 will be promptly at 11 p.m.

Media covering launch only should assemble at the Gate 1 Pass and Identification Building at 1 a.m., May 3. The convoy to Press Site 1 will depart at 1:15 a.m.

Media who wish to cover the pre-launch press conference and the launch of GOES-L should send a letter of request on news organization letterhead. Include the full names, Social Security numbers and birth dates of those desiring accreditation. Letters should be faxed to 321/867-2692 or may be addressed to:

GOES-L Launch Accreditation  
NASA AB-F1  
Kennedy Space Center, FL 32899

GOES-L/AC-137 mission badges may be picked up at the NASA-KSC News Center beginning on Monday, May 1. Badges may also be obtained on launch day at the Gate 1 Pass and Identification Building starting at 1 a.m. with prior approval. STS 101 mission badges will not be honored.

#### **Remote Camera Placement**

On Tuesday, May 2 at 9 a.m., a van will depart from the NASA-KSC News Center for Complex 36 for media photographers to establish remote cameras at the pad. There will be no access or transportation from Gate 1 for remote camera set-ups.

#### **NASA-KSC News Center Overnight Hours for Launch**

The NASA-KSC News Center will open on launch day at 1 a.m. and remain open until a successful launch and spacecraft solar array deployment can be confirmed at approximately L+90 minutes.

#### **NASA Television Coverage**

NASA Television will carry live the GOES-L/AC-137 pre-launch press conference on Monday, May 1 at 11:30 a.m. A two-way question and answer capability will be available from other NASA field centers.

A complete GOES-L video package will be broadcast during the NASA TV video file scheduled for noon, 3 p.m., 6 p.m., 9 p.m. and midnight on May 1, May 2 and May 3.

On launch day, May 3, launch commentary will begin at 1 a.m. EDT and continue through spacecraft separation at L+27 minutes.

The pre-launch press conference and launch coverage will be carried on the NASA "V" audio circuits which may be accessed by dialing 321/867-1220, 1240, 1260, 7135, 4003, and 4920.

NASA Television is available on the GE-2 satellite, transponder 9C, located at 85 degrees West.

#### **Status Reports**

Recorded status reports on the launch of GOES-L/AC-137 will be available on the KSC news media codaphone starting on Monday, May 1. The telephone number is 321/867-2525.

-- end --

April 22, 2000  
KSC Contact: Bruce Buckingham  
KSC Release No. 44-00

## **RECOVERY TEAM TO TEST BOOSTER RETRIEVAL BY SUBMARINE DURING STS-101 MISSION**

A demonstration to evaluate the use of a one-man submarine during Space Shuttle solid rocket booster retrieval operations will be conducted at sea by United Space Alliance post flight operations during the upcoming STS-101 mission.

The demonstration is part of a continuing program by NASA and United Space Alliance (USA) to augment safety in all phases of Space Shuttle operations.

USA, prime contractor to NASA for the Space Shuttle program, is responsible for retrieving the two expended solid rocket boosters (SRB) after they separate from the Space Shuttle about two minutes into powered flight. The boosters splash down in an impact area about 140 miles east of Jacksonville, FL, and are towed back to Cape Canaveral Air Force Station for refurbishment by two specially rigged recovery ships, Liberty Star and Freedom Star.

For STS-101, a chartered one-man submarine, designated DeepWorker 2000, will be deployed from Liberty Star once the right-hand booster splashes down. The submarine will be evaluated on its ability to duplicate the job USA divers presently do at the recovery site. Using a manipulator arm, the submarine pilot will demonstrate capabilities to cut tangled parachute riser lines, if necessary, and attach a Diver Operator Plug (DOP) used to extract water and provide flotation for the SRB. A team of USA divers currently performs these operations at depths of as much as 120 feet, sometimes under hazardous conditions.

The test also will include evaluation of a new Enhanced Diver Operator Plug (EDOP) that features a motor-powered locking mechanism that replaces the present manual system to enhance diver safety and reduce workload at depth. It also has been streamlined for easier handling underwater.

Under the test plan, the submersible will attach the EDOP to the SRB nozzle on launch day with two divers in the water documenting the event. A third diver is present as a safety observer. Since the EDOP is not yet certified, it will be removed and taken onboard Liberty Star after the test.

On the morning after launch, the submarine pilot will install the conventional DOP to the SRB nozzle with five divers available to provide documentation and complete the installation as necessary. The SRB will then be towed back to Port Canaveral.

The newly designed DeepWorker 2000, built by Nuytco Research Ltd., North Vancouver, British Columbia, is 8.25 feet long, 5.75 feet high and weighs 3,800 pounds. It can explore to depths of 2,000 feet and is equipped with a package of eight high-powered thrusters, double the number used during preliminary testing at Port Canaveral last August.

Space Shuttle program management will evaluate the results of the demonstration.

**NOTE TO EDITORS:** Video and photos of the sub's test activities are available in the KSC News Room. Still photos are also available at Publishers Photo Corner on KSC's website at [www-pao.ksc.nasa.gov/kscpao/captions/hotpics.htm](http://www-pao.ksc.nasa.gov/kscpao/captions/hotpics.htm).

-- end --



**May 8, 2000  
KSC Contact: Patti Phelps  
KSC Release No. 45a-00**

**RAMONA BOBER HONORED BY NASA ASTRONAUT**

**Ramona Bober, a native of Buffalo, N.Y., and graduate of State University of New York (SUNY) at Buffalo and SUNY College of Technology at Delhi, was recently presented with NASA's prestigious Silver Snoopy Award for service to the Space Shuttle astronauts.**

**Born in Buffalo, N.Y., Bober graduated from Holy Angels Academy in 1978, and graduated from State University of New York with a bachelor of science in Veterinary Science. Her parents, Richard and Carolyn Dombrowski, reside in Buffalo, N.Y.**

**Bober lives in Viera, Fla., and is married to John M. Bober.**

**Astronaut John Herrington presented the award to Bober in March at Kennedy Space Center. Bober is the lead technologist for the Bionetics Corporation, a NASA contractor. She is responsible for Shuttle mission preplanning, implementation of procedures and supervision of personnel for KSC's Life Sciences Support Facility. She joined The Bionetics Corporation in 1990.**

**Bober was recognized for her quality of work and dedication demonstrated on the STS-90 Neurolab. "Your efforts in support of the mission were above and beyond the normal call of duty. Much of the success of the Neurolab mission can be directly attributed to your superior performance," said astronaut Herrington.**

**Snoopy, of the comic strip "Peanuts," has been the unofficial mascot of NASA's astronaut corps since the earliest days of human space flight. The Silver Snoopy Award was created by the astronauts to honor persons who contribute most to the safety and success of human space flight.**

**The award is presented to no more than one percent of the Space Center's work force each year. Recipients are given a silver pin depicting the famous beagle wearing a space suit. All the pins have flown on a previous Space Shuttle mission. The awardees also received a framed certificate and a congratulatory letter signed by the presenting astronaut.**

**-- end --**

May 8, 2000  
KSC Contact: Patti Phelps  
KSC Release No. 45b-00

#### **JAMES R. FOWLER HONORED BY NASA ASTRONAUT**

James R. Fowler, a native of Anderson, S.C., was recently presented with NASA's prestigious Silver Snoopy Award for service to the Space Shuttle astronauts.

Born in Anderson, S.C., Fowler graduated from Anderson Boys High School in 1958, and from Rollins College in Orlando, Fla. with a bachelor of science in Business Administration. His parents are Mrs. L.J. Fowler of Anderson, S.C. and the late L.J. Fowler.

Fowler lives in Satellite Beach, Fla., and is married to the former Jeanette McDowell.

Astronaut John Herrington presented the award to Fowler in March at Kennedy Space Center. Fowler is an occupational health and safety specialist responsible for providing safety expertise for Space Shuttle ground processing operations involving hazardous propellants and fuels. He joined Kennedy Space Center in 1990.

Fowler was recognized for his undaunting devotion and dedication to the safety of the Shuttle Program since STS-4. "Your commitment to excellence is above reproach and fosters the type of pride and dedication that NASA needs to be successful in space exploration," said astronaut Herrington.

Snoopy, of the comic strip "Peanuts," has been the unofficial mascot of NASA's astronaut corps since the earliest days of human space flight. The Silver Snoopy Award was created by the astronauts to honor persons who contribute most to the safety and success of human space flight.

The award is presented to no more than one percent of the Space Center's work force each year. Recipients are given a silver pin depicting the famous beagle wearing a space suit. All the pins have flown on a previous Space Shuttle mission. The awardees also received a framed certificate and a congratulatory letter signed by the presenting astronaut.

-- end --

May 8, 2000  
KSC Contact: Patti Phelps  
KSC Release No. 45c-00

#### **ELIZABETH C. GODFREY HONORED BY NASA ASTRONAUT**

Elizabeth C. Godfrey, a native of Titusville, Fla., was recently presented with NASA's prestigious Silver Snoopy Award for service to the Space Shuttle astronauts.

Godfrey graduated from Titusville High School in 1965, and graduated from Brevard Community College in 1986 with an associate of arts in business. Her parents, Tom and Irene Smircich, currently resides in Titusville.

Godfrey lives in Titusville, Fla., and is married to John D. Godfrey.

Astronaut John Herrington presented the award to Godfrey in March at Kennedy Space Center. Godfrey is an administrative officer in the safety and mission assurance directorate. She joined KSC in 1968.

Godfrey was commended for her commitment to making critical staffing a priority and going beyond what is expected to make sure the appropriate people are hired, promoted, awarded and trained. "Your initiative and dedication to staffing are characteristics of your total commitment to quality and safety," said astronaut Herrington.

Snoopy, of the comic strip "Peanuts," has been the unofficial mascot of NASA's astronaut corps since the earliest days of human space flight. The Silver Snoopy Award was created by the astronauts to honor persons who contribute most to the safety and success of human space flight.

The award is presented to no more than one percent of the Space Center's work force each year. Recipients are given a silver pin depicting the famous beagle wearing a space suit. All the pins have flown on a previous Space Shuttle mission. The awardees also received a framed certificate and a congratulatory letter signed by the presenting astronaut.

-- end --

May 8, 2000  
KSC Contact: Lisa Malone  
KSC Release No. 46-00

## KENNEDY SPACE CENTER ROLLS OUT NEW ORGANIZATION STRUCTURE

Today, Kennedy Space Center will begin with a fresh organization focused on safe operations of the Space Shuttle, Space Station, Expendable Launch Vehicle programs and customers, and spaceport technology development.

Highlights of the new structure include creating a Spaceport Engineering and Technology organization to focus on spaceport technology and development and project management; a Spaceport Services group to service the needs of the center's internal and external customers; and establishment of an External Relations and Business Development team to create a "one-stop shopping" for new customers and improve internal and external communications.

"Our main objective is to continue safe and effective support of our operational programs: Space Shuttle, International Space Station (ISS) and payload processing, and Expendable Launch Vehicle (ELV) Services. At the same time we will strive to improve our ability to focus on spaceport technology development," said Bridges.

KSC has taken on significant changes within several organizations over the past two years leading up to the reorganization. For example: 1) the transition of Shuttle processing tasks to United Space Alliance; 2) the consolidation of the Expendable Launch Vehicle program at KSC from Goddard Space Flight Center, Greenbelt, MD, and Glenn Research Center, Cleveland, OH, and 3) the creation of special teams to process and test the ISS in a multiple element configuration.

Since last August, a core team has been in place working on a new overall structure for the center. Teams of employees have been actively involved in setting up the new organizations.

Bridges said the number one driving force for the change is that a reduced workforce has left NASA with critical skill shortages. Through the reorganization Bridges said, "We hope to attract, develop and retain a highly competent, diverse, agile and flexible workforce." Other factors leading to the reorganization include redundant functions within the current organizational structure, an excessive number of internal customer handoffs, limited flexibility for employees, and an inconsistent alignment with the KSC Roadmap. Bridges added, "None of the center's nearly 1,781 civil service employees will lose his or her civil service status, but some people will have new opportunities within the new structure."

Editor's Note: Roy Bridges will give an informal briefing to news media at the KSC Press Site at 3:30 p.m. today at the Press Site auditorium. This event will not be carried live. Video and audio tapes will be provided. Biographies of KSC's executive directors are available on at <http://www-pao.ksc.nasa.gov/kscpao/bios/bios.htm> A chart of the new organization is available at <http://www.ksc.nasa.gov/admin/org/organization.html>

-- end --



May 11, 2000  
KSC Contact: Joel Wells  
KSC Release No. 47-00

## SHUTTLE MISSION STS-101 LAUNCH COUNTDOWN SET TO BEGIN

NASA will begin the countdown for launch of Space Shuttle Atlantis on mission STS-101 May 15, at 9:30 a.m. EDT at the T-43 hour mark. This mission marks the 3rd Shuttle flight to the International Space Station. The KSC launch team will conduct the countdown from Firing Room 1 of the Launch Control Center.

The countdown includes 26 hours and 2 minutes of built-in hold time leading to a preferred launch time at about 6:38 a.m. on May 18. The launch window opens at 6:32 a.m. and extends for 10 minutes until 6:42 a.m. A preferred launch time will be determined during the T-9 minute built-in hold based on the orbital location of the International Space Station (ISS). Mission STS-101 is the 21st flight of the orbiter Atlantis and the 98th flight overall in NASA's Space Shuttle program. STS-101 is scheduled to last 10 days, 19 hours and 14 minutes with a planned KSC landing at 2:18 a.m. on May 29.

This is Atlantis' first flight since it returned to KSC from a maintenance down period in Palmdale, CA, on Sept. 27 of 1998. Following an extended processing period, Atlantis rolled out of the OPF on March 17 to be mated with the external tank and solid rocket boosters in the VAB. The entire Space Shuttle stack rolled out to Launch Pad 39A March 25 to undergo final launch preparations. The first three launch attempts for STS-101, on April 24 through 26, were scrubbed because of unacceptable weather conditions at KSC's Shuttle Landing Facility and at the Transoceanic Abort Landing sites.

On mission STS-101, the seven-member flight crew will prepare ISS for the arrival of the Russian-made Zvezda service module. The mission includes a single space walk to complete maintenance on the outpost and astronauts will also transfer a variety of supplies and logistics.

The STS-101 crew includes: Commander Jim Halsell, Pilot Scott Horowitz, Mission Specialists Susan Helms, Yuri Usachev, James Voss, Mary Ellen Weber and Jeff Williams.

### COUNTDOWN MILESTONES

\*all times are Eastern

#### Launch - 3 Days (Monday, May 15)

- Prepare for the start of the STS-101 launch countdown
- Perform the call-to-stations (9 a.m.)
- Countdown begins at the T-43 hour mark (9:30 a.m.)
- Begin final vehicle and facility close-outs for launch
- Check out back-up flight systems
- Review flight software stored in mass memory units and display systems
- Load backup flight system software into Atlantis' general purpose computers
- Remove mid-deck and flight-deck platforms (5:30 p.m.)
- Activate and test navigational systems (10:30 p.m.)
- Middeck and flight deck preliminary inspections complete (11 p.m.)

#### Launch - 2 Days (Tuesday, May 16)

- Complete preparation to load power reactant storage and distribution system (12:30 a.m.)

Enter first built-in hold at T-27 hours for duration of 4 hours (1:30 a.m.)

- Clear launch pad of all non-essential personnel
- Perform test of the vehicle's pyrotechnic initiator controllers (noon)

Resume countdown (5:30 a.m.)

- Begin operations to load cryogenic reactants into Atlantis' fuel cell storage tanks (5:30 a.m. – 1:30 p.m.)

Enter 4-hour built-in hold at T-19 hours (1:30 p.m.)

- Begin filling pad sound suppression system water tank
- Demate orbiter mid-body umbilical unit
- Resume orbiter and ground support equipment close-outs
- Pad sound suppression system water tank filling complete

Resume countdown (5:30 p.m.)

- Start final preparations of the Shuttle's three main engines for main propellant tanking and flight (5:30 p.m.)

Launch - 1 Day (Wednesday, May 17)

- Close-out the tail service masts on the mobile launcher platform (1:30 a.m.)

Enter planned hold at T-11 hours for 13 hours, 12 minutes (1:30 a.m.)

- Begin star tracker functional checks (2:30 a.m.)
- Activate orbiter's inertial measurement units
- Activate the orbiter's communications systems
- Install film in numerous cameras on the launch pad (5:30 a.m.)
- Flight crew equipment late stow (6:30 a.m.)
- Move Rotating Service Structure (RSS) to the park position (10:30 a.m.)
- Perform ascent switch list
- Fuel cell flow-through purge complete (1:30 p.m.)

Resume countdown (2:42 p.m.)

- Activate the orbiter's fuel cells (4:02 p.m.)
- Clear the blast danger area of all non-essential personnel
- Switch Atlantis' purge air to gaseous nitrogen

Enter planned 2-hour built-in hold at the T-6 hour mark (7:42 p.m.)

- Launch team verifies no violations of launch commit criteria prior to cryogenic loading of the external tank
- Clear pad of all personnel
- Chilldown of propellant transfer lines
- Begin loading the external tank with about 500,000 gallons of cryogenic propellants (about 9:12 p.m.)

Resume countdown (9:42 p.m.)

Launch Day (Thursday, May 18)

- Complete filling the external tank with its flight load of liquid hydrogen and liquid oxygen propellants (about 12:42 a.m.)
- Final Inspection Team proceed to launch pad

Enter planned 2-hour built-in hold at T-3 hours (12:42 a.m.)

- Perform inertial measurement unit preflight calibration
- Align Merritt Island Launch Area (MILA) tracking antennas
- Perform open loop test with Eastern Range

**Resume countdown at T-3 hours (2:42 a.m.)**

- Crew departs Operations and Checkout Building for the pad (2:47 a.m.)
- Complete close-out preparations in the white room
- Check cockpit switch configurations
- Flight crew begins entry into the orbiter (about 3:17 a.m.)
- Astronauts perform air-to-ground voice checks with Launch and Mission Control
- Close Atlantis' crew hatch (about 4:32 a.m.)
- Begin Eastern Range final network open loop command checks
- Perform hatch seal and cabin leak checks
- Complete white room close-out
- Close-out crew moves to fallback area
- Primary ascent guidance data is transferred to the backup flight system

**Enter planned 10-minute hold at T-20 minutes (5:22 a.m.)**

- NASA Test Director conducts final launch team briefings
- Complete inertial measurement unit pre-flight alignments

**Resume countdown (5:32 a.m.)**

- Transition the orbiter's onboard computers to launch configuration
- Start fuel cell thermal conditioning
- Close orbiter cabin vent valves
- Transition backup flight system to launch configuration

**Enter planned 40-minute hold at T-9 minutes (5:43 a.m.)**

- Launch Director, Mission Management Team and NASA Test Director conduct final polls for go/no go to launch

**Resume countdown at T-9 minutes (6:23 a.m.)**

- Start automatic ground launch sequencer (T-9:00 minutes)
- Retract orbiter crew access arm (T-7:30)
- Start mission recorders (T-6:15)
- Start Auxiliary Power Units (T-5:00)
- Arm SRB and ET range safety safe and arm devices (T-5:00)
- Start liquid oxygen drainback (T-4:55)
- Start orbiter aerosurface profile test (T-3:55)
- Start main engine gimbal profile test (T-3:30)
- Pressurize liquid oxygen tank (T-2:55)
- Begin retraction of the gaseous oxygen vent arm (T-2:55)
- Fuel cells to internal reactants (T-2:35)
- Pressurize liquid hydrogen tank (T-1:57)
- Deactivate SRB joint heaters (T-1:00)
- Orbiter transfers from ground to internal power (T-0:50 seconds)
- Ground Launch Sequencer go for auto sequence start (T-0:31 seconds)
- SRB gimbal profile (T-0:21 seconds)
- Ignition of three Space Shuttle main engines (T-6.6 seconds)
- SRB ignition and liftoff (T-0)

-- end --



May 12, 2000  
KSC Contact: Bruce Buckingham  
KSC Release No. 48-00

**Note to Editors/News Directors:  
MISSION STS-101 EVENTS, NEWS CENTER OPERATING HOURS SET**

News conferences, events and operating hours for KSC's News Center have been set for the May 18 launch of the Space Shuttle Atlantis on Mission STS-101, the 98th launch in the Shuttle program. This will be the 4th attempt to launch Atlantis following three failed attempts last month due to weather violations at KSC and at the Transoceanic Abort Landing sites in Spain and Africa.

Liftoff on May 18 is set for about 6:38 a.m. at the opening of a five-minute preferred launch window. The conferences and events will be carried live on NASA Television unless otherwise noted, and originate from the KSC Press Site.

The seven-member STS-101 crew is scheduled to arrive at KSC on Sunday, May 14 at about 11 p.m. EDT. News media representatives planning to cover the event must be at the KSC News Center by 10 p.m. (in the event of a possible early crew arrival) for transportation to the Shuttle Landing Facility. Media are advised to call the KSC codaphone over the weekend for possible updates to the crew arrival time.

News media representatives with proper authorization may obtain STS-101 mission credentials at the Pass and Identification Building on State Road 3 (south of KSC) on Merritt Island during published times. (Credential and badging hours are listed below.) Accreditation provided to media for the earlier launch attempts will be honored for this attempt as well.

Countdown status briefings are scheduled at 9 a.m. each day prior to launch. The full briefing schedule is listed below.

-- end of general release --

**STS-101 BRIEFING & EVENTS SCHEDULE** *(all times are EDT)*  
*(All briefings are held inside the KSC Press Site auditorium and will be carried live on NASA TV unless otherwise noted)*

**L-4 Days - Sunday, May 14**

**11:30 p.m. ----- STS-101 Flight Crew Arrival (Live on NASA TV)**

**L-3 Days - Monday, May 15**

**(Launch countdown begins at 9:30 a.m.)**

**9 a.m. ----- Countdown Status Briefing**

- Steve Altemus, NASA Test Director
- Richard Kuhns, KSC Payload Manager
- Ed Priselac, Shuttle Weather Officer

**L-2 Days - Tuesday, May 16**

**9 a.m. ----- Countdown Status Briefing**

- Jeff Spaulding, NASA Test Director
- Richard Kuhns, KSC Payload Manager
- Ed Priselac, Shuttle Weather Officer

**L-1 Day - Wednesday, May 17**

**9 a.m. ----- Countdown Status Briefing/Pre-launch Press Conference**

- Bill Gerstenmaier, Launch Integration Manager, JSC
- Bob Cabana, Deputy ISS Manager for International Operations, JSC
- Dave King, Director of Shuttle Processing, NASA, Kennedy Space Center
- Ed Priselac, Shuttle Weather Officer

*(Tanking begins at about 9:30 p.m.)*

**L-0 Day - Thursday, May 18**

**1 a.m. ----- NASA Television live launch programming begins**

**Launch Day Crew activities:**

**5:30 p.m. (Wednesday) ---- Wake up**

**6 p.m. (Wednesday) ----- Breakfast**

**11:30 p.m. (Wednesday) -- Lunch**

**\*1:37 a.m. ----- Snack (Crew Photo)**

**2:07 a.m. ----- Weather briefing**

**\*2:30 a.m. ----- Suit up photo**

**\*2:47 a.m. ----- Walkout/depart for pad**

**\*3:17 a.m. ----- Arrive at pad**

**\*4:32 a.m. ----- Close hatch**

**\*6:38 a.m. --- Launch of Atlantis**

*(\*Carried live on NASA TV)*

**Launch + 1 hour ----- Post-launch Press Conference**

- Bill Gerstenmaier, Launch Integration Manager, JSC
- Dave King, Director of Shuttle Processing, KSC

**KSC News Center office hours for STS-101**

*(Times may be adjusted in real time depending on mission events and timelines.)*

Sunday, May 14 (*Launch minus 4 days*) ----- 9 p.m. - 1 a.m. (Monday)

Monday, May 15 (*Launch minus 3 days*) ----- 8 a.m. - 4:30 p.m.

Tuesday, May 16 (*Launch minus 2 days*) ----- 8 a.m. - 4:30 p.m.

Wednesday, May 17 (*Launch minus 1 day*) ----- 8 a.m. -----

Thursday, May 18 (*Launch Day*) *Flight day 1* ----- ----to 4:30 p.m.

Friday, May 19 - *Flight day 2* ----- 8 a.m. - 4:30 p.m.

Sat./Sun., May 20-21 - *Flight days 3 - 4* ----- Closed (see note below)

Mon.-Fri., May 22-26 - *Flight days 5 - 9* ----- 8 a.m. - 4:30 p.m.

Sat./Sun., May 27-28 - *Flight days 10 - 11* ----- Closed (see note below)

Monday, May 29 (*Landing day*) *Flight day 12* ----- 10 p.m. (Sun.) - 10 a.m.

**NOTE:** The KSC News Center will be opened for overnight and weekend STS-101 Mission Status Briefings and the in-flight crew news conference. The office will open one hour prior to the event and close one hour after the conclusion of the event. Times of these briefings are available in the NASA TV schedule at:

<http://www.spaceflight.nasa.gov/realdata/nasatv/schedule.html>

**Pass and Identification Hours**

L-3 Monday, May 15 ----- 8 a.m. - 4:30 p.m.

L-2 Tuesday, May 16 ----- 8 a.m. - 4:30 p.m.

L-1 Wednesday, May 17 ---- 8 a.m. - 4:30 p.m.

L-0 Thursday, May 18 ----- 1 a.m. - 5:30 a.m.

**NOTE:** News media may obtain STS-101 mission credentials at the Pass and Identification Building at Gate 2 on State Road 3, Merritt Island, during the above published times.

News media with annual Shuttle credentials are reminded to sign the logbook at the query counter in the News Center.

**NEWS MEDIA ARE REQUIRED TO BE UNDER PUBLIC AFFAIRS ESCORT AT ALL TIMES WHILE AT KSC EXCEPT WHEN DRIVING TO THE NEWS CENTER OR THE COMPLEX 39 CAFETERIA.**

**NEWS MEDIA ARE ALLOWED AT THE PRESS SITE ONLY WHEN PUBLIC AFFAIRS PERSONNEL ARE ON DUTY AND THE NASA NEWS CENTER IS OPEN.**

-- end --

May 26, 2000  
KSC Contact: Bruce Buckingham  
KSC Release No. 49-00

**Note to Editors:  
ATLANTIS SCHEDULED TO LAND AT KSC COMPLETING MISSION STS-101**

The orbiter Atlantis is scheduled to land at Kennedy Space Center on Monday, May 29, at about 2:20 a.m. EDT completing its near 10-day STS-101 mission that was launched from KSC May 19, 2000.

Landing at KSC's Shuttle Landing Facility (SLF) is slated to occur on orbit 156 at mission elapsed time 9 days, 20 hours, 9 minutes. Deorbit burn will occur at about 1:16 a.m. EDT.

Two KSC landing opportunities Monday are: 2:20 a.m. and 3:56 a.m.

Managers have decided not to call up the back-up landing location at Edwards Air Force Base (EAFB), CA, for a possible landing there on Monday.

If managers must keep Atlantis in orbit an additional day, two landing opportunities are available Tuesday at KSC and two at EAFB.

KSC Tuesday landing times are: 1:16 a.m. and 2:51 a.m. EDT.

EAFB Tuesday landing times are: 4:22 a.m. and 5:58 a.m. EDT.

This landing of Atlantis will mark the 51st landing at KSC in the history of Space Shuttle flight. It will be the 22nd consecutive landing at KSC and the 29th in the last 30 Shuttle flights. Atlantis is currently on the 98th Space Shuttle mission in the history of the program.

#### SLF and KSC Ground Operations

The Shuttle Landing Facility was built in 1975. It is 300 feet wide and 15,000 feet long with 1,000-foot overruns at each end. The strip runs northwest to southeast and is located about 3 miles northwest of the 525-foot tall Vehicle Assembly Building.

Once the orbiter is on the ground, safing operations will commence and the flight crew will prepare the vehicle for post-landing operations. The Crew Transport Vehicle (CTV) will be used to assist the crew, allowing them to leave the vehicle and remove their launch and re-entry suits easier and quicker.

The CTV and other KSC landing convoy operations have been "on-call" since the launch of Atlantis May 19. The primary functions of the Space Shuttle recovery convoy are to provide immediate service to the orbiter after landing, assist crew egress, and prepare the orbiter for towing to the Orbiter Processing Facility.

Convoy vehicles are stationed at the SLF's mid-point. About two hours prior to landing, convoy personnel will don SCAPE suits, or Self-Contained Atmospheric Protective Ensemble, and communications checks are made. A warming-up of coolant and purge equipment is conducted and nearly two dozen convoy vehicles are positioned to move onto the runway as quickly and as safely as possible once the orbiter coasts to a stop. When the vehicle is deemed safe of all potential explosive hazards and toxic gases, the purge and coolant umbilical access vehicles move into position at the rear of the orbiter.

Following purge and coolant operations, flight crew egress preparations will begin and the CTV will be moved into position at the crew access hatch located on the orbiter's port side. A physician will board the Shuttle and conduct a brief preliminary

examination of the astronauts. The crew will then make preparations to leave the vehicle.

Following departure from the SLF, the crew will be taken to their quarters in the O&C Building, meet with their families and undergo physical examinations. The crew is scheduled to depart for JSC later in the day Monday.

If Atlantis lands at Edwards, an augmented KSC convoy team will be on-site to safe the vehicle, disembark the crew and move the orbiter to the Mate/Demate Device. The turnaround team will be deployed to Edwards by charter aircraft on landing day.

About 3½ hours after Atlantis lands at KSC, the orbiter will be towed to the Orbiter Processing Facility for post-flight deservicing.

**NOTICE TO EDITORS:** The KSC press site will be open this weekend at the following times: Saturday from 10:30 p.m. to 3:30 a.m. (Sunday) and on Sunday at 9 p.m. through 10 a.m. Monday. Accredited news media wishing to view Atlantis' landing should be at the KSC press site prior to 1 a.m. Monday for transport to the SLF.

Additional specific information regarding landing photo opportunities, post-landing press conferences and KSC News Center operational hours is available at the KSC News Center. It is suggested that members of the media call the KSC codaphone this weekend for updates at 321-867-2525.

-- end --

June 6, 2000  
KSC Contact: Joel Wells  
KSC Release No. 50-00

## STATE PARTNERS WITH NASA TO DEVELOP RESEARCH FACILITY AND COMMERCE PARK AT KENNEDY SPACE CENTER

Florida's ongoing efforts to expand and diversify the state's space industry will be significantly enhanced with a \$14 million investment that is included in the FY-2001 budget signed last week by Governor Jeb Bush. The funds will support the construction of a Space Experiment, Research & Processing Laboratory (SERPL) at NASA's Kennedy Space Center (KSC), and a roadway to serve the SERPL and a 400-acre Space Station Commerce Park on KSC property.

"The state is investing in the future of its space industry and in the success of the International Space Station," said Lt. Governor Frank Brogan. "The SERPL and the Space Station Commerce Park will provide ground-floor access to the boundless opportunities that will be explored in Earth orbit and beyond."

The SERPL will be an approximately \$43 million facility through which government, commercial and academic research projects from around the world will flow on their way to and from the International Space Station. As part of the \$43 million, NASA is contributing \$9 million for design and activation, and Delaware North Park Services, NASA's Visitor Complex concessionaire, is allocating \$4 million for the Space Station Commerce Park roadway. Funds required to complete the facility construction will be proposed for the state's FY-2002 budget. The 100,000 square-foot facility, which will be constructed by the state over a 25-month period, will feature shared-use laboratories where Florida university researchers will collaborate on a day-to-day basis with NASA, industry and international research organizations.

The SERPL will also serve as a "magnet facility" for the Space Station Commerce Park, which will be available for industry, government and academic space programs that will benefit from having close proximity to the launch pads, landing sites and other infrastructure at the Cape Canaveral Spaceport. The park will be incrementally developed as new programs come forward.

"The new era ushered in by the International Space Station and next generation launch vehicles will bring with it new global competition in space," said KSC Director Roy Bridges. "NASA's partnership with the State of Florida will increase the entire nation's competitive posture through improved infrastructure for space transportation and research, expanded support from academia, and new opportunities for industry."

Construction management for the SERPL will be provided by the Florida Department of Management Services, under contract to the Spaceport Florida Authority. Upon completion, the SERPL facility will be co-managed by NASA and the Florida Space Research Institute, using the University of Florida as its lead institution.

# # #

NOTE TO EDITORS: Still photos of recent life sciences research at KSC are available at the KSC Press site or at KSC's website [www.ksc.nasa.gov](http://www.ksc.nasa.gov) under [Publishers Photo Corner](#).

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June 9, 2000  
KSC Contact: George Diller  
KSC Release No. 51-00

**Note to Editors/News Directors:  
TDRS-H SPACECRAFT PRESS OPPORTUNITY AT KSC TUESDAY, JUNE 13**

NASA's Tracking and Data Relay Satellite-H (TDRS-H) to be launched aboard a Lockheed Martin Atlas IIA rocket on June 29 is the subject of a news media opportunity on Tuesday, June 13. Media representatives will be taken inside the clean room at the SAEF-2 spacecraft checkout facility located in the KSC Industrial Area to see and photograph the satellite. Spokespeople from NASA's Goddard Space Flight Center and Hughes Space & Communications, builders of the spacecraft, will discuss TDRS-H and will be available for questions and interviews.

TDRS-H is the first in a new series of three Tracking and Data Relay Satellites designed to replenish the existing on-orbit fleet of six spacecraft, the first of which was launched in 1983. The Tracking and Data Relay Satellite System is the primary source of air-to-ground voice, data and telemetry for the Space Shuttle. It also provides communications with the International Space Station and scientific spacecraft in low earth orbit such as the Hubble Space Telescope and the Chandra X-Ray Observatory. This new advanced series of satellites will extend the availability of TDRS communications services until approximately 2010.

For this event, standard clean room protocol will be observed. Those planning to attend are requested to wear long pants and closed-toe shoes. Clean room attire (bunny suits) will be furnished. Quality control personnel will request cleaning of photographic equipment with alcohol wipes which will be provided. No suede, leather or vinyl attire or accessories are permitted. Please do not wear perfume, cologne or makeup. Special plastic bags will be provided for photographic accessories. No graphite pencils, food, tobacco, lighters, matches, or pocket knives will be permitted inside the clean room. Electronic flash photography is permitted. The lighting in the facility is mercury vapor.

Those needing accreditation should contact the NASA News Center at 321/867-2468 by the close of business Monday, Jun. 12. The departure from the KSC News Center for SAEF-2 will be at 8 a.m. on Tuesday, June 13. The event concludes at 9:30 a.m.

The launch of TDRS-H is scheduled for June 29, 2000 at 8:38 a.m. EDT from Pad A at Launch Complex 36 on Cape Canaveral Air Force Station. The launch window is 40 minutes in duration.

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June 21, 2000  
KSC Contact: George Diller  
KSC Release No. 52-00

**Note to Editors/News Directors:  
LAUNCH OF NASA'S TDRS-H SATELLITE SCHEDULED FOR JUNE 29**

The launch of NASA's Tracking and Data Relay Satellite-H (TDRS-H) aboard a Lockheed Martin Atlas IIA rocket (AC-139) is scheduled for Thursday, June 29. Liftoff is targeted to occur at the opening of a launch window that extends from 8:38 - 9:18 a.m. EDT, a duration of 40 minutes. Launch will occur from Pad A at Complex 36 on Cape Canaveral Air Force Station.

TDRS-H is the first in a new series of three Tracking and Data Relay Satellites designed to replenish the existing on-orbit fleet of six spacecraft, the first of which was launched in 1983. It is also the first TDRS spacecraft designed to be launched on an expendable vehicle instead of the Space Shuttle. The Tracking and Data Relay Satellite System is the primary source of air-to-ground voice, data and telemetry for the Space Shuttle. It also provides the communications and data capability for the International Space Station and scientific spacecraft in low earth orbit such as the Hubble Space Telescope and the Chandra X-ray Observatory. This new advanced series of satellites will extend the availability of TDRS communications services until approximately 2010.

**TDRS-H Prelaunch Press Conference**

The prelaunch press conference will be held at the NASA-KSC News Center on Wednesday, June 28, at 10 a.m. EDT. Participating in the briefing will be:

- Robert Spearing, NASA Deputy Associate Administrator for Space Communications
- Stan Newberry, Director, Space Operations Management Office, Johnson Space Center
- Randy Brinkley, Senior Program Vice President, Hughes Space and Communications
- Chuck Dovale, NASA Launch Manager, Kennedy Space Center
- Adrian Laffitte, Director, Atlas Launch Operations, Lockheed Martin
- Anthony Comberiate, TDRS Project Manager, Goddard Space Flight Center
- James Sardonia, Launch Weather Officer, 45th Weather Squadron, USAF

No post-launch news conference is planned.

**Press Coverage**

Media who wish to cover the prelaunch press conference and the launch of TDRS-H should send a letter of request on news organization letterhead. Include the full names, Social Security numbers and birth dates of those desiring accreditation. Letters should be faxed to 321/867-2692 or may be addressed to:

**TDRS-H Launch Accreditation  
NASA XAE-1  
Kennedy Space Center, FL 32899**

TDRS-H/AC-139 mission badges may be picked up at the NASA-KSC News Center beginning on Monday, June 26. Badges may also be obtained on launch day at the Gate 1 Pass and Identification Building of Cape Canaveral Air Force Station on SR 401 starting at 7 a.m. with prior approval. Foreign press must apply for accreditation in advance, no later than June 28.

To expedite the launch day badging process, all media planning to cover TDRS-

H/AC-139 should call the KSC News Center at 867-2468 no later than Wednesday, June 28. On June 29, after receiving a NASA TDRS-H mission badge required for all media covering launch from Press Site 1, the Air Force will issue a car placard necessary for vehicles to gain access through Gate 1.

#### Remote Camera Placement

On Wednesday, June 28 at 11 a.m. following the prelaunch press conference, a van will depart from the NASA-KSC News Center for Complex 36 for media photographers to establish remote cameras at the pad. There will be no access or transportation from Gate 1 for remote camera set-ups.

#### NASA-KSC News Center Hours for Launch

The NASA-KSC News Center will open on launch day at 7 a.m. and close at 4:30 p.m. A news release confirming a successful launch and a properly functioning spacecraft in orbit will be released from the News Center at approximately L+90 minutes.

#### NASA Television Coverage

NASA Television will carry live the TDRS-H/AC-139 prelaunch press conference on Wednesday, June 28 at 10 a.m. A two-way question-and-answer capability will be available from other NASA field centers.

A complete TDRS-H video package will be broadcast during the NASA TV video file scheduled for noon, 3 p.m., 6 p.m., 9 p.m. and midnight EDT on June 27 and June 28.

On launch day, June 29, launch commentary will begin at 7 a.m. EDT and continue through spacecraft separation at L+30 minutes.

The prelaunch press conference and launch coverage will be carried on the NASA "V" audio circuits which may be accessed by dialing 321/867-1220, 1240, 1260, 7135, 4003, and 4920.

NASA Television is available on the GE-2 satellite, transponder 9C, located at 85 degrees West. The coverage will also be webcast on the NASA-KSC home page at [www.ksc.nasa.gov](http://www.ksc.nasa.gov).

#### Status Reports

Recorded status reports on the launch of TDRS-H/AC-139 will be available on the KSC news media codaphone starting on Monday, June 26. The telephone number is 321/867-2525.

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June 22, 2000  
KSC Contact: Bruce Buckingham  
KSC Release No. 53-00

#### **KSC/AF LEADERS SIGN INTERAGENCY AGREEMENT**

Another milestone was reached today towards planning for the Cape Canaveral Spaceport when Roy Bridges, director of Kennedy Space Center and Brig. Gen. Donald P. Pettit, commander of the 45th Space Wing signed an interagency agreement that established the Joint Planning and Customer Service (JPCS) office.

The agreement brings together an integrated staff from the 45th Space Wing and KSC into a single office to represent both agencies at the Spaceport. The principal missions of the JPCS are to eliminate bureaucracy, serve as a "one-stop shop" for new customers of the two federal agencies and to continue to expand the Air Force/NASA partnership.

"Our goals are simple: To make things easier for our customers to operate here and to plan together for the future. This office will offer personalized service and will be the first place all new customers come to initiate a business relationship with the Air Force and NASA," said Pettit. The JPCS is also designed to facilitate inter-agency planning activities between the 45th Space Wing and KSC.

"We're continuing to widen the bridge over the river between NASA and the Air Force at the Cape," said Bridges. "This is another major step towards streamlining and integrating our operations where possible and becoming more customer friendly."

Pettit added, "One more giant step towards ensuring the next 50 years of progress from the Cape is as dynamic as the first 50."

Patrick AFB will be the temporary location of the JPCSO. It will be relocated to Cape Canaveral AFS once a permanent office site is determined. Mr. Rick Blucker, director of the 45th Space Wing Plans and Programs Office, will be dual-hatted. He'll also serve as director of the JPSC staff.

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July 5, 2000  
KSC Contact: George Diller  
KSC Release No. 54-00

Note to Editors/News Directors:  
MEDIA OPPORTUNITY FOR U.S. LABORATORY DESTINY AT KSC JULY 7

A media opportunity will be available on Friday, July 7, as the 28-foot long U.S. Laboratory Destiny is removed from a vacuum chamber in the Operations and Checkout (O&C) Building at Kennedy Space Center.

Destiny, to be flown on Space Shuttle Atlantis in January 2001, reached a milestone in processing this week with the completion of its vacuum chamber testing.

The 32,000-pound lab is the first International Space Station element to be tested in the three-story renovated chamber last used to test the Apollo program flight hardware including the Command and Lunar Modules.

Once the chamber lid was lowered and secured, a vacuum environment equivalent to 210,000 feet or 40 miles in altitude was created to leak test the pressurized Destiny module. The test was successfully concluded on Tuesday. The lab will be installed into the payload transportation canister Saturday and returned to the Space Station Processing Facility for further preflight processing.

Spokespeople who will be available during the event Friday to discuss this milestone in prelaunch preparations for Destiny will be Jon Cowart, STS-98 Mission Manager, NASA-KSC and John Elbon, Director, ISS Ground Operations, The Boeing Company.

Reporters and photographers desiring to attend the event should be at the NASA News Center at 8:45 a.m. on Friday to be taken to the O&C Building.

Those needing accreditation should contact the NASA News Center by the close of business Thursday at 321/867-2468.

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KSC news releases are available at:

<http://www-pao.ksc.nasa.gov/kscpao/release/release.htm>

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July 6, 2000  
KSC Contact: George Diller  
KSC Release No. 55-00

## **SPACE STATION LABORATORY EXCEEDS EXPECTATIONS IN VACUUM CHAMBER TEST**

The U.S. Laboratory, Destiny, has more than successfully completed a series of milestone testing operations that move it closer to its final destination - space.

The 32,000-pound scientific research lab was the first International Space Station (ISS) pressurized element to spend seven days in a renovated vacuum chamber last used when Americans walked on the moon. The 28-foot-long, 14-foot wide laboratory was placed in the chamber July 1 to undergo the element leak test.

"Completing this test was a large step in meeting the lab's 'Destiny': launch early next year. Its performance exceeded expectations, boosting our confidence in on-orbit performance. I'm very happy for the lab team," said Tip Talone, director of International Space Station and Payload Processing at KSC.

NASA and Boeing employees coordinated the operation.

"Testing the laboratory in the vacuum chamber has provided us with the information we need to ensure Destiny is leak free and safe for the astronauts to inhabit while working at the International Space Station," said John Elbon, Boeing director of ISS ground operations at Kennedy Space Center.

To perform the test, the laboratory was placed on the rotation and handling fixture inside the Operations & Checkout (O&C) Building high bay, raised to vertical, lifted and moved to a point above the chamber, then lowered inside. Once the lid was lowered and secured, the chamber created a vacuum environment equivalent to 257,000 feet altitude or 48 miles to determine if the module had any leaks and confirm the rates at which gases were consumed.

The three-story, stainless steel chamber is one of two built by NASA in 1964 to test the Apollo program flight hardware. The 33-foot-wide by 50-foot-tall chambers were used to simulate a low-Earth orbit environment for the command and lunar modules. Both chambers were deactivated in 1975 when the Apollo-Soyuz project ended.

In 1998, NASA selected the Boeing payload ground operations contract team to renovate one of the two chambers to leak test pressurized elements of the Space Station. The team, which included NASA and Dynacs Engineering Co., provided designs for the new vacuum chamber pumping equipment and controls, a new control room and a new rotation and handling fixture.

The U.S. Laboratory as been designed to provide world-class, state-of-the art facilities to complete scientific research in zero gravity. There is space for 24 racks inside the module – 13 will be dedicated to scientific research and 11 will provide cooling water, power and temperature and humidity control, as well revitalization to remove carbon dioxide and replenish oxygen. During the early assembly missions, astronauts will manipulate the Canadian robotic arm from within the lab using an integrated video system that will receive live pictures from cameras positioned on the arm and on the Station's structure.

Destiny is among more than 216,000 pounds of Space Station elements, including truss sections that are being prepared for flight at Kennedy Space Center. The lab is scheduled to be launched on Shuttle mission STS 98, the 5A assembly mission, targeted for Jan. 18, 2001. When fully assembled in 2004, the Space Station will house a crew of seven –who will be able to work in 46,000 cubic feet of pressurized

volume spread across six laboratories, two habitation modules, and two logistics modules.

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KSC news releases are available at:

<http://www-pao.ksc.nasa.gov/kscpao/release/release.htm>

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July 11, 2000  
KSC Contact: George Diller  
KSC Release No. 56-00

## FLORIDA AIRBORNE FIELD MILL RESEARCH MAY IMPROVE LAUNCH WEATHER CRITERIA

A weather study conducted at Kennedy Space Center last month could lead to improved lightning avoidance rules and fewer launch scrubs for the Space Shuttle and other launch vehicles on the Eastern and Western Ranges.

A team of NASA and university scientists is gathering data both from the air, using a specially equipped Cessna Citation jet aircraft, and from the ground with the Cape Canaveral Spaceport's extensive weather monitoring system.

"We believe this new study will help us get the evidence we need to demonstrate that weather criteria for launch can be made more flexible and at the same time be as safe or safer than now," said Dr. Hugh Christian, a senior Marshall Space Flight Center scientist who is principal investigator in the study at KSC. "When we better understand the physics behind lightning generation, we can better predict what weather conditions preclude launching."

Weather in general is the single greatest cause for launch delays and scrubs. About 30 percent of weather delays and scrubs are related to natural and triggered lightning avoidance rules, called lightning launch commit criteria (LCC), said Dr. Frank Merceret, KSC's Applied Meteorology Unit chief and program manager for the research project.

"Those national criteria prohibit launching any space vehicle under certain lightning danger conditions," Dr. Merceret said. "Because many factors related to the genesis of lightning are incompletely understood, the criteria have been set conservatively."

A launch vehicle and its plume ascending through an anvil cloud can trigger lightning at lower electric field levels than required for natural lightning. That's because the vehicle and the plume act as a conductor and thus decreases the electric field strength necessary to initiate a lightning flash. Such triggered lightning can disrupt or damage vehicles and their electronics. An Atlas-Centaur rocket and its payload, for example, were destroyed in 1987 when the launch of the vehicle triggered lightning.

To prevent such accidents the lightning LCC (a strict set of lightning avoidance rules) were modified by the national Lightning Advisory Panel. The panel, which is made up of representatives from various government agencies and academia, continues to review and modify those lightning launch commit criteria. These rules apply to all launches from both the Eastern and Western ranges.

The current study, which might lead to significant changes in the criteria, will use airborne devices that measure electric fields, called field mills. Six of the field mills, attached to a Cessna Citation aircraft owned and operated by the University of North Dakota, are being flown into anvil clouds in the KSC area. The aircraft is also equipped with cloud physics probes that measure the size, shape and number of ice and water particles in the clouds. Electric fields within anvil clouds are a major focus of the new study because the LCC relating to these anvil-shaped storm clouds show significant potential for improvement as soon as the behavior of these fields is better understood.

The electric field data generated from the airborne field mills will be correlated with the cloud physics data and data generated from ground field mill stations at KSC as well as a mobile field mill unit being driven by graduate student researchers from the

University of Arizona. The field mill data will also be compared to data generated by the rest of the Eastern Range's weather monitoring system, including radar, wind profilers and weather towers.

"We are hoping to see clear patterns in the data from our ground-based monitoring system that correlate with data generated by the airborne field mills so that during a launch we can more accurately predict what the actual conditions in the cloud are," said Dr. Merceret. "If we can do that, then the criteria could become more flexible."

The payoff of the study could be significant. It costs about \$300,000 extra for mission costs, for example, when a Shuttle launch is scrubbed. In addition, weather delays for one launch vehicle on a range can cause launch delays for other vehicles.

The current airborne field mill research project is being funded through savings created from KSC and the 45th Space Wing's Joint Base Operations Contract.

NASA plans to conduct additional related airborne electric field studies at KSC during 2001 if funding is available. Range weather monitoring is one of KSC's strategic areas for research and development in its growing role as a Spaceport Technology Center.

"KSC is an incredible location for studying lightning," said Dr. Phil Krider, a KSC visiting professor from the University of Arizona, who is the head of the Lightning Advisory Panel. "You have a combination of the world's best instruments and one of the most active lightning areas."

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**NOTE TO EDITORS:** Still photos and video of the airborne field mill at KSC are available by contacting the KSC Press Site.

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July 14, 2000  
KSC Contact: Bruce Buckingham  
KSC Release No. 57-00

#### **KSC STUDY SHOWS RISING CO2 LEVELS MAY SPUR GLOBAL PLANT GROWTH**

A life sciences study at Kennedy Space Center, Fla. is showing that rising levels of carbon dioxide (CO2) in our atmosphere, partially caused by the burning of fossil fuels, could spur plant growth globally as it has to local scrub oaks at KSC.

Higher levels of CO2 also could change the survival odds of certain plants, insects and animals, and thus the balance of those species in various ecosystems across the world.

While the changes might not be so dramatic as to create a primitive-forest type environment within the next millennium, the environmental effects could be significant.

The CO2 study is a collaborative research project of NASA and the Smithsonian Institution with support from the Department of Energy and participation from a variety of other government agencies and universities.

"Levels of carbon dioxide continue to rise in our environment, so it's important for us to understand the effects," said Dr. Bert Drake, the Smithsonian's principal investigator on the project. "We still have a lot to learn, but now at least we have a rich data set."

Researchers have learned through the study that although scrub oaks grow faster in a CO2-rich environment, their leaves are less nutrient rich. That means insects that feed upon the leaves spend more time feeding, have more exposure to predators and thus higher death rates. Also, certain scrub oak species do better than others in the enriched CO2 environment.

"All the small changes created by CO2 add up and could cause major changes it's impossible to imagine," Drake said. "By studying the reaction of a natural ecosystem to high CO2 levels we will have a better idea of what we may be facing in years to come."

Scientists and students continue to collect data from the CO2 test site, which is about a half mile north of KSC's Vehicle Assemble Building (VAB). The site is a natural scrub oak area where 12-foot diameter areas of scrub oak have been enclosed in 16 open-top test chambers. CO2 is blown into the test chambers to study its effect on the growth of scrub oak and the insects and other creatures that feed on and around the scrub oak.

Five scientists from NASA and the Smithsonian Environmental Research Center in Edgewater, Md., work at the site to monitor experiments and keep the site running. In addition, about 15 scientists and students from the University of Northern Arizona, Old Dominion University, The University of Illinois in Champaign, and the Desert Research Institute participate in studies at the site.

The scientists hope to continue the study another five to 10 years to determine long-term effects of high levels of CO2 on a natural ecosystem.

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See <http://www-pao.ksc.nasa.gov/kscpao/captions/2000/jun/00pp0920.htm> for photos.

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July 19, 2000  
KSC Contact: Lisa Fowler  
KSC Release No. 58-00

#### **ALAN PARRISH HONORED BY NASA ASTRONAUT**

Alan Parrish, a native of Monticello, Ill., was recently presented with NASA's prestigious Silver Snoopy Award for service to the Space Shuttle astronauts.

Parrish graduated from Bement High School in 1975. After high school, he went on to complete his bachelor of science degree in mechanical engineering from Southern Illinois College in 1987. His parents, Clarence and Betty Parrish, reside in Monticello, Ill.

Parrish currently lives in Merritt Island, Fla. He is married the former Carrie Lee Belton and has one child, Bryce age 4.

Astronaut Jerry Ross presented the award to Parrish in June at Kennedy Space Center. Parrish joined the Kennedy Space Center in 1988 as an aerospace engineer. He is responsible for docking and berthing mechanisms on the International Space Station.

Parrish was honored for his attention to detail in recognizing flight power bolts that were assembled incorrectly and damaged during installation. All units were recalled. "You are recognizable throughout the International Space Station program as an expert," said Astronaut Ross. "The problems International Space Station has avoided due to your efforts can not be quantified."

Snoopy, of the comic strip "Peanuts," has been the unofficial mascot of NASA's astronaut corps since the earliest days of human space flight. The Silver Snoopy Award was created by the astronauts to honor persons who contribute most to the safety and success of human space flight.

The award is presented to no more than 1 percent of the space center's work force each year. Recipients are given a silver pin depicting the famous beagle wearing a space suit. All the pins have flown on a previous Space Shuttle mission. The awardees also received a framed certificate and a congratulatory letter signed by the presenting astronaut.

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July 19, 2000  
KSC Contact: Lisa Fowler  
KSC Release No. 59-00

#### **FIVE KSC WORKERS HONORED BY NASA ASTRONAUTS**

Five NASA/KSC employees recently were presented with NASA's prestigious Silver Snoopy Award for service to the Space Shuttle astronauts.

Ronald E. Hunt, Protective Services; Abraham Negrón, Safety and Mission Assurance Directorate; Robert (Al) Parrish, Systems Integration and Space Station Hardware Integration Office; Joseph A. Prann, Engineering Services; and Bruce Stitt, Information Management, were presented awards at Kennedy Space Center in June by astronaut Jerry Ross.

Hunt was recognized for his observation of light-colored chips cause by hail damage on the southwest quadrant of the upper one third of Discovery's external tank. The Shuttle Discovery had to be returned to the Vehicle Assembly Building for repairs to ensure the safety of our astronauts. "You have gone above and beyond the call of duty and your attention to detail has proven your professional competence in the security field," said Astronaut Ross.

Negrón, a software assurance specialist, was awarded the Silver Snoopy for voluntarily providing around-the-clock, seven-days-a week "on call" services to the International Space Station's contractor at KSC. "By employing your skills in unique and innovative ways, you have forged invaluable and enormously productive relationships with your customers in NASA," Ross told Negrón.

Parrish was honored for his attention to detail in recognizing flight power bolts that were assembled incorrectly and damaged during installation. All units were recalled. "You are recognizable throughout the International Space Station program as an expert," said Astronaut Ross. "The problems International Space Station has avoided due to your efforts can not be quantified."

Prann, a project manager for Engineering Services, was recognized for being the single key player to organize and lead the 1999 Annual Maintenance Outages over and above his normal project management work. "Under your stringent monitoring of the outage program, all modifications and maintenance tasks were safely accomplished assuring continued facility support to mission and launch operations," Ross told Prann.

Stitt was awarded the Silver Snoopy for his technical leadership during the consolidation of the Computer Sciences Corp. and KSC Communication Control Centers into a Joint Communications Control Center. "Your commitment to the task of implementing the system on schedule and without interruptions to the KSC user community, resulted in saving approximately 25,900 hours of support," said Astronaut Ross.

Snoopy, of the comic strip "Peanuts," has been the unofficial mascot of NASA's astronaut corps since the earliest days of human space flight. The Silver Snoopy Award was created by the astronauts to honor persons who contribute most to the safety and success of human space flight.

The award is presented to no more than 1 percent of the space center's work force each year. Recipients are given a silver pin depicting the famous beagle wearing a space suit. All the pins have flown on a previous Space Shuttle mission. The awardees also received a framed certificate and a congratulatory letter signed by the presenting astronaut.

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July 26, 2000  
KSC Contact: George Diller  
KSC Release No. 60-00

## **INTERNATIONAL SPACE STATION P1 TRUSS SEGMENT ARRIVES AT KSC TO BEGIN PROCESSING**

Another International Space Station (ISS) truss segment arrived today at KSC's Shuttle Landing Facility aboard the "Super Guppy" transport aircraft. The truss segment was manufactured by a division of the Boeing Company in Huntington Beach, Calif. and assembled in Huntsville, Ala.

This truss segment, called "P1," is a 46-by-15 foot structure weighing about 32,000 pounds when fully outfitted and ready for launch. The P1 truss will attach to the port side of the center truss, S0, and will be the third truss assembled to the ISS as part of a total 10-truss, girder-like structure that will ultimately extend the length of a football field. Scheduled for launch in the spring of 2002, astronauts will use the orbiter's robot arm to attach the P1 truss to the S0 truss. During later assembly flights, the astronauts will attach remaining truss segments to the port side of P1.

During processing at KSC, one radiator wing comprising three radiator assemblies will be installed on the truss structure. The P1 radiators dispose of thermal energy into space to maintain thermal conditioning for the ISS. The radiator assemblies are launched in a stowed position and will be deployed on orbit by a scissors-type mechanism.

Other items to be attached to the P1 truss include power distribution system modules, computers, a grapple fixture and a UHF antenna. In addition, the P1 truss provides rails on which Canada's Mobile Service System will move its 55-foot robotic arm down the length of the 300-foot truss structure.

The P1 truss was transported to the Operations and Checkout Building, which has been reconfigured from a Spacelab processing facility to accommodate ISS truss processing.

-- end --

July 27, 2000  
KSC Contact: Lisa Malone  
KSC Release No. 61-00

#### SENATOR KIRKPATRICK HONORED FOR SUPPORT OF SPACE PROGRAM

NASA Kennedy Space Center and the Florida Space Business Roundtable recently honored Florida State Senator George Kirkpatrick, District 5, with special plaques for his many contributions to the space program.

Kirkpatrick was honored July 24 during a ceremony commemorating the 50th anniversary of the launch of Bumper 8, the first rocket launched from the Cape. The ceremony, held at Launch Pad 3 at Cape Canaveral Air Force Station, was hosted by the Air Force Space and Missile Museum Foundation.

KSC Center Director Roy Bridges praised Kirkpatrick for his work in championing the space program in the State Legislature, especially considering that KSC is not in his specific district. "Sen. Kirkpatrick has always shown enthusiasm toward the space program and its long-term impact on the economy of the state of Florida. His leadership in Tallahassee has been critical to the center's future vitality. He was especially effective in assuring full support and funding for the Space Experiment, Research and Processing Laboratory (SERPL) during the most recent session. The SERPL will serve as the ground floor for the 'elevator' to the International Space Station," said Bridges.

Astronaut James Halsell presented Kirkpatrick a special plaque with a Florida flag and a University of Florida gator pennant. Halsell carried the flags into space on his Space Shuttle mission to the International Space Station in May 2000. Commander Halsell noted that he was honored to fly these mementos and present them to Kirkpatrick in recognition of his commitment to the Space Station program. Halsell recognized the senator's work over the last two years to educate Floridians about the importance the International Space Station brings to the world, the U.S. and to the state of Florida.

Sen. Kirkpatrick was also presented with the annual Bumper Award by the Florida Space Business Roundtable. Bud Gardner, board chairman of the Florida Space Business Roundtable said, "Each year we select the person we think has been the biggest contributor in furthering the business of space. We took particular care in the selection this year since it is the 50th anniversary of the first space launch. The board unanimously selected Sen. Kirkpatrick because of his outstanding support in the Florida legislature and in bringing the SERPL to the space center."

###

Photo available at: <http://www-pao.ksc.nasa.gov/kscpao/captions/2000/jul/00pp0974.htm>

-- end --

July 28, 2000  
KSC Contact: George Diller  
KSC Release No. 62-00

**Note to Editors/News Directors:  
JULY 31 MEDIA EVENT SCHEDULED FOR TRANSFER OF Z-1 TRUSS**

News media are invited to attend a ceremonial event on Monday, July 31, when the Zenith 1 (Z-1) Truss, the cornerstone truss for the International Space Station (ISS), will be symbolically transferred to NASA. The transfer signals the completion of prelaunch processing at KSC's Space Station Processing Facility (SSPF). The Z-1 is scheduled to fly in Space Shuttle Discovery's payload bay on STS-92 targeted for launch Oct. 5, 2000.

Z-1 is considered a cornerstone truss because it carries critical components of the Station's attitude, communications, thermal and power control systems as well as four control moment gyros, high and low gain antenna systems, and two plasma contactor units used to disperse electrical charge build-ups.

The Z-1 truss and a Pressurized Mating Adapter (PMA-3), also flying to the Station on the same mission, will be the first major U.S. elements flown to the ISS aboard the Shuttle since the launch of the Unity element in December 1998.

The ceremony is being held to commemorate the successful completion of Z-1 prelaunch processing. During the event, an official transfer of the truss will occur from The Boeing Company to NASA for final prelaunch preparations and installation aboard Discovery next month. John Elbon, Boeing director of ISS ground operations, will present a symbolic key for the truss to Tip Talone, NASA director of International Space Station and Payload Processing at KSC. Members of the STS-92 astronaut flight crew also will likely attend.

Reporters and photographers who wish to attend this event should be at the NASA-KSC News Center by 11:45 a.m., Monday, July 31, to be taken to the Space Station Processing Facility. Media needing accreditation should contact the News Center at 321/867-2468 to arrange for badging.

-- end --

**August 1, 2000**  
**KSC Contact: Bruce Buckingham**  
**KSC Release No. 63-00**

**Note to Editors:**  
**KSC TO HOST ANNUAL COMMUNITY LEADERS BRIEFING AUG. 3**

"Milestones of the Millennium" is this year's theme for the annual Community Leaders Briefing to be held Aug. 3 at the KSC Visitor Complex.

KSC Director Roy D. Bridges, Jr., and Deputy Director James L. Jennings will meet with various community leaders from across Brevard County and the State of Florida about long-term viability of KSC and benefits the space program contributes to the community. Leaders will hear about KSC's vision, budget, employment trends, launch outlook, and future goals.

Attendees will gather at the Dr. Kurt H. Debus Conference Facility at 8:30 a.m. for registration and a continental breakfast. The briefings will begin at 9 a.m. Afterwards, guests are invited to a special showing of the IMAX movie "Hail Columbia" in the Galaxy Center and tour the Visitor Complex's newest attractions, "Astronaut Encounter" and "Exploration in the New Millennium."

Several hundred invitations have been sent to a wide variety of community leaders, business executives, state and local government officials, and other community organizations.

Media representatives are invited to attend and should drive directly to the KSC Visitor Complex and proceed to the Debus Conference Facility. Further information may be obtained by contacting the KSC News Center at 321-867-2468.

-- end --

**August 4, 2000**  
**KSC Contact: George Diller**  
**KSC Release No. 64-00**

**Note to Editors/News Directors:**  
**MEDIA OPPORTUNITY SCHEDULED TO VIEW SPACE STATION TRUSS PROCESSING**

On Tuesday, Aug. 8, news media are invited to attend a viewing and photographic opportunity of four International Space Station truss segments currently being processed for launch at KSC's Operations and Checkout (O&C) Building.

With the recent arrival of two additional trusses over the past week, KSC is now preparing a total of seven of the ISS segments for future launch aboard the Space Shuttle. Four of these trusses are in the O&C Building.

Managers from NASA and The Boeing Company will be available to discuss truss-processing operations at KSC. Answering media questions will be:

- Roselle Hanson, NASA-KSC Space Station Truss Mission Manager
- Mike Smith, Inboard Truss Cargo Element Manager, The Boeing Company

Media wishing to attend this event should be at the NASA-KSC News Center at 12:30 p.m. on Tuesday, Aug. 8 for transportation to the O&C Building. Media will return to the News Center by 2:30 p.m.

Media needing credentials should contact the KSC News Center at 321-867-2468 before close of business Monday.

-- end --

**August 10, 2000**  
**KSC Contact: Joel Wells**  
**KSC Release No. 65-00**

**Note to Editors:**  
**NASA TO SIZE UP SPACE SHUTTLE'S NEW VAB "SAFE HAVEN" ON AUG. 12**

For the first time in Space Shuttle history, a fully stacked Shuttle will roll into the Vehicle Assembly Building's (VAB) high bay 2 on the building's west side Saturday Aug. 12. The VAB and nearby rock-paved crawlerway have recently undergone major modifications to allow more storage space and protection – "Safe Haven" - for Shuttle flight hardware from hurricanes or tropical storms.

Orbiter Atlantis, the twin solid rocket boosters and external tank will begin moving out of VAB high bay 1 at about 3 a.m. EDT on Aug. 12. The 6-million pound crawler transporter will carry the Mobile Launcher Platform and Space Shuttle around the north side of the VAB and into high bay 2.

After a successful "Safe Haven" fit check, Shuttle Atlantis will roll out to Launch Pad 39B late Sunday night from VAB high bay 2 in preparation for the STS-106 launch on Sept. 8. The move is expected to begin at 11 p.m. Aug. 13 and concludes when the Shuttle arrives at Pad 39B around 8 a.m. Aug. 14.

News media interested in covering Saturday's move operations should report to the KSC Press Site at 5 a.m. Aug. 12 for transport to the viewing site. The Press Site codaphone will be updated at 3:30 a.m. with status on the move. A KSC Shuttle processing manager Mike Leinbach will be available for interviews at the Press Site about one hour after the move. Aerial video and still photos of the move will be available at the Press Site on Saturday.

Media interested in covering Atlantis' rollout to the launch pad on Monday should be at the KSC Press Site at 8 a.m. Aug. 14. NASA will provide video and still photos of the Shuttle rollout on Monday.

-- end --

**August 14, 2000**  
**KSC Contact: George Diller**  
**KSC Release No. 66-00**

**Note to Editors/News Directors:**  
**MEDIA INVITED TO WITNESS MATING OF CANADIAN SPACE STATION ROBOTIC**  
**ARM TO PAYLOAD CARRIER**

The Canadian Space Agency's (CSA) first contribution to the International Space Station, the 56-foot-long Space Station Remote Manipulator System (SSRMS) will be the subject of a media event and photo opportunity on Wednesday, Aug. 16. The SSRMS is the primary means of transferring payloads between the orbiter payload bay and the Station for assembly.

During the media event, the SSRMS will be hoisted from the floor of the Space Station Processing Facility (SSPF) into a test stand where it will be mated to its payload carrier. This pallet will later be installed into the payload bay of Space Shuttle Endeavour for launch on STS-100 in April 2001.

The SSRMS will be seen folded into its three segments. There are two Latching End Effectors for grappling, one effector mounted on each end of the arm. Seven joints are associated with the arm, which allow for highly flexible and precise movement.

When fully extended the arm comprises two booms, each with two 12-foot sections, joined by a hinge. Four video cameras with lights, two of which have a pan/tilt capability, are mounted on each of the booms and on the two end effectors. These cameras will give astronauts maximum visibility for operations and maintenance tasks on the ISS.

**Media wishing to attend should be at the KSC News Center at 9 a.m. on Wednesday, Aug. 16, for transportation to the SSPF.** Available to answer questions or for interviews will be Frank Foran, CSA manager for systems integration, validation, and verification, and Steve Mozes, manager of the CSA liaison office at KSC.

**Note to Editors:** Live views of this event will be available on the NASA-KSC Home Page at [www.ksc.nasa.gov](http://www.ksc.nasa.gov). Click on "Live Views of Space Station Processing" under the heading of Online Video Coverage. Still photographs will also be available on "Publishers Photo Corner," under the heading of Visit the KSC News Room.

-- end --

**August 14, 2000**  
**KSC Contact: Joel Wells**  
**KSC Release No. 68-00**

### **SHUTTLE ATLANTIS TAKES A DETOUR ON ITS WAY TO LAUNCH PAD 39B**

Space Shuttle Atlantis arrived at Launch Pad 39B today at about 8:30 a.m., but not before a weekend visit to KSC's new "Safe Haven" in the Vehicle Assembly Building (VAB). While preparing Atlantis for its targeted Sept. 8 launch date, KSC Shuttle managers orchestrated an unprecedented move of the Space Shuttle to the VAB's recently renovated west side for a fit check.

In August of 1999, contractors began an extensive two-year renovation project on VAB high bays 2 and 4 and the crawlerway that carries a Space Shuttle to and from the launch pad. The modification was needed to improve KSC's ability to store and protect Shuttle flight hardware during hurricane season and to increase processing flexibility with an upcoming busy launch schedule.

Under a \$3 million NASA contract, RUSH Construction of Titusville, FL, extended the crawler transporter pathway from the VAB's east side into VAB high bay 2 on the building's west side. The 1250-foot extension was topped-off with about 3,000 tons of river rock. Crews also constructed a new orbiter tow-way into VAB high bay 4.

KWI Construction, Inc. of Merritt Island, FL, went to work under a \$1.8 million United Space Alliance contract renovating the inside of both western VAB high bays 2 and 4. In high bay 2, crews removed a 125-ton crane, modified the steel frame, and completed significant floor and foundation work – including replacement of the existing Mobile Launcher Platform mounts. Utility infrastructure for electrical, potable water, gaseous helium, nitrogen, and compressed air was also installed.

KWI also prepared VAB high bay 4 for horizontal orbiter storage capability. A protective canopy was installed above the orbiter storage area and operational communication equipment is now in place. Limited utilities were also installed. With construction completed on schedule in May, engineers only lacked a Space Shuttle fit check to add confidence that their design on paper was fully functional.

Orbiter Atlantis arrived in KSC's Orbiter Processing Facility (OPF) on May 29 after completing mission STS-101. It then moved to Vehicle Assembly Building high bay 1 on Aug. 7 to be mated to the external tank and solid rocket boosters. At 3 a.m. on Aug. 13, Space Shuttle Atlantis and the crawler transporter lumbered out of VAB high bay 1, traversed the newly laid crawlerway and successfully arrived in high bay 2 at about 7:30 a.m. Hours later, Atlantis was en route to the launch pad to undergo final preparation for its upcoming launch.

Mission STS-106 will prepare the International Space Station for its first resident crew and begin the outfitting of the newly arrived Zvezda Service Module. The seven-member STS-106 crew will perform support tasks on orbit, transfer supplies and prepare the Zvezda living quarters for the Expedition One crew, due to arrive later this year.

The SPACEHAB payload was delivered to the launch pad Aug. 11 and will be installed into the orbiter's payload bay Aug. 15. Payload testing resumes Aug. 22 and the orbiter payload bay doors will be closed for flight Aug. 30.

Atlantis and crew are scheduled to launch on Sept. 8 at about 8:31 a.m. EDT marking the 22nd flight of this orbiter. After 10 days and 21 hours in space, Atlantis returns to KSC's Shuttle Landing Facility Sept. 19 at about 4:45 a.m.

**NOTE TO EDITORS:** Video and still photos of the "Safe Haven" fit check and Shuttle Atlantis' roll out to Launch Pad 39B are available at the KSC Press Site and on the KSC website at Publisher's Photo Corner.

-- end --

**August 14, 2000**  
**KSC Contact: Joel Wells**  
**KSC Release No. 68-00**

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**NOTE TO EDITORS:** Video and still photos of the "Safe Haven" fit check and Shuttle Atlantis' roll out to Launch Pad 39B are available at the KSC Press Site and on the KSC website at Publisher's Photo Corner.

-- end --

Bruce Buckingham  
Kennedy Space Center, FL

For Release: Aug. 29, 2000

James Hartsfield  
Johnson Space Center, TX

KSC Release No. 70 - 00

**ATLANTIS LIFTOFF SET SEPT. 8 TO OPEN DOORS OF NEW STATION MODULE**

Following a thorough review of mission preparations today, the launch of Space Shuttle Atlantis has been set for Sept. 8, 2000, on a mission that will open the doors to the International Space Station's new living quarters.

"This mission begins a series of Station assembly flights aboard the Shuttle during the next year that will be as complex and challenging as anything NASA has ever done, including landing a man on the moon," Space Shuttle Program Manager Ron Dittmore said. "I believe these flights will be as impressive as they are complex. The team has done a fantastic job preparing Atlantis for this mission, and we're excited and ready to get started."

Atlantis's liftoff from the Kennedy Space Center on Shuttle mission STS-106 will be targeted for 8:45 a.m. EDT at the opening of a launch window that will be less than five minutes long. During the planned 11-day flight, the crew of seven will spend a week docked to the International Space Station, unloading more than one and a half tons of equipment and supplies from both the Shuttle and from a docked Russian Progress cargo craft.

This mission will set the stage for the arrival of the first resident Station crew, planned to launch and begin living aboard the outpost later this year.

Terry Wilcutt will command Atlantis and Scott D. Altman will be pilot. The crew also includes Edward T. Lu, Richard A. Mastracchio, Daniel C. Burbank, Yuri I. Malenchenko and Boris V. Morukov as mission specialists. While Atlantis is docked to the Station, Lu and Malenchenko are scheduled to perform one space walk to conduct assembly tasks.

Atlantis is scheduled to land at the Kennedy Space Center at about 4 a.m. EDT Sept. 19.

-- end --

Joel Wells  
Kennedy Space Center, FL

For Release: Aug. 31, 2000

KSC Release No. 71 - 00

**LAUNCH COUNTDOWN FOR SHUTTLE MISSION STS-106 SET TO BEGIN SEPT. 5**

NASA will begin the countdown for launch of Space Shuttle Atlantis on mission STS-106 Sept. 5 at 11 a.m. EDT at the T-43 hour mark. This mission marks the 4th Shuttle flight to the International Space Station and the 3rd Shuttle mission this year. The KSC launch team will conduct the countdown from Firing Room 1 of the Launch Control Center.

The countdown includes 26 hours and 45 minutes of built-in hold time leading to a preferred launch time at about 8:45 a.m. on Sept. 8. A preferred launch window of 2 ½ minutes exists inside a 10-minute window. The exact location of the orbiting International Space Station (ISS) will be determined during the T-9 minute built-in hold. The launch director will at that time determine the exact time of launch.

Mission STS-106 is the 22nd flight of the orbiter Atlantis and the 99th flight overall in NASA's Space Shuttle program. STS-106 is scheduled to last 10 days, 19 hours and 9 minutes with a planned KSC landing at about 3:54 a.m. on Sept. 19.

Following Atlantis' previous flight, STS-101, the orbiter underwent an accelerated processing turnaround for this mission. Atlantis arrived in KSC's Orbiter Processing Facility (OPF) bay 3 May 29. It rolled out of the OPF on Aug. 7 to be mated with the external tank and solid rocket boosters in the Vehicle Assembly Building (VAB). The entire Space Shuttle stack rolled out to Launch Pad 39B Aug. 13 to undergo final launch preparations.

On mission STS-106, the seven-member crew will prepare ISS for the arrival of its first international crew later this year. During the flight, the crew of Atlantis will outfit the newly arrived Zvezda Service Module with supplies carried to orbit in the double SPACEHAB cargo module and from a Russian Progress craft currently docked to Zvezda. The mission includes a single space walk to connect electrical lines and data cables between Zvezda and the rest of the Station.

The STS-106 crew includes: Commander Terrence Wilcutt, Pilot Scott Altman, and Mission Specialists Yuri Malenchenko, Boris Morukov, Daniel Burbank, Edward Lu and Richard Mastracchio.

(end of general release)

<b>SUMMARY OF BUILT-IN HOLDS FOR STS-106</b>			
<b>T-TIME</b>	<b>LENGTH OF HOLD</b>	<b>HOLD BEGINS</b>	<b>HOLD ENDS</b>
T-27 hours	4 hours	3:00 a.m. Wed.	7:00 a.m. Wed.
T-19 hours	4 hours	3:00 p.m. Wed.	7:00 p.m. Wed.
T-11 hours	13 hours, 50 minutes	3:00 a.m. Thurs.	4:50 p.m. Thurs.
T-6 hours	2 hours	9:50 p.m. Thurs.	11:50 p.m. Thurs.

T-3 hours	2 hours	2:50 a.m. Fri.	4:50 a.m. Fri.
T-20 minutes	10 minutes	7:30 a.m. Fri.	7:40 p.m. Fri.
T-9 minutes	about 45 minutes	7:51 a.m. Fri.	8:36 a.m. Fri.

<b>CREW FOR MISSION STS-106</b>	
<b>POSITION</b>	<b>NAME</b>
Commander (CDR)	Terrence Wilcutt
Pilot (PLT)	Scott Altman
Mission Specialist (MS1)	Edward Lu
Mission Specialist (MS2)	Richard Mastracchio
Mission Specialist (MS3)	Daniel Burbank
Mission Specialist (MS4)	Yuri Malenchenko
Mission Specialist (MS5)	Boris Morukov

<b>SUMMARY OF STS-106 LAUNCH DAY CREW ACTIVITIES</b>	
<b>Thursday, Sept. 7</b>	
7:30 p.m.	Crew wake up
8:00 p.m.	Breakfast
<b>Friday, Sept. 8</b>	
3:50 a.m.	Light dinner and crew photo
4:20 a.m.	Weather briefing (CDR, PLT, MS2)
4:20 a.m.	Don launch and entry suits (MS1, MS3, MS4 & MS5)
4:30 a.m.*	Don launch and entry suits (CDR, PLT & MS2)
5:00 a.m.*	Depart for Launch Pad 39B
5:30 a.m.*	Arrive at white room and begin ingress
6:45 a.m.*	Close crew hatch
8:45 a.m.*	Launch

\*Televised events (times may vary slightly)  
All times Eastern

Bruce Buckingham  
Kennedy Space Center, FL

For Release: Aug. 31, 2000

KSC Release No. 72-00

**Note to Editors/News Directors:  
KSC MISSION STS-106 EVENTS, NEWS CENTER OPERATING HOURS SET**

News conferences, events and operating hours for KSC's News Center have been set for the Sept. 8 launch of the Space Shuttle Atlantis on Mission STS-106, the 99th launch in the Shuttle program. Launch on Sept. 8 is set for about 8:45 a.m. EDT at the opening of a window that extends for about 2 ½ minutes. The conferences and events listed below will be carried live on NASA Television (unless otherwise noted) and originate from the KSC Press Site.

The seven-member STS-106 crew is scheduled to arrive at KSC on Monday, Sept. 4 at about 9 p.m. EDT. News media representatives planning to cover the event must be at the News Center by 8 p.m. (in the event of a possible early crew arrival) for transportation to the Shuttle Landing Facility.

News media representatives with proper authorization may obtain STS-106 mission credentials at the Pass and Identification Building on State Road 3 (south of KSC) on Merritt Island during published times. (Credential and badging hours are listed below.)

In addition to daily 9 a.m. countdown status briefings, an International Space Station briefing and prelaunch press conference will be held two days before launch. The full briefing schedule is listed below.

-- end of general release --

**STS-106 BRIEFINGS & EVENTS SCHEDULE** *(all times are EDT)*  
*(All briefings are held inside the KSC Press Site auditorium and will be carried live on NASA TV unless otherwise noted)*

**L-4 Days - Monday, Sept. 4**

**9 p.m.** ----- *STS-106 Flight Crew Arrival (Live on NASA TV)*

**L-3 Days - Tuesday, Sept. 5**

(Launch countdown begins at 11 a.m.)

**9 a.m.** ----- *Countdown Status Briefing*

- Jeff Spaulding, NASA Test Director
- Scott Higginbotham, KSC Payload Manager
- Ed Priselac, Shuttle Weather Officer

**L-2 Days - Wednesday, Sept. 6**

**9 a.m.** ----- *Countdown Status Briefing*

- Steve Altemus, NASA Test Director
- Scott Higginbotham, KSC Payload Manager
- Ed Priselac, Shuttle Weather Officer

**10 a.m. ----- International Space Station Briefing**

- Bob Cabana, ISS Manager for International Operations, JSC
- Mikhail Sinelshikov, Chief of Piloted Programs, Russian Aviation and Space Agency
- Steve Mozes, Manager, CSA, KSC Liaison Office
- Ian Pryke, ESA, Washington Office
- Masaaki Komatsu, NASDA, KSC Office

**4 p.m. ----- Prelaunch News Conference**

- Ron Dittmore, Shuttle Program Manager, NASA, JSC
- Tommy Holloway, ISS Program Manager, NASA, JSC
- Dave King, Director of Shuttle Processing, NASA, KSC
- Dan Bland, SPACEHAB, Senior Vice President for Flight Services
- Captain Clif Stargardt, Staff Meteorologist, 45th Weather Squadron, USAF

**L-1 Day - Thursday, Sept. 7**

**9 a.m. ----- Countdown Status Briefing**

- Jeff Spaulding, NASA Test Director
- Scott Higginbotham, KSC Payload Manager
- Ed Priselac, Shuttle Weather Officer

**L-0 Day - Friday, Sept. 8**

(Tanking begins at about 12 midnight)

**3:30 a.m. ----- NASA Television live launch programming begins**

**Launch Day Crew activities:**

*(Thursday, Sept. 7)*

7:30 p.m. ----- Wake up

8 p.m. ----- Breakfast

*(Friday, Sept. 8)*

12 midnight ----- Lunch

\*3:50 a.m. ----- Snack (Crew Photo)

4:20 a.m. ----- Weather briefing

\*4:45 a.m. ----- Suit up photo

\*5 a.m. ----- Walkout/depart for pad

\*5:30 a.m. ----- Arrive at pad

\*6:45 a.m. ----- Close hatch

**\*8:45 a.m. --- Launch of Atlantis**

*(\* Carried live on NASA TV)*

**Launch + 1 hour ----- Post-launch Press Conference**

- Ron Dittmore, Shuttle Program Manager, JSC
- Jim Halsell, Shuttle Program Launch Integration Manager, KSC
- Mike Leinbach, Shuttle Launch Director, KSC

**NOTE:** STS-106 MISSION STATUS BRIEFINGS WILL BE HELD DAILY THROUGHOUT THE MISSION. TIMES OF THESE BRIEFINGS ARE AVAILABLE IN THE NASA TV SCHEDULE AT: <http://www.spaceflight.nasa.gov/realdata/nasatv/schedule.html>

**KSC News Center office hours for STS-106**

*(Times may be adjusted in real time depending on mission events and timelines.)*

Monday, Sept. 4 - *(Launch minus 4 days)* ----- 6 p.m. – 11 p.m.

Tuesday, Sept. 5 - *(Launch minus 3 days)* ----- 8 a.m. – 6 p.m.

Wednesday, Sept. 6 - *(Launch minus 2 days)* ----- 8 a.m. – 4:30 p.m.

Thursday, Sept. 7 - *(Launch minus 1 day)* ----- 8 a.m. – round-the-clock

Friday, Sept. 8 - *(Launch Day) Flight day 1* ----- 4:30 p.m.

Sat.- Sun., Sept. 9-10 - *Flight days 2 - 3* ----- Closed *(See note below)*

Mon.-Fri., Sept. 11-15 - *Flight days 4 – 8* ----- 8 a.m. – 4:30 p.m.  
Sat.- Sun., Sept. 16-17 - *Flight days 9 - 10* ----- Closed (*See note below*)  
Monday, Sept. 18 - *Flight day 11* ----- 8 a.m. – 4:30 p.m.  
Tuesday, Sept. 19 - *Landing Day* ----- 12 mid – 4:30 p.m.

**NOTE:** The KSC News Center will be opened for overnight and weekend STS-106 Mission Status Briefings and the in-flight crew news conference. The office typically will open one hour prior to the event and close one hour after the conclusion of the event when they occur after normal office hours. Times of these briefings are available in the NASA TV schedule at: <http://www.spaceflight.nasa.gov/realdata/nasatv/schedule.html>

### **Pass and Identification Hours**

L-4 Monday, Sept. 4 ----- 6 – 8 p.m.  
L-3 Tuesday, Sept. 5 ----- 8 a.m. – 12 noon  
L-2 Wednesday, Sept. 6 --- 8 a.m. – 4:30 p.m.  
L-1 Thursday, Sept. 7 ----- 8 a.m. – 4:30 p.m.  
L-0 Friday, Sept. 8 ----- 12 mid. – 7:30 a.m.

News media may obtain STS-106 mission credentials at the Pass and Identification Building at Gate 2 on State Road 3, Merritt Island, during the above published times.

News media with annual Shuttle credentials are reminded to sign the logbook at the query counter in the News Center.

**NEWS MEDIA ARE REQUIRED TO BE UNDER PUBLIC AFFAIRS ESCORT AT ALL TIMES WHILE AT KSC EXCEPT WHEN DRIVING TO THE NEWS CENTER OR THE COMPLEX 39 CAFETERIA.**

**NEWS MEDIA ARE ALLOWED AT THE PRESS SITE ONLY WHEN THE KSC NEWS CENTER IS OPEN.**

-- end --

Bruce Buckingham  
Kennedy Space Center, FL

For Release: Sept. 11, 2000

KSC Release No. 75-00

**Note to Editors:**

**MEDIA OPPORTUNITIES WITH STS-92 CREW SET FOR THIS WEEK'S COUNTDOWN TEST**

The crew of Space Shuttle mission STS-92, the 100th mission in the history of Shuttle flight, will be at Kennedy Space Center this week for the Terminal Countdown Demonstration Test (TCDT).

The TCDT is held at KSC prior to each Space Shuttle flight, providing the crew an opportunity to participate in simulated countdown activities. The TCDT ends with a mock launch countdown culminating in a simulated main engine cut-off. The crew also spends time undergoing emergency egress training exercises at the pad and has an opportunity to view and inspect the payloads in the orbiter's payload bay.

The following events are available for media to attend during the STS-92 TCDT.

**Tuesday, Sept. 12** -- The seven-member crew of mission STS-92 is scheduled to arrive at KSC's Shuttle Landing Facility (SLF) at 7 p.m. Media who wish to take part in this photo opportunity should be at the KSC Press Site by 6 p.m. for transport to the SLF.

**Wednesday, Sept. 13** -- Media are invited to attend a photo event featuring the crew of STS-92 as they practice driving an armored personnel carrier (M113). This transport is designed to assist the crew if an emergency egress is required away from the pad. Media should be at the KSC Press Site at 9:45 a.m. for transport to the M113 location.

**Thursday, Sept. 14** -- Media representatives will have an opportunity to speak informally with and photograph the crew at Launch Pad 39A. Media interested in participating in this question and answer session should be at the KSC Press Site by 12:30 p.m. for transport to the pad. This question and answer session will be a local media event only. However, the session will be covered live on NASA TV beginning at about 1:30 p.m.

**Friday, Sept. 15** -- The entire crew will take part in simulated launch day events. Media interested in covering the crew walkout from the Operations and Checkout Building should be at the KSC Press Site by 6:45 a.m.

Once the crew is at the pad, they will enter the orbiter Discovery fully suited for the final hours of the practice countdown, including the simulated Shuttle main engine ignition and cut-off.

Following TCDT, the will depart KSC for final mission preparations in Houston, TX.

Discovery, on mission STS-92, is targeted for launch from Kennedy Space Center on Oct. 5 at about 9:30 p.m. The flight is scheduled to last 11 days and will feature Discovery docking with the International Space Station (ISS). Discovery will deliver to ISS the Zenith-1 (Z-1) Truss and the third Pressurized Mating Adapter.

Crew members for mission STS-92 are: Commander Brian Duffy; Pilot Pam Melroy; and Mission Specialists Koichi Wakata (of the National Space Development Agency of Japan),

Leroy Chiao, Jeff Wisoff, Michael Lopez-Alegria, and Bill McArthur.

-- end --

George H. Diller  
Kennedy Space Center, FL

For Release: Sept. 12, 2000

KSC Release No. 76-00

**Note to Editors/News Directors:**

**NOAA-L/TITAN II ROCKET TO LAUNCH SEPT. 20 FROM VANDENBERG AIR FORCE BASE, CA**

The launch of the NOAA-L polar-orbiting weather satellite for NASA and the National Oceanic and Atmospheric Administration (NOAA) aboard a U.S. Air Force Titan II rocket is scheduled to occur on Wednesday, Sept. 20. Liftoff will be from Space Launch Complex (SLC) 4W at Vandenberg Air Force Base, CA. The ten-minute launch window extends from 3:22 - 3:32 a.m. PDT.

The NOAA-L satellite will improve weather forecasting and monitor environmental events around the world. NOAA-L is the second in the current series of five polar-orbiting satellites with improved imaging and sounding capabilities that will operate over the next 12 years. NOAA-L will collect meteorological data and transmit the information to NOAA's National Weather Service for its long-range weather and climate forecasts. Users around the world will also be able to access the satellite's images and data.

**ACCREDITATION**

News media requesting accreditation for the launch of NOAA-L should fax their request on news organization letterhead to:

Staff Sgt. Rebecca Bonilla  
30th Space Wing Public Affairs Office  
Vandenberg Air Force Base, CA  
FAX: 805/606-8303

For further information on launch accreditation, the USAF Public Affairs Office can be reached at 805/606-3595.

**PRELAUNCH NEWS CONFERENCE**

The prelaunch news conference will be held on Tuesday, Sept. 19 at 10 a.m. PDT in the main conference room of the NASA Vandenberg Resident Office, Building 840. Participants will be:

- Mike Mignogno, Program Manager, Polar-orbiting Operational Environmental Satellite, NOAA
- Major Dave Salm, Air Force Titan II Launch Director, 30th Space Wing, Vandenberg Air Force Base, CA
- Chuck Dovale, NASA Mission Director, Kennedy Space Center, FL
- Harry McCain, Program Manager, Polar Operational Environmental Satellites, NASA Goddard Space Flight Center, MD
- Dr. Christine Crosiar, Launch Weather Officer, 30th Weather Squadron, Vandenberg Air Force Base, CA

Question and answer capability will be available from other participating NASA centers.

Media requesting to cover the prelaunch news conference should meet at the south gate of Vandenberg Air Force Base on California State Road 246 at 9:30 a.m. They will be escorted to the NASA Vandenberg Resident Office.

No post-launch news conference is scheduled.

#### **REMOTE CAMERAS**

Media desiring to establish sound-activated remote cameras at the launch pad will depart from the south gate of Vandenberg Air Force Base at 4 p.m. on Monday, Sept. 18, for SLC-4.

#### **LAUNCH DAY PRESS COVERAGE**

On launch day, Sept. 20, media covering the NOAA-L/Titan II launch should meet at the Vandenberg AFB south gate located on California State Road 1 at 2:30 a.m. to be escorted to the launch viewing location on north Vandenberg Air Force Base. After launch, media will be escorted back to the gate.

#### **NASA TELEVISION AND VOICE CIRCUIT COVERAGE**

NASA Television will carry the prelaunch news conference live starting at 10 a.m. PDT on Tuesday, Sept. 19. On launch day, Sept. 20, NASA TV coverage of the countdown will begin at 2 a.m. PDT. It will conclude after spacecraft separation from the Titan II occurring about 16 minutes after launch.

A complete NOAA-L video package will be broadcast during the NASA TV Video File on Sept. 19 at 9 a.m., noon, 3 p.m., 6 p.m., and 9 p.m. PDT.

NASA Television is carried on GE-2, transponder 9C located at 85 degrees West longitude. Audio only will be available on two "V" circuit numbers that may be reached by dialing 321/867-1260 or -7135.

A Webcast of the NOAA-L launch will also be available on the NASA-KSC Home Page at [www.ksc.nasa.gov](http://www.ksc.nasa.gov). (Select KSC Live Video Feeds followed by NASA TV coverage.)

#### **NASA NOAA-L NEWS CENTER**

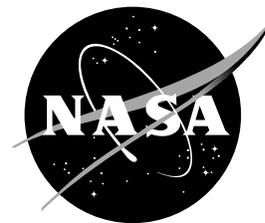
The NOAA-L News Center at the NASA Vandenberg Resident Office will be staffed beginning Monday, Sept. 18. For further information at that time contact Bruce Buckingham at 805/605-3051. A recorded status report will also be available starting at that time by dialing 805/734-2693.

-- end --

# NASA Facts

National Aeronautics and  
Space Administration

**John F. Kennedy Space Center**  
Kennedy Space Center, Florida 32899  
AC 321 867-2468



October 2000  
KSC Release No. 77

## STS-92/Discovery

### 100<sup>th</sup> Mission Highlighted by Delivery of Z1 Truss

Space Shuttle Discovery, the third operational Shuttle built, will undertake the 100<sup>th</sup> Shuttle mission to be launched from Kennedy Space Center. Discovery's mission, STS-92, plays a pivotal role in the continued construction of the International Space Station because of its critical payloads, the Zenith (Z1) Integrated Truss and the third Pressurized Mating Adapter (PMA3).

The Z1 Truss will carry components of the Station's attitude, communications, thermal and power control systems including four control moment gyroscopes as well as high and low gain antenna systems. The Z1 Truss and the PMA3 will be the first U.S.-built cargo elements to be flown to the International Space Station since the successful launch of the Unity element in late 1998.

The STS-92 mission signals the beginning of work on the major elements of the International Space Station that will make it more than just a vision but a long-awaited reality and marks a dramatic turn in the assembly process. The mission kicks off a series of assembly flights that will include such Station elements as a scientific research laboratory, solar arrays and additional truss structures. Eight Space Shuttle missions will be required to deliver and assemble the structure's ten pre-integrated truss segments. These missions will be spread out over a four-year period.

Once completed, the combination of trusses will be the length of a football field. Labs, living quarters, payloads and systems equipment will be directly or indirectly attached to it. The U.S. solar arrays, which will be delivered to the structure in late November aboard Space Shuttle Endeavor on STS-97, will supply the International Space Station with enough power to light up an entire town.



The Pressurized Mating Adapter (PMA3), also being delivered to the Station on this mission, will mirror the existing two adapters already in place at opposite ends of the Unity module. These adapters essentially act as pressurized pathways or hallways for the astronauts to use when accessing connecting modules. Because they are pressurized, heated and supplied with handhold grips, these tunnel-like sections allow the crew to move easily between the Shuttle and different areas of the Station. One of the existing adapters serves as a docking site for the Shuttle fleet while the opposing adapter provides the linkage for the Zarya module.

The 28<sup>th</sup> flight of Discovery will begin with a liftoff from Launch Pad 39A. Discovery will ascend at a 51.6-degree inclination to the equator for direct insertion into orbit. The mission is scheduled for 11 days. Landing is planned for the Kennedy Space Center's Shuttle Landing Facility.

## The Crew

**Commander Brian Duffy (Col., USAF)**, a veteran of three previous space flights, has logged more than 667 hours in space as both a commander and pilot. Most recently Duffy served as the Acting Deputy Director of the Johnson Space Center. He has participated in the development and testing of displays, flight crew procedures and computer software for Shuttle flights. Born in Boston, Mass, he received a bachelor of science degree in mathematics from the United States Air Force (USAF) Academy and a master of science degree in systems management from the University of Southern California. NASA selected Duffy as an astronaut in June 1985.

**Pilot Pamela Melroy (Lt. Col., USAF)** will make her first Shuttle flight aboard Discovery on mission STS-92. Prior to joining NASA, she was assigned to the C-17 Combined Test Force where she served as a test pilot. Melroy has logged more than 4,000 hours of flight time in 45 different aircraft. Though born in Palo Alto, Calif., she considers Rochester, N.Y., to be her hometown. She received a bachelor of science degree in physics and astronomy from Wellesley College and a master of science in earth and planetary sciences from Massachusetts Institute of Technology. In December 1994, she was selected to be an astronaut candidate by NASA.

**Mission Specialist Koichi Wakata (National Space Development Agency of Japan NASDA)** served as mission specialist aboard STS-72 in 1996 and logged more than 214 hours in space including two space walks. Born in Omiya, Saitama, Japan, Wakata received a bachelor of science in aeronautical engineering and a master of science degree in applied mechanics from Kyushu University. Before joining NASA, he was assigned as a structural engineer for Japan Airlines to research the structural integrity of transport aircraft. He was selected as an astronaut candidate by NASDA in June 1992.

**Mission Specialist Leroy Chiao (Ph.D.)** has flown on two previous missions and has logged 567 hours in space. Though born in Milwaukee, Wis., he considers Danville, Calif., to be his hometown. Chiao has had diverse technical assignments including Space Shuttle flight software verification, crew equipment, training and flight data file issues, and

Extravehicular Activities (EVA) or space walks for the EVA Branch. He received a bachelor of science in chemical engineering from the University of California, Berkley and a master of science and doctorate in chemical engineering from the University of California, Santa Barbara. Selected by NASA in January 1990, Chiao became an astronaut in July 1991.

**Mission Specialist Peter "Jeff" Wisoff (Ph.D.)**, a veteran of three space flights, STS-57, STS-68 and STS-81, has logged more than 754 hours in space. Born in Norfolk, Va., Wisoff received a bachelor of science in physics from the University of Virginia and a master of science and a doctorate in applied physics from Stanford University. His technical assignments to date include spacecraft communicator (CAPCOM) in Mission Control, coordinating flight crew equipment and evaluating extravehicular activity (EVA) techniques for the International Space Station. Wisoff became an astronaut in July 1991.

**Mission Specialist Michael Lopez-Alegria (Cmdr., USN)** will be making his second flight aboard the Space Shuttle on STS-92. Though born in Madrid, Spain, he considers both Madrid and Mission Viejo, Calif., to be his hometown. Lopez-Alegria received a bachelor of science in systems engineering from the U.S. Naval Academy and a master of science in aeronautical engineering from the U.S. Naval Postgraduate School. Most recently, he served as NASA Director of Operations at the Yuri Gagarin Cosmonaut Training Center in Star City, Russia. NASA selected him as an astronaut in March 1992.

**Mission Specialist William (Bill) McArthur Jr. (Col., USA)** is a veteran of two previous space flights and has traveled 9.2 million miles in space. Though born in Laurinburg, N.C., he considers Wakulla, N.C., to be his hometown. McArthur received a bachelor of science in applied science and engineering from the United States Military Academy, West Point, N.Y., and a master of science in aerospace engineering from the Georgia Institute of Technology. Most recently he served as Chief of the Astronaut Office Flight Support Branch, supervising astronaut support of the Mission Control Center. He was selected to be an astronaut by NASA in January 1990.

George H. Diller  
Kennedy Space Center, FL

For Release: Sept. 13, 2000

KSC Release No. 78-00

### **SPACE STATION AIRLOCK ARRIVES AT KSC ABOARD SUPER GUPPY**

The Joint Airlock Module -- the gateway from which crew members aboard the International Space Station (ISS) will enter and exit the 470-ton orbiting research facility -- arrived at the Kennedy Space Center today.

The airlock was transported from NASA's Marshall Space Flight Center in Huntsville, Ala., today arriving at KSC's Shuttle Landing Facility aboard NASA's Super Guppy aircraft at 1:40 p.m. The airlock was then transported to the Operations and Checkout Building in the KSC industrial area where it will undergo vacuum chamber testing beginning next week. It will then be moved to the Space Station Processing Facility (SSPF) for further prelaunch preparation and checkout.

The massive, spindle-shaped airlock is 20 feet long, has a diameter of 13 feet at its widest point, and weighs six and a half tons. It was manufactured at NASA's Marshall Space Flight Center by the Huntsville division of The Boeing Company.

The airlock includes two compartments: the crew lock, to be used by astronauts as they enter and exit the Space Station; and the equipment lock, where astronauts will change into and out of their spacesuits and stow all necessary gear.

The airlock is a critical element of the ISS because of design differences between American and Russian spacesuits. Currently, American suits will not fit through Russian-designed airlocks. The Joint Airlock Module is specially designed to accommodate both suits, providing a chamber where astronauts from every nation can suit up for spacewalks to conduct maintenance and construction work or to do science experiments outside the Station.

The Space Shuttle Atlantis will carry the airlock to orbit on mission STS-104, the tenth International Space Station flight, currently targeted for liftoff in May 2001. The Shuttle crew will secure the airlock to the right side of "Unity," the American-built connecting node that currently comprises one-third of the current Space Station, along with the Russian modules "Zarya" and "Zvezda."

The International Space Station is a cooperative endeavor by the United States and 15 other nations -- the largest multinational space construction effort in history. Orbital assembly of the Station is expected to be complete in 2006.

-- end --



KSC Contact: Bruce Buckingham  
Kennedy Space Center  
(321) 867-2468

For Release: Sept. 28, 2000

KSC Release No. 80-00

**NOTICE TO EDITORS/NEWS DIRECTORS:  
MISSION STS-92 EVENTS, NEWS CENTER OPERATING HOURS SET**

News conferences, events and operating hours for KSC's News Center have been set for the Oct. 5 launch of the Space Shuttle Discovery on Mission STS-92, the 100<sup>th</sup> launch in the Shuttle program. Launch on Oct. 5 is set for about 9:38 p.m. EDT at the opening of a window that extends for about 2 ½ - 5 minutes. The conferences and events listed below will be carried live on NASA Television (unless otherwise noted) and originate from the KSC Press Site.

The seven-member STS-92 crew is scheduled to arrive at KSC on Sunday, Oct. 1 at about 7:30 p.m. EDT. News media representatives planning to cover the event must be at the KSC News Center by 6:30 p.m. (in the event of a possible early crew arrival) for transportation to the Shuttle Landing Facility. On launch day, Oct. 5, the crew will depart their KSC living quarters and be driven to the launch pad at about 5:48 p.m. Media interested in attending this event should be at the News Center no later than 4:30 p.m.

News media representatives with proper authorization may obtain STS-92 mission credentials at the Pass and Identification Building on State Road 3 (south of KSC) on Merritt Island during published times. (Credential and badging hours are listed below.)

In addition to daily 9 a.m. countdown status briefings, a prelaunch press conference will be held two days before launch. The full briefing schedule is listed below.

-- end of general release --

-- more --

## **STS-92 BRIEFINGS & EVENTS SCHEDULE**

*(all times are EDT)*

*(All briefings are held inside the KSC Press Site auditorium and will be carried live on NASA TV unless otherwise noted)*

### **L-4 Days - Sunday, Oct. 1**

**7:30 p.m.** ----- *STS-92 Flight Crew Arrival (Live on NASA TV)*

### **L-2 Days - Tuesday, Oct. 3**

(Launch countdown begins at 12:01 a.m.)

**9 a.m.** ----- *Countdown Status Briefing*

- TBD, NASA Test Director
- Bill Dowdell, KSC Payload Manager

Ed Priselac, Shuttle Weather Officer

**4 p.m. ----- Prelaunch News Conference**

- Ron Dittmore, Shuttle Program Manager, NASA, JSC
- Bob Cabana, Manager, Space Station Program, NASA, JSC
- Yasushi Horikawa, Space Station Program Manager, NASDA
- Dave King, Director of Shuttle Processing, NASA, KSC
- Captain Cliff Stargardt, Staff Meteorologist, 45th Weather Squadron, USAF

**L-1 Day - Wednesday, Oct. 4**

**9 a.m. ----- Countdown Status Briefing**

- TBD, NASA Test Director
- Bill Dowdell, KSC Payload Manager
- Ed Priselac, Shuttle Weather Officer

**L-0 Day - Thursday, Oct. 5**

*(Tanking begins at about 12:10 p.m.)*

**4 p.m. ----- NASA Television live launch programming begins**

**Launch Day Crew activities:**

9:30 a.m. ----- Wake up  
10:30 a.m. ----- Breakfast  
3 p.m. ----- Lunch  
\*4:38 p.m. ----- Snack (Crew Photo)  
5:08 p.m. ----- Weather briefing  
\*5:30 p.m. ----- Suit up photo  
\*5:48 p.m. ----- Walkout/depart for pad  
\*6:18 p.m. ----- Arrive at pad  
\*7:33 p.m. ----- Close hatch  
**\*9:38 p.m. --- Launch of Discovery**  
(\* Carried live on NASA TV)

**Launch + 1 hour ----- Post-launch Press Conference**

- Jim Halsell, Shuttle Program Launch Integration Manager, KSC
- Mike Leinbach, Shuttle Launch Director, KSC

**NOTE:** STS-92 MISSION STATUS BRIEFINGS WILL BE HELD DAILY THROUGHOUT THE MISSION. TIMES OF THESE BRIEFINGS ARE AVAILABLE IN THE NASA TV SCHEDULE AT:

<http://www.spaceflight.nasa.gov/realdata/nasatv/schedule.html>

**KSC News Center office hours for STS-92**

*(Times may be adjusted in real time depending on mission events and timelines.)*

Sunday, Oct. 1 -----	Launch minus 4 days)-----	4 p.m. – 11 p.m.
Monday, Oct. 2 -----	(Launch minus 3 days)-----	8 a.m. – 4:30 p.m.
Tuesday, Oct. 3-----	(Launch minus 2 days)-----	8 a.m. – 6 p.m.
Wednesday, Oct. 4 -----	(Launch minus 1 day)-----	8 a.m. – 7 p.m.
Thursday, Oct. 5 -----	(Launch Day) Flight day 1 ---	6 a.m. -- 2 a.m. (Friday)

Friday, Oct. 6 -----	Flight day 2-----	8 a.m. – 7 p.m.
Sat.- Sun., Oct. 7-8 -----	Flight days 3 - 4 -----	Closed (See note)
Mon., Oct. 9 -----	Flight day 5 -----	Holiday (see note)
Tues. – Fri., Oct. 10-13 --	Flight days 6 - 9 -----	8 a.m. – 11 p.m.
Sat.- Sun., Oct. 16-17 ----	Flight days 10 -11 -----	Closed (See note)
Monday, Oct. 18 -----	Landing Day -----	8 a.m. – 9 p.m.

**NOTE:** The KSC News Center will be opened for overnight and weekend STS-92 Mission Status Briefings and the in-flight crew news conference. The office typically will open one hour prior to the event and close one hour after the conclusion of the event when they occur after normal office hours. Times of these briefings are available in the NASA TV schedule at:

<http://www.spaceflight.nasa.gov/realdata/nasatv/schedule.html>

### **Pass and Identification Hours**

L-4	Sunday, Oct. 1 -----	4 – 6:30 p.m.
L-3	Monday, Oct. 2 -----	8 a.m. – 12 noon
L-2	Tuesday, Oct. 3 -----	8 a.m. – 4:30 p.m.
L-1	Wednesday, Oct. 4 -----	8 a.m. – 4:30 p.m.
L-0	Thursday, Oct. 5 -----	6 a.m. – 8:30 p.m.

News media may obtain STS-92 mission credentials at the Pass and Identification Building at Gate 2 on State Road 3, Merritt Island, during the above published times.

News media with annual Shuttle credentials are reminded to sign the logbook at the query counter in the News Center.

**NEWS MEDIA ARE REQUIRED TO BE UNDER PUBLIC AFFAIRS ESCORT AT ALL TIMES WHILE AT KSC EXCEPT WHEN DRIVING TO THE NEWS CENTER OR THE COMPLEX 39 CAFETERIA.**

**NEWS MEDIA ARE ALLOWED AT THE PRESS SITE ONLY WHEN THE KSC NEWS CENTER IS OPEN.**

Status reports and other NASA publications are available on the World Wide Web at: <http://www-pao.ksc.nasa.gov/kscpao/kscpao.htm> .

Information about the countdown and mission can be accessed electronically via the Internet at: <http://www.ksc.nasa.gov/shuttle/countdown/> and at <http://spaceflight.nasa.gov/>

-- end --

Dwayne Brown  
NASA Headquarters

For Release: Sept. 28, 2000

Rob Navias  
Johnson Space Center

Joel Wells  
Kennedy Space Center

KSC Release No. 81-00

## **DISCOVERY LIFTOFF SET OCT. 5 TO BEGIN SPACE STATION BUILDUP**

NASA managers today set Oct. 5 as the launch date for Discovery on a mission that will initiate the heart of construction for the International Space Station (ISS), carrying aloft a nine-ton exterior framework and a three-ton docking port to be attached to the complex.

After the traditional Flight Readiness Review at the Kennedy Space Center, Oct. 5 was selected for the launch of the 100<sup>th</sup> Shuttle mission, designated STS-92. Discovery is targeted for a 9:38 p.m. EDT liftoff from Launch Pad 39-A at KSC during a launch window not to exceed five minutes in duration.

The exterior framework that will be attached to the expanding Station, called the Z1 truss, will house gyroscopes and communications equipment that will provide a future sense of balance for the outpost as well as enhanced voice and television capability. In addition, a conical mating adapter called Pressurized Mating Adapter 3 will be attached, providing an additional Shuttle docking port.

"The foundation for the International Space Station has been laid and this mission begins the true station build-up in orbit," Space Shuttle Program Manager Ron Dittmore said. "With multiple space walks planned and multiple components to attach, we're taking the level of complexity up a notch over the past few station construction flights."

Discovery will be commanded by Brian Duffy (Col., USAF). Pam Melroy (Lt. Col., USAF) will serve as Pilot. Mission Specialists include Dr. Leroy Chiao, Bill McArthur (Col. USA), Dr. Jeff Wisoff, Mike Lopez-Alegria (Cdr., USN) and Koichi Wakata, representing NASDA, the Japanese Space Agency.

During the 11-day mission, Wakata will use the Shuttle's robotic arm to attach the framework and mating adapter to the station's Unity module. The other Mission Specialists will be divided into two space-walking teams to conduct four planned space walks to provide electrical and data connectivity between the new components and the existing Station modules.

Discovery's flight will be the final Shuttle mission prior to the launch of the first resident, or Expedition crew to the ISS, currently targeted for Oct. 30 from the Baikonur Cosmodrome in Kazakhstan

Discovery is planned to land at about 4:50 p.m. EDT Oct. 16 at Kennedy Space Center.

-- end --

George Diller, NASA  
321/867-2468

Sept. 29, 2000

Ann Beach, Boeing Co.  
321/264-8582

KSC Release No: 82-00

Note to Editors/News Directors:

**MEDIA OPPORTUNITY FOR SPACE STATION AIRLOCK AT KSC OCT. 2**

The Joint Airlock Module -- the gateway from which crew members aboard the International Space Station (ISS) will enter and exit the orbiting research facility -- reached a milestone in processing this week with the completion of vacuum chamber testing in the Operations and Checkout (O&C) Building at Kennedy Space Center (KSC).

On Monday, Oct. 2, an opportunity is available for media to witness the airlock being removed from the chamber in preparation for installation into the payload transportation canister. It will then be taken to the Space Station Processing Facility where it will continue to undergo preflight processing for the STS-104 mission scheduled to occur aboard Space Shuttle Atlantis in May 2001.

The six-and-a-half ton, spindle-shaped airlock is 20 feet long and has a diameter of 13 feet at its widest point. It was manufactured at NASA's Marshall Space Flight Center by the Huntsville, Ala., division of the Boeing Company.

Once the lid of the vacuum chamber was lowered and secured early last week, it created a vacuum environment equivalent to 210,000 feet or 40 miles in altitude to leak test the pressurized air lock.

Spokespeople anticipated to be available to discuss this milestone in prelaunch preparations for the airlock will be Jon Cowart, STS-104 mission manager, NASA-KSC; and David Bethay, Pressurized Cargo Element Manager Director, The Boeing Company.

Reporters and photographers planning to attend the event should be at the NASA News Center at 9 a.m. on Monday, Oct. 2, to be taken to the O&C building located in the KSC Industrial Area. Before coming to the press site, media should call the codaphone at 321-867-2525 to be sure that the time of the opportunity has not changed.

-- end --



**October 2, 2000**

**George H. Diller Oct. 2, 2000  
Kennedy Space Center  
321/867-2468**

**Nancy Neal  
Goddard Space Flight Center  
301/286-0039**

**KSC Release No. 83-00**

**Note to Editors/News Directors:  
HETE-2 SPACECRAFT SCHEDULED FOR LAUNCH ON SATURDAY,  
OCT. 7**

The High-Energy Transient Explorer-2 (HETE-2) funded by NASA and built by the Massachusetts Institute of Technology is scheduled for launch at 1:45 a.m. EDT on Saturday, Oct. 7. Carrying the spacecraft into orbit will be a Pegasus rocket built by Orbital Sciences Corporation. It will be deployed from the Orbital Sciences L-1011 aircraft at the Kwajalein Missile Range in the south Pacific.

HETE-2 is an international collaborative mission involving the United States, France and Japan, each of which built one of the spacecraft's three instruments.

The mission objective is to detect gamma ray bursts that appear without warning from all corners of the universe. Scientists do not know the cause of these great releases of energy that may last only a few milliseconds or up to a minute. Gamma ray bursts occur once or twice a day but seldom do they afford scientists a good look before they fade away. HETE-2 will also be able to observe star systems that suddenly flare up with little or no warning.

The Massachusetts Institute of Technology (MIT) in Cambridge, Mass., developed the HETE-2 satellite. MIT is responsible for mission and science operations. NASA Headquarters in Washington, D.C. and the NASA Goddard Space Flight Center, Greenbelt, Md., manage the mission. NASA's John F. Kennedy Space Center, Fla., is responsible for management of the launch.

The countdown will be managed not at Kwajalein, but from the NASA Mission Director's Center (MDC) at Cape Canaveral Air Force Station. Communications and telemetry data from the L-1011 and the Pegasus rocket will be relayed back to the MDC by satellite, making this the first remotely conducted countdown by KSC launch management.

**WORLD WIDE WEB AND VOICE CIRCUIT COVERAGE**

Live coverage of the launch of HETE-2 aboard the Pegasus Rocket from the Kwajalein Missile Range will be provided by a webcast. No live NASA Television coverage is planned. The webcast location will be highlighted on the NASA-KSC Home Page found at: [www.ksc.nasa.gov](http://www.ksc.nasa.gov) and [www.kennedyspacecenter.com](http://www.kennedyspacecenter.com).

Audio only will be available on two "V" circuit numbers that may be reached by dialing 321/867-1260 or 321/867-7135.

The webcast and V circuit coverage will begin at 12:30 a.m. EDT on Saturday, Oct. 7. It will conclude after spacecraft separation from the Pegasus rocket approximately 12 minutes after launch.

A complete HETE-2 video package will be broadcast during the NASA TV Video File on Friday Oct. 6, at noon EDT. No news conferences are planned.

**RECORDED STATUS**

A recorded status report on the launch of HETE-2 will be provided beginning Friday, Oct. 6 by dialing 321/867-2525 and 805/734-2693.

-- end --

October 5, 2000  
KSC Contact: George Diller  
KSC Release No. 85-00

## **KSC EXPENDABLE LAUNCH VEHICLE SERVICES TO REMOTELY MANAGE ROCKET LAUNCH FROM KWAJALEIN**

For the first time, NASA's Expendable Launch Vehicle Services at Kennedy Space Center will remotely manage a rocket launch.

The High-Energy Transient Explorer 2 (HETE-2) - a satellite that will detect gamma-ray bursts - is set to launch at 1:45 a.m. on Oct. 7, on a Pegasus vehicle from the Kwajalein Missile Range in the South Pacific.

Because the Kwajalein site does not have a monitoring setup necessary for the level of management required by NASA, a system for remotely monitoring the launch was created at KSC. Three separate communication channels have been setup for voice and data transmission as a fail-safe measure.

"This is a great opportunity to demonstrate that we can launch anytime, anywhere, which is one of the program's strategic goals," said Chuck Dovale, NASA ELV launch manager.

Remote monitoring has been used previously by the KSC team on certain secondary aspects of managing a launch from Vandenberg Air Force Base. That monitoring helped prove to program leaders that remote launch monitoring was a viable alternative in certain situations, Dovale said.

The Kwajalein site was chosen for the launch because of its required inclination, less than 5 degrees with of goal of less than 2 degrees.

KSC assumed lead center responsibility for NASA's acquisition and management of ELV Launch Services at the start of fiscal year 1999. Separate ELV programs managed by Goddard Space Flight Center and Glenn Research Center were integrated and based at KSC.

On orbit, HETE-2 will locate mysterious gamma-ray bursts and other explosive cosmic phenomena. The bursts represent the great releases of energy and scientists do not know what causes them.

HETE-2 will detect up to a thousand bursts a year and, for about 30 of these bursts, provide very detailed information about their location and spectra, or light characteristics.

The HETE-2 collaboration includes NASA, the Massachusetts Institute of Technology and Los Alamos National Laboratory; France's Centre National d'Etudes Spatiales (CNES) and Centre d'Etude Spatiale des Rayonnements (CESR); and Japan's Institute of Physical and Chemical Research (RIKEN).

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KSC news releases are available at:

<http://www-pao.ksc.nasa.gov/kscpao/release/release.htm>

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October 13, 2000  
KSC Contact: Bruce Buckingham  
KSC Release No. 86-00

#### **KSC TRANSFERS OXYGEN DELIVERY SYSTEM TECHNOLOGY TO USAF**

The Medevac Oxygen System, developed at Kennedy Space Center, is to be used by the U.S. Air Force through a technology transfer agreement with the KSC Technology Programs and Commercialization Office.

The system, created by NASA biomedical electronics technician Barry Slack, was originally designed to provide therapeutic oxygen supply to astronauts being flown aboard the C-130 aircraft in case of a forced landing at a Space Shuttle Transatlantic Abort Landing (TAL) site.

Through an intergovernmental agency technology transfer, the system is now being tested for planned incorporation into the U.S. Air Force Air Mobility Command for use in C-130s and C-141s.

Slack created the system, which fits in a watertight case, in response to an inspection of medical resources at a TAL site. The inspection showed the existing oxygen distribution system would not cover a scenario when the majority of astronauts being transported would need oxygen. An expanded system was needed, but the cost was a staggering \$1.25 million.

Before beginning to design the new system, Slack consulted with staff at Patrick Air Force Base about how the system could be designed to best service a C-130.

Pararescue specialist Senior Master Sgt. Greg Lowdermilk – who doubles as a reservist with the 920th Rescue Group and program analyst for the Department of Defense Manned Space Flight Support Office at Patrick - was particularly helpful, Slack said.

"It makes me feel good to know that lives could be saved because of this system, which is inexpensive and easy to build," Slack said.

Each new kit costs only approximately \$1,300 in materials to build. Slack built eight systems, six are kept in Germany to support TAL sites and two are spares kept at KSC.

Slack, who works in the Biomedical Lab at KSC, equips Black Hawk helicopters with medical supplies to support potential medical needs for astronauts during launch and landing.

U.S. Air Force testing of a Medevac Oxygen System kit provided by KSC is nearly complete, according to Master Sgt. David "Chris" Hudson of the Aeromedical Evacuation Equipment Research and Acquisition section of the Command Surgeon's Office at Scott Air Force Base, Ill. Laboratory testing of the kit, conducted at Brooks AFB, Texas, was completed on Sept. 12.

In addition to laboratory testing, the system must also pass airborne form, fit, and function testing before it is approved for use aboard Air Force medevac aircraft. Initial flight testing of the kit aboard a C-141 transport aircraft was complete last month. Once the system is formally approved for use, the Air Force will proceed with parts procurement, assembly and kit deployment to aeromedical evacuation units around the world.

The KSC Medevac Oxygen System will replace the Air Force's aging Therapeutic Oxygen Manifold System (TOMS) currently used on aeromedical evacuation aircraft. The Air Force's supplier of TOMS units has gone out of business, making

procurement of new units or replacement parts impossible. KSC's system, which uses commercially available off-the-shelf components, will provide an inexpensive, readily available solution to meet future Air Force needs.

First awareness of the Air Force's problem occurred when the Technology Programs and Commercialization Office's technology counselor, Lew Parrish, received a message from the Chief of In-Flight Medical Equipment at Ramstein Air Base, Germany, asking for information on the KSC system as a potential replacement for their TOMS units.

Parrish, a 23-year Air Force veteran now working for the University of Florida's Southern Technology Applications Center, then embarked on a 19-month odyssey to locate the correct person and office within the Air Force with whom to collaborate.

The Air Force plans to use the Medevac Oxygen System on existing C-141 aircraft and future C-130J and C-130X aircraft equipped with a LOX unit for medical use. The Medevac Oxygen System may be deployed on a variety of opportune aircraft as well. The U.S. Navy and Coast Guard are also considering using the KSC developed system aboard their aeromedical evacuation aircraft.

For more information on NASA KSC technology transfers and spinoffs, see the NASA Spinoffs fact sheet at <http://www-pao.ksc.nasa.gov/kscpao/nasafact/pdf/nasaspinoff.pdf>

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October 12, 2000  
KSC Contact: Bruce Buckingham  
KSC Release No. 87-00

## **BUSINESS EXPO TO FEATURE VENDOR-NETWORKING OPPORTUNITIES**

Business leaders interested in learning more about government contracting and what local and national vendors have to offer won't want to miss the Business Opportunities Expo 2000 on Tuesday, Oct. 24. The Expo will be held from 9 a.m. to 3 p.m. in Cruise Terminal No. 10 at Port Canaveral.

The annual trade show - sponsored by the NASA/Kennedy Space Center Small Business Council, 45th Space Wing and Canaveral Port Authority - will feature 216 business and government exhibitors, some from Brevard and others from across the country.

Exhibitors will include vendors from a variety of product and service areas, including computer technology, printed circuit boards, safety products and more. Representatives of NASA, the 45th Space Wing, prime contractors and Spaceport Florida Authority will be available to give out information and answer specific questions about doing business with their respective organizations. Admission is free and open to the public.

"This is an incredible networking and information gathering opportunity for area businesses. We've always received good response in the past and we're hoping for even greater participation at this year's event," said Ember Smith, small business liaison with NASA's Central Industry Assistance Office.

NASA's Central Industry Assistance Office provides support to small businesses that want to do business at KSC. That office works with the NASA/KSC Small Business Council - which consists of United Space Alliance, The Boeing Co., Space Gateway Support, and Dynacs Engineering Inc. - to help small businesses learn how to navigate in the world of government contracting. By co-sponsoring the Expo, the Council helps provide a one-stop environment for buyers and sellers.

Also, to kick off the Expo, NASA/KSC will present a Contractor Awards Ceremony. The following companies will be honored this year:

- Large business prime contractor, The Boeing Co.
- Small disadvantaged business prime contractor, Dynacs Engineering Inc.
- Women-owned small business prime contractor, Dynamac Corp.
- Small business prime contractor, Johnson, Levinson, Slider, Davila, Inc.
- HUBZone small business, Technonerds
- Small disadvantaged business subcontractor, Creative Management Technology, Inc.
- Women-owned small business subcontractor, Wiltech of Florida Corp., Inc.
- Small business subcontractor, Engravers Metal Fabricators

For more information visit: <http://EXPO2000.ksc.nasa.gov>

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October 16, 2000  
KSC Contact: Bruce Buckingham  
KSC Release No. 88-00

**KSC AND 45TH SPACE WING OBSERVE SAFETY AND HEALTH DAY OCT. 18**

Kennedy Space Center and the 45th Space Wing will celebrate the 3rd annual Super Safety and Health Day on Wednesday, Oct. 18. All normal work activities, with the exception of mandatory services such as fire and security, will be suspended permitting thousands of NASA and Air Force employees and contractors to participate in a full day of informative activities.

The theme this year is "Safety and Health . . . A Working Relationship." It is a day to remember that the health and safety of the workforce, both on and off duty, is crucial to the overall effectiveness and success of mission goals and objectives. Safety and Health Day will begin with activities planned and be conducted in local work groups. There will also be astronaut visits and safety award presentations.

Afternoon programs will include a keynote address by Dr. Beck Weathers, an accomplished pathologist and survivor of the 1996 climbing tragedy on Mt. Everest. Following Dr. Weathers, there will be a panel session with NASA, Air Force, and contractor subject matter experts who will answer questions on safety and health in the workplace. Areas to be covered are health and fitness, environmental and security, voluntary protection programs, and safety and mission assurance.

The three-hour session will be broadcast live on closed circuit television for all KSC and 45th Space Wing employees to view.

From 8 a.m. to 5:30 p.m., employees will be able to visit about 140 safety and health displays set up in various locations at KSC and Cape Canaveral Air Force Station.

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October 20, 2000  
KSC Contact: Joel Wells  
KSC Release No. 89-00

**NOTE TO EDITORS: DISCOVERY SCHEDULED TO LAND AT KSC COMPLETING MISSION STS-92**

The orbiter Discovery is scheduled to land at Kennedy Space Center on Sunday, Oct. 22, at about 2:14 p.m. EDT completing its 11-day STS-92 mission that was launched from KSC Oct. 11, 2000.

Landing at KSC's Shuttle Landing Facility (SLF) is slated to occur on orbit 169 at mission elapsed time 10 days, 18 hours, 57 minutes. Deorbit burn will occur at about 1:07 p.m. EDT.

The two KSC landing opportunities Sunday are: 2:14 p.m. and 3:50 p.m.

Managers will not call up the back-up landing location at Edwards Air Force Base (EAFB), CA, for landing support on Sunday.

If managers must keep Discovery in orbit an additional day, two landing opportunities are available Monday at KSC and two at EAFB.

KSC Monday landing times are: 2:51 p.m. and 4:27 p.m. EDT.

EAFB Monday landing times are: 4:58 p.m. and 7:34 p.m. EDT.

This landing of Discovery will mark the 53rd landing at KSC in the history of Space Shuttle flight. It will be the 24th consecutive landing at KSC. Discovery is currently on the 100th Space Shuttle mission in the history of the program.

**SLF and KSC Ground Operations**

The Shuttle Landing Facility was built in 1975. It is 300 feet wide and 15,000 feet long with 1,000-foot overruns at each end. The strip runs northwest to southeast and is located about 3 miles northwest of the 525-foot tall Vehicle Assembly Building.

Once the orbiter is on the ground, safing operations will commence and the flight crew will prepare the vehicle for post-landing operations. The Crew Transport Vehicle (CTV) will be used to assist the crew, allowing them to leave the vehicle and remove their launch and re-entry suits easier and quicker.

The CTV and other KSC landing convoy operations have been "on-call" since the launch of Discovery. The primary functions of the Space Shuttle recovery convoy are to provide immediate service to the orbiter after landing, assist crew egress, and prepare the orbiter for towing to the Orbiter Processing Facility.

Convoy vehicles are stationed at the SLF's mid-point. About two hours prior to landing, convoy personnel will don SCAPE suits, or Self-Contained Atmospheric Protective Ensemble, and communications checks are made. A warming-up of coolant and purge equipment is conducted and nearly two dozen convoy vehicles are positioned to move onto the runway as quickly and as safely as possible once the orbiter coasts to a stop. When the vehicle is deemed safe of all potential explosive hazards and toxic gases, the purge and coolant umbilical access vehicles move into position at the rear of the orbiter.

Following purge and coolant operations, flight crew egress preparations will begin and the CTV will be moved into position at the crew access hatch located on the orbiter's port side. A physician will board the Shuttle and conduct a brief preliminary examination of the astronauts. The crew will then make preparations to leave the

vehicle.

Following departure from the SLF, the crew will be taken to their quarters in the O&C Building, meet with their families and undergo physical examinations. The crew is scheduled to remain at KSC overnight and depart for Johnson Space Center on Monday.

If Discovery lands at Edwards, an augmented KSC convoy team will be on-site to safe the vehicle, disembark the crew and move the orbiter to the Mate/Demate Device. The turnaround team will be deployed to Edwards by charter aircraft on landing day.

About 3½ hours after Discovery lands at KSC, the orbiter will be towed to the Orbiter Processing Facility for post-flight deservicing.

**NOTICE TO EDITORS:** The KSC press site will be open this week at the following times: Saturday from 2 p.m. to 6:30 p.m. The press site will reopen on Sunday at 9 a.m. and remain open through 6 p.m. Sunday. Accredited news media wishing to view Discovery's landing should be at the KSC press site prior to 1 p.m. Sunday for transport to the SLF. Additional specific information regarding landing photo opportunities, post-landing press conferences and KSC News Center operational hours is available at the KSC News Center. It is suggested that members of the media call the KSC codaphone this weekend for updates at 321-867-2525.

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October 23, 2000

KSC Contact: Bruce Buckingham or Jill Rock

KSC Release No. 90-00

**KENNEDY SPACE CENTER AND CAPE CANAVERAL AIR FORCE STATION OPEN GATES TO COMMUNITY ON NOV. 4**

Kennedy Space Center and Cape Canaveral Air Force Station are gearing up for Community Appreciation Day on Nov. 4, 2000. KSC Director Roy Bridges and 45th Space Wing Commander Brig. Gen. Donald Pettit have decided to share many of the unique facilities at NASA and the Cape with the local community.

KSC and CCAFS will open their doors from 9 a.m. to 3 p.m. to a select number of car pass holders from the surrounding community. "This allows both organizations the opportunity to share the excitement of their people, unique facilities and one-of-a-kind launch vehicles with visitors who might otherwise not have an opportunity to be this close to the space program again," said Bridges.

Car passes are available on a first-come, first-served basis at all Brevard County Library locations beginning Oct. 23, 2000.

"Our wish is to encourage your exploration and appreciation of the many accomplishments, both past and present, which have occurred here," said Pettit. "Our theme for this year, 'Milestones of the Millennium,' allows us time to reflect about the significant space milestones that have made an everlasting impact on our lives."

For more information about detailed directions, car pass pick up locations and facilities that will be open to visitors, call the Open House Information Line at 321-867-5522.

-- end --

October 31, 2000  
KSC Contact: Bruce Buckingham  
KSC Release No. 92-00

## **PERSONAL CABIN PRESSURE ALTITUDE MONITOR HOLDS PROMISE**

**A new NASA KSC innovation - the Personal Cabin Pressure Altitude Monitor - promises to significantly contribute to public aviation safety.**

**The monitor, which is about the size of a hand-held pager, is designed to warn individuals of potentially dangerous or deteriorating aircraft cabin pressure altitude conditions through audio, vibratory and visual alarms. In addition, a lighted digital screen displays a text message of the warning and the specific condition causing the alarm.**

**The inventor of the device, NASA engineer Jan Zysko, said the monitor operates independently of other aircraft systems and monitors the pressure/time conditions when supplemental oxygen is to be used according to federal aviation regulations.**

**"For pressurized aircraft, the invention provides an independent warning of cabin pressure altitude where a cabin leak or other reason for pressurization loss might go undetected," Zysko said. "For non-pressurized aircraft, the monitor tracks time and altitude profiles and warns when supplemental oxygen is needed."**

**The monitor was originally developed to offer Space Shuttle and Space Station crew members added independent notification about any depressurization. Two major incidents spurred Zysko to create the monitor, the Mir/Progress collision in June 1997 and the Payne Stewart aircraft accident in October 1999.**

**The Technology Programs and Commercialization Office at KSC held a technology licensing industry briefing on the monitor on Oct. 26. About a dozen aerospace companies sent representatives to the briefing to hear a description of the technology and an explanation of the technology licensing process.**

**Part of the royalties from licenses that this new technology generates will be used to help fund other research and development projects at KSC, which continues to grow as a Spaceport Technology Center. Although KSC's patent licensing program is only four years old, among NASA centers, KSC was the No. 1 producer of licenses during fiscal year 2000.**

**Licensing Manager Melanie Chan said there are several potential NASA and aviation/aerospace applications for the monitor. Pilots flying both pressurized and non-pressurized aircraft could benefit from the warning system. Human space operations also could use the innovation.**

**Low-Earth orbit vehicles - the Space Shuttle, Space Station, and Mir - are markets, as well as long-duration/interplanetary vehicles and future planetary habitats. Ground systems also present potential applications including the Mars simulation chamber and pressure/vacuum test chambers at KSC.**

**Possible applications beyond aviation and aerospace include scuba diving, skydiving, mountain climbing, meteorology, underwater habitats, hyperbolic pressure chambers, altitude chambers, and positive/negative pressure vessels.**

**"If this technology can help avoid even one incident or accident," Zysko said, "it will have been worth all the effort and resources put forth over this past year."**

**During the next phase of the monitor's development, Zysko would like to integrate carbon monoxide (CO) and carbon dioxide (CO<sub>2</sub>) sensors into the unit for more complete aviation and aerospace environmental monitoring.**

Zysko pointed out the need for his invention by citing hypoxia and cabin pressure-related incidents contained in various government accident and incident databases.

There are probably many more hypoxia-related incidents and accidents than are listed, Zysko indicated, but in many cases there has been insufficient evidence to determine whether hypoxia was a probable or contributing cause.

NOTE TO EDITORS: Photos of the Personal Cabin Pressure Altitude Monitor can be found at <http://www-pao.ksc.nasa.gov/kscpao/captions/hotpics.htm>.

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October 31, 2000  
KSC Contact: Bruce Buckingham  
KSC Release No. 93-00

**CEREMONY TO COMMISSION NEW COST-SAVING CAPE CANAVERAL SPACEPORT  
HELIUM PIPELINE TO BE HELD ON NOV. 2**

A new high-pressure helium pipeline to service launch needs at the new Delta IV launch complex, Complex 37 at the Cape Canaveral Air Force Station (CCAFS), will be commissioned at a ceremony on Nov. 2 at Kennedy Space Center.

The ceremony for the Cape Canaveral Spaceport Helium Pipeline will be held at the Converter Compressor Facility in the Complex 39 area. Media interested in covering this event should be at the KSC Press Site by 8:30 a.m.

The nine-mile-long, buried pipeline for Complex 37 will save NASA money through sharing use and costs of the Kennedy Space Center Helium Facility. It will also serve as a backup helium resource for Shuttle launches. Nearly one launch's worth of helium will be available in the pipeline to support a Shuttle pad in an emergency.

Space Gateway Support (SGS), the Joint Base Operations and Support contractor (J-BOSC) at KSC and CCAFS, was responsible for the design and construction of the buried pipeline, now owned and operated by NASA. The Boeing Co. provided funding.

The pipeline is capable of delivering helium pressurized to 6,000 pounds per square inch (psi) from the KSC Helium Facility.

The KSC Helium Facility, currently operated by SGS, has a capacity of 1,800 standard cubic feet per minute at 6,000 psi. High-pressure helium is now being delivered via an above-ground pipeline from the Helium Facility to the Shuttle launch pads, the Vehicle Assembly Building, and the Orbiter Processing Facility.

Other users of pressurized helium currently rely upon high-pressure gas railcars (in support of Titan), compressed gas trailers (Atlas Centaur and Delta II/III), and K-bottles (institutional shops and laboratories).

The new pipeline will provide helium for the new Boeing Delta IV, a heavy lift rocket to be launched from Complex 37 currently under construction on CCAFS. Like the Space Shuttle, the Delta IV is a liquid hydrogen-fueled launch vehicle and is expected to consume nearly as much helium for ground processing.

The new line originates at the Helium Facility and runs east along the Crawlerway Road to Phillips Parkway, then south to Complex 37, terminating in a meter station at the perimeter of the launch pad. Construction of the line began in late June.

Advantages associated with burying the new line rather than running it above ground include reduced maintenance costs stemming from the corrosive effects of the ocean-side atmosphere, elimination of barriers to free movement on the surface that are posed by an above-ground line, and increased resistance to displacement in the unlikely event of a break in the line.

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# NASA Facts

National Aeronautics and  
Space Administration

**John F. Kennedy Space Center**  
Kennedy Space Center, Florida 32899  
AC 321 867-2468



October 2000  
KSC Release No. 94-00

## STS-97/Endeavour

### Shuttle to Power Up Orbiting Station with Help from the Sun

Powering up the enormous orbiting International Space Station (ISS) will be the primary objective of the five-member crew aboard STS-97. Two of the eight giant solar arrays will be carried aboard the P6 Integrated Truss Segment and will be the first part of a system that ultimately will deliver 60 times more power to the ISS research facilities than was possible on Russia's Mir. The P6 Truss Segment, containing the solar arrays and the batteries, will be temporarily installed to the Unity connecting module by the Z1 Truss recently launched aboard STS-92.

Each 108.6-ft. long solar array wings will extend outward at right angles and be connected to the Station's 310-ft. long truss. Altogether, they will cover an area about the size of an acre, and when fully extended, will span about 240 feet, the largest deployable structure ever built.

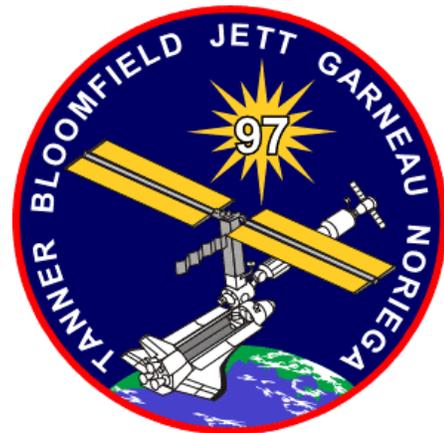
An array consists of two solar cell "blankets," one on either side of a telescoping mast that extends and retracts to form the solar array wing. The mast turns on a gimbal or device to level the arrays and keep it facing the sun. There are a total of four pairs of wings, each with two arrays measuring 112 feet long by 39 feet wide, and along with its assemblies are called a "photo-voltaic module."

The most powerful solar arrays ever to orbit Earth will capture the sun's elusive energy and begin the process of converting it into power for the Station.

The arrays will supply 105 kilowatts - enough to light a town - and will connect the labs, living quarters, payloads and systems equipment.

To complete this daunting task, Mission Specialists Carlos Noriega and Joseph Tanner will perform two spacewalks to install the solar array connections.

The crew will also install batteries to provide



power when the Station is in Earth's shadow, about one-third of every orbit, to compensate for the time the Station will spend in darkness. The batteries will store energy gathered by the solar arrays during the sunlit portion of time and will supply the energy to power the Station.

This mission, STS-97, will have the challenge of catching up to and docking with an inhabited International Space Station traveling more than 17,000 miles per hour. Three crew members, launched earlier from Baikonur Cosmodrome in Kazakhstan on a Russian Soyuz rocket, will greet the visitors of STS-97 and welcome them as guests to the Station.

Bill Shepard, Sergei Krikalev and Yuri Gidzneko make up the Station's first crew and begin the preparations for a five-month stay that will mark the beginning of continuous habitation of the Space Station. The Soyuz spacecraft will stay docked to the Station to serve as a Crew Return Vehicle in case of a medical or

other emergency.

The International Space Station represents a global partnership of 16 nations. The million-pound Station will include six laboratories and provide more space for research than any spacecraft ever built. Internal volume of the Station will be roughly equal to the passenger cabin volume of a 747 jumbo jet.

One goal to building and operating an International Space Station is to provide a world-class research center in the unique environment of space. More than 900 researchers from countries around the world are developing experiments that will be carried out aboard the ISS to improve life on Earth.

## The Crew

Commander Brent W. Jett Jr. (Com., USN) is a veteran of two previous space flights and has traveled 7.6 million miles and more than 458 hours in space. Before becoming an astronaut, he worked as a project test pilot at the Carrier Stability Department of the Strike Aircraft Directorate flying F-14s and was then assigned to the USS Saratoga. After being selected as an astronaut in March 1992, Jett served in various technical assignments in the Astronaut Office at Johnson Space Center in Houston.

Jett was born in Pontiac, Mich., but considers Ft. Lauderdale, Fla., to be his hometown. His educational background includes a bachelor of science degree in aerospace engineering from the U.S. Naval Academy and a master of science degree in aeronautical engineering from the U.S. Naval Postgraduate School.

Michael J. Bloomfield (Lt. Col., USAF) will serve as pilot aboard the STS-97 flight. His initial space flight for NASA was STS-86, the seventh mission to rendezvous and dock with the Russian Space Station Mir. Selected as an astronaut by NASA in December 1994, he worked technical issues for the Operations Planning Branch and served as chief of safety for the Astronaut Office.

Bloomfield was born in Flint, Mich., but considers Lake Fenton, Mich., to be his hometown. He received a bachelor of science degree in engineering mechanics from the U.S. Air Force Academy and a master of science degree in engineering management from Old Dominion University.

Mission Specialist Joseph R. "Joe" Tanner is an experienced spacewalker and has spent a total of 14 hours on previous Extravehicular Activities (EVA) to service the Hubble Space Telescope on mission STS-82. His work for NASA began as a research pilot and involved teaching astronaut pilots Space Shuttle landing techniques in the Shuttle Training Aircraft.

Tanner considers Danville, Ill., to be his hometown. He received his bachelor of science degree in mechanical engineering from the University of Illinois. Selected as an astronaut candidate by NASA in March 1992, he served between missions as a part of the Astronaut Support Personnel team at KSC to support launches and landings.

Carlos I. Noriega (Lt. Col., USMC) will serve as a mission specialist on his second space flight. Aboard STS-97, Noriega will conduct two spacewalks to assist in the assembly of the P6 Integrated Truss Segment of the International Space Station. Noriega has held technical assignments in the Astronaut Office EVA/Robotics and Operations Planning Branches and Johnson Space Center. He flew aboard STS-84 in 1997 and has logged more than 221 hours in space.

Born in Lima, Peru, he considers Santa Clara, Calif., to be his hometown. Noriega's educational background includes a bachelor of science degree in computer science from the University of Southern California and a master of science degree in computer science and space systems operations from the Naval Postgraduate School. Selected by NASA in December 1994, Noriega reported to Johnson Space Center in March 1995 to begin his training.

Mission Specialist Marc Garneau (Ph.D.) will be making his third space flight on mission STS-97. Garneau was the first Canadian to fly on NASA's initial mission to carry a seven-person crew on STS-41G in 1984 and has logged more than 437 hours in space. After his initial flight, he served as spacecraft communicator (CAPCOM) in Mission Control during Shuttle flights.

He was born in Quebec City, Canada, and attended the Canadian Forces Command and Staff College in Toronto. Garneau earned a bachelor of science degree in engineering physics from the Royal Military College of Kingston and a doctorate in electrical engineering from the Imperial College of Science and Technology, London, England.

### Related NASA Web sites

Mission and crew press kit:  
[www.shuttlepresskit.com/](http://www.shuttlepresskit.com/)

Mission and crew - Johnson Space Center:  
[spaceflight.nasa.gov/](http://spaceflight.nasa.gov/)

Shuttle countdown - Kennedy Space Center:  
[www.ksc.nasa.gov/shuttle/countdown/](http://www.ksc.nasa.gov/shuttle/countdown/)

Multimedia prelaunch guest presentation:  
[www-pao.ksc.nasa.gov/kscpao/briefing/](http://www-pao.ksc.nasa.gov/kscpao/briefing/)



**November 2, 2000**

**KSC Contact: Bruce Buckingham**

**KSC Release No. 95-00**

**NOTE TO EDITORS:**

**MEDIA OPPORTUNITIES WITH STS-97 CREW SET FOR NEXT WEEK'S COUNTDOWN TEST**

The crew of Space Shuttle mission STS-97, the 101<sup>st</sup> mission in the history of Shuttle flight, will be at Kennedy Space Center next week for the standard Terminal Countdown Demonstration Test (TCDT).

The TCDT is held at KSC prior to each Space Shuttle flight, providing the crew an opportunity to participate in simulated countdown activities. The TCDT ends with a mock launch countdown, culminating in a simulated main engine cut-off. The crew also spends time undergoing emergency egress training exercises at the pad and has an opportunity to view and inspect the payloads in the orbiter's payload bay.

The following events are available for media to attend during the STS-97 TCDT.

- **Monday, Nov. 6** -- The five-member crew of mission STS-97 is scheduled to arrive at KSC's Shuttle Landing Facility (SLF) at 10:30 a.m. Media who wish to take part in this photo opportunity should be at the KSC Press Site by 9:30 a.m. for transport to the SLF.
- **Tuesday, Nov. 7** -- Media representatives will have an opportunity to speak informally with and photograph the crew at Launch Pad 39B. Media interested in participating in this question and answer session should be at the KSC Press Site by 8:30 a.m. for transport to the pad. This question and answer session will be a local media event only and will NOT be covered live on NASA TV. Tape replays of the event will occur during the regularly scheduled NASA Video File, replayed at various times later in the day.

Once the crew is at the pad, they will enter the orbiter Endeavour fully suited for the final hours of the practice countdown, including the simulated Shuttle main engine ignition and cut-off. Following TCDT, the crew will depart KSC for final mission preparations in Houston, Texas.

Endeavour, on mission STS-97, is targeted for launch from Kennedy Space Center on Nov. 30 at about 10 p.m. EST. The flight is scheduled to last 11 days and will feature Endeavour docking with the International Space Station (ISS) with the Expedition One crew awaiting them on Station. The payload for this mission is the P6 Truss Segment and a twin set of solar arrays that will be attached to the Station.

Crew members for mission STS-97 are: Commander Brent Jett; Pilot Michael Bloomfield; and Mission Specialists Joe Tanner, Carlos Noriega, and Marc Garneau of the Canadian Space Agency.





**November 8, 2000**

**David E. Steitz  
NASA Headquarters  
202/358-1730**

**George H. Diller  
Kennedy Space Center  
321/867-2468**

**Lynn Chandler  
Goddard Space Flight Center  
301/614-5562**

**Nancy Neal  
Goddard Space Flight Center  
301/286-0039**

**KSC Release No. 96-00**

**NOTE TO EDITORS/NEWS DIRECTORS:**

**EO-1/SAC-C READY FOR LAUNCH ON DELTA II ROCKET NOV. 18**

- o The launch of the Earth Observing 1 (EO-1) satellite for NASA and the SAC-C spacecraft for the Argentine Commission on Space Activities (CONAE) aboard a Boeing Delta II rocket is scheduled to occur on Saturday, Nov. 18 from NASA's Space Launch Complex 2 at Vandenberg Air Force Base, CA. The launch time is 10:24:21 a.m. PST and the available launch window is 22 seconds.

The first of three New Millennium Program Earth-orbiting missions, EO-1 is an advanced land-imaging mission that will demonstrate new instruments and spacecraft systems. The charter of NASA's New Millennium Program is to identify, develop and flight-validate key instrument and spacecraft technologies that can enable new or more cost-effective approaches to conducting science missions in the 21st century.

Joining EO-1 aboard the Delta rocket is the SAC-C spacecraft, designed to study the structure and dynamics of the Earth's atmosphere, ionosphere and geomagnetic field. SAC-C will also seek to measure the space radiation in the environment and its influence on advanced electronic components, as well as determine the migration route of the Franca whale. Another objective of the payload is to verify autonomous methods of attitude and orbit determination.

**ACCREDITATION**

U.S. News media desiring accreditation for the launch of EO-1/SAC-C should fax their request on news organization letterhead to:

NASA Vandenberg Resident Office  
Vandenberg Air Force Base, CA  
Attention: Bruce Buckingham  
FAX: 805/605-3380

Foreign news media desiring accreditation should fax their request to:

30th Space Wing Public Affairs Office  
Vandenberg Air Force Base, CA  
Attention: Staff Sgt. Rebecca Bonilla  
FAX: 805/606-8303

For further information on launch accreditation call 321/867-2468. Beginning Nov. 16 call the NASA EO-1/SAC-C News Center at Vandenberg Air Force Base 805/605-3051.

### **PRELAUNCH NEWS CONFERENCE**

The prelaunch news conference will be held on Friday, Nov. 17 at 11 a.m. PST in the main conference room of the NASA Vandenberg Resident Office, Building 840, Vandenberg Air Force Base, CA. Participants will be:

Chuck Dovale, NASA Launch Manager  
Kennedy Space Center, FL

Joy Bryant, Boeing Mission Director, Delta II  
The Boeing Company

Dale Schulz, EO-1 Project Manager  
NASA Goddard Space Flight Center

Luis Aloy, SAC-C Mission Director  
Argentine Commission on Space Activities (CONAE)

Captain Greg Fox, USAF Launch Weather Officer, 30th Weather Squadron  
Vandenberg Air Force Base, CA

Remote question and answer capability will be available from NASA field centers including KSC, GSFC and NASA Headquarters.

Media desiring to cover the prelaunch news conference should meet at the south gate of Vandenberg Air Force Base on California State Road 246 at 10:30 a.m. They will be escorted to the NASA Vandenberg Resident Office.

### **REMOTE CAMERAS**

Media desiring to establish sound-activated remote cameras at the launch pad will depart from the south gate of Vandenberg Air Force Base on California State Road 246 at 12 noon on Friday, Nov. 17.

### **LAUNCH DAY PRESS COVERAGE**

On launch day, Nov. 18, media covering the launch of EO-1/SAC-C should be at the main gate located on California State Road 1 at 9 a.m. to be escorted to the press site located on north Vandenberg Air Force Base. After launch, media will be escorted back to the main gate. A post-launch news conference will not be held.

### **NASA TELEVISION AND VOICE CIRCUIT COVERAGE**

NASA Television will carry the prelaunch news conference starting at 11 a.m. PST on Friday, Nov. 17. On launch day, Nov. 18, NASA TV coverage of the countdown will begin at 9 a.m. PST and continue through the EO-1 and SAC-C spacecraft separation activities. The deployments are complete at 91 minutes into flight.

NASA Television is carried on GE-2, transponder 9C located at 85 degrees West longitude.

Audio only will be available on the "V" circuits that may be reached by dialing 321/867-1220, 1240, 1260, 7135, 4003, 4920.

A webcast of the launch will also be available on [www.ksc.nasa.gov](http://www.ksc.nasa.gov) and [www.kennedyspacecenter.com](http://www.kennedyspacecenter.com).

The EO-1/SAC-C News Center at the NASA Vandenberg Resident Office will be staffed beginning Thursday, Nov. 16 and may be reached at 805/605-3051. A recorded status report will also be available starting at that time by dialing 805/734-2693.

-- end --



**November 16, 2000**

**KSC Contact: Bruce Buckingham**

**KSC Release No. 98-00**

**NOTE TO EDITORS:**

**EO-1/SAC-C LAUNCH DELAYED TO MONDAY, NOV. 20**

The launch of NASA's Earth Observing-1 (EO-1) satellite and the SAC-C spacecraft for the Argentine Commission on Space Activities aboard a Boeing Delta II rocket has been rescheduled to occur no earlier than Monday, Nov. 20 at 10:24 a.m. PST from NASA's Space Launch Complex 2 at Vandenberg Air Force Base, Calif.

NASA and Boeing engineers plan to resolve discrepancies in the review of the pedigree paper from the redundant inertial flight control assembly (RIFCA). The RIFCA is the guidance computer on board the Delta II vehicle.

Managers determined there is insufficient time to perform the independent review of the pedigree paper, and therefore, the launch was postponed 24 hours.

The prelaunch press conference has also been rescheduled and will now occur on Sunday, Nov. 19 at 11 a.m. PST from Vandenberg.

-- end --



**November 17, 2000**

**Bruce Buckingham**  
**Kennedy Space Center, FL**  
**(Phone: 321/867-2468)**

**James Hartsfield**  
**Johnson Space Center, TX**  
**(Phone: 281/483-5111)**

**KSC Release No. 99-00**

## **ENDEAVOUR TO LAUNCH NOV. 30 ON STATION ASSEMBLY FLIGHT TO DEPLOY LARGEST SOLAR ARRAYS EVER IN SPACE, VISIT FIRST CREW**

The launch of the Space Shuttle Endeavour has been set for Thursday, Nov. 30, 2000, on a mission of space flight firsts that will spread giant solar array wings -- the longest structure ever in space -- above the International Space Station, providing it with more power than any previous spacecraft.

"This mission will assemble the heaviest, largest and most complex piece of the International Space Station to date," Space Shuttle Program Manager Ron Dittmore said. "Every Shuttle flight for the next year carries its own set of firsts. But this mission, unfolding solar arrays of historic proportions, will make the challenge and grandeur of this entire venture more apparent than will any other single flight. It's a great mission to complete a very safe and successful year for the Space Shuttle team coast to coast."

Endeavour's liftoff from the Kennedy Space Center on Shuttle mission STS-97 is targeted for 10:06 p.m. EST, in a launch window that will be less than five minutes long. Endeavour and its five-man crew will carry aloft a 17-ton package of immense solar arrays and their associated batteries, electronics and cooling equipment to be attached to the International Space Station. Once deployed, this first set of U.S.-developed arrays -- three more sets of arrays will be added in coming years -- will measure 240 feet tip-to-tip and power the first station science experiments and laboratory, the U.S. Destiny Lab, to be launched on the next shuttle flight, STS-98 in January 2001.

Veteran Astronaut Brent Jett (Cmdr., USN) will command the mission. Michael Bloomfield (Lt. Col., USAF) will serve as pilot. They will be accompanied by Mission Specialists Joe Tanner, Carlos Noriega (Lt. Col., USMC) and Canadian Space Agency astronaut Marc Garneau. Tanner and Noriega will perform space walks during the mission to install the arrays and prepare for the laboratory's arrival next year. Endeavour also will be the first Shuttle to visit an inhabited International Space Station, dropping off supplies and equipment for the three-person station crew -- Commander Bill Shepherd, Pilot Yuri Gidzenko and Flight Engineer Sergei Krikalev -- that has been aboard the outpost since Nov. 2.

-- end --





**November 21, 2000**

**Joel Wells**  
**Kennedy Space Center, FL**  
**(Phone: 321/867-2468)**

**KSC Release No. 100-00**

## **LAUNCH COUNTDOWN FOR SHUTTLE MISSION STS-97 BEGINS 1 A.M. NOV. 28**

NASA will begin the countdown for launch of Space Shuttle Endeavour on mission STS-97 Nov. 28 at 1 a.m. EST at the T-43 hour mark. This mission marks the 6th Shuttle flight to the International Space Station and the 5th Shuttle mission this year. The KSC launch team will conduct the countdown from Firing Room 1 of the Launch Control Center.

The countdown includes 28 hours of built-in hold time leading to a preferred launch time at about 10:06 p.m. on Nov. 30 with a launch window not to exceed 5 minutes. The exact location of the orbiting International Space Station (ISS) will be determined during the T-9 minute built-in hold. The launch director will at that time determine the exact time of launch.

Mission STS-97 is the 15th flight of the orbiter Endeavour and the 101st flight overall in NASA's Space Shuttle program. STS-97 is scheduled to last 10 days, 19 hours and 52 minutes with a planned KSC landing at about 5:58 p.m. on Dec. 11.

Endeavour rolled into KSC's Orbiter Processing Facility on Feb. 23, after completing mission STS-99, to undergo processing for this flight. The orbiter rolled out of OPF bay 2 and into the Vehicle Assembly Building on Oct. 25. While in VAB high bay 1, Endeavour was mated to the external tank and solid rocket boosters. The entire Space Shuttle stack was transferred to Launch Pad 39B Oct. 31.

On mission STS-97, the five-member crew will be the first to visit the occupied International Space Station. During the flight, the crew of Endeavour will deliver the P6 Integrated Truss Segment and two of the eight solar arrays that will eventually provide 105 kilowatts of power to ISS. The mission objectives include a total of three space walks to be completed by Carlos Noriega and Joe Tanner.

The STS-97 crew includes: Commander Brent Jett, Pilot Mike Bloomfield, and Mission Specialists Joe Tanner, Marc Garneau and Carlos Noriega.

(end of general release)

### **COUNTDOWN MILESTONES**

\*all times are Eastern

**Launch- 2 Days (Tuesday, Nov. 28)**

- .. Prepare for the start of the STS-97 launch countdown
- .. Perform the call-to-stations (12:30 a.m.)
- .. Countdown begins at the T-43 hour mark (1 a.m.)
- .. Begin final vehicle and facility close-outs for launch
- .. Check out back-up flight systems
- .. Review flight software stored in mass memory units and display systems
- .. Load backup flight system software into Endeavour's general purpose computers
- .. Remove mid-deck and flight-deck platforms (9 a.m.)
- .. Activate and test navigational systems (2 p.m.)
- .. Complete preparation to load power reactant storage and distribution system (4 p.m.)
- .. Flight deck preliminary inspections complete (5 p.m.)

**Enter first built-in hold at T-27 hours for duration of 4 hours (5 p.m.)**

- .. Clear launch pad of all non-essential personnel
- .. Perform test of the vehicle's pyrotechnic initiator controllers (6 p.m.)

**Resume countdown (9 p.m.)**

- .. Begin operations to load cryogenic reactants into Endeavour's fuel cell storage tanks (9 p.m. – 5 a.m.)

### **Launch-1 Day (Wednesday, Nov. 29)**

**Enter 4-hour built-in hold at T-19 hours (5 a.m.)**

- .. Begin filling pad sound suppression system water tank (5 a.m.)
- .. Demate orbiter mid-body umbilical unit (5:30 a.m.)
- .. Resume orbiter and ground support equipment close-outs
- .. Pad sound suppression system water tank filling complete (8:30 a.m.)

**Resume countdown (9 a.m.)**

- .. Final preparations of the Shuttle's three main engines for main propellant tanking and flight (9 a.m.)
- .. Close out the tail service masts on the mobile launcher platform

**Enter planned hold at T-11 hours for 13 hours, 10 minutes (5 p.m.)**

- .. Begin star tracker functional checks (6 p.m.)
- .. Activate orbiter's inertial measurement units
- .. Activate the orbiter's communications systems
- .. Install film in numerous cameras on the launch pad (9 p.m.)
- .. Flight crew equipment late stow (10:50 p.m.)

### **Launch Day (Thursday, Nov. 30)**

- .. Move Rotating Service Structure (RSS) to the park position (2 a.m.)
- .. Perform ascent switch list
- .. Fuel cell flow-through purge complete

**Resume countdown at T-11 hours (6:10 a.m.)**

- .. Activate the orbiter's fuel cells (7:20 a.m.)
- .. Clear the blast danger area of all non-essential personnel
- .. Switch Endeavour's purge air to gaseous nitrogen (8:25 a.m.)

**Enter planned 2-hour built-in hold at the T-6 hour mark (11:10 a.m.)**

- .. Launch team verifies no violations of launch commit criteria prior to cryogenic loading of the external tank
- .. Clear pad of all personnel
- .. Chilldown of propellant transfer lines (12:40 p.m.)
- .. Begin loading the external tank with about 500,000 gallons of cryogenic propellants (about 1:10 p.m.)

**Resume countdown (1:10 p.m.)**

- .. Complete filling the external tank with its flight load of liquid hydrogen and liquid oxygen propellants (about 4:10 p.m.)
- .. Final Inspection Team proceed to launch pad

**Enter planned 2-hour built-in hold at T-3 hours (4:10 p.m.)**

- .. Perform inertial measurement unit preflight calibration
- .. Align Merritt Island Launch Area (MILA) tracking antennas
- .. Perform open loop test with Eastern Range

**Resume countdown at T-3 hours (6:10 p.m.)**

- .. Crew departs Operations and Checkout Building for the pad (at 6:20 p.m.)
- .. Complete close-out preparations in the white room
- .. Check cockpit switch configurations
- .. Flight crew begins entry into the orbiter (about 6:50 p.m.)
- .. Astronauts perform air-to-ground voice checks with Launch and Mission Control
- .. Close Endeavour's crew hatch (about 8:05 p.m.)
- .. Begin Eastern Range final network open loop command checks
- .. Perform hatch seal and cabin leak checks
- .. Complete white room close-out
- .. Close-out crew moves to fallback area
- .. Primary ascent guidance data is transferred to the backup flight system

**Enter planned 10-minute hold at T-20 minutes (8:50 p.m.)**

- .. NASA Test Director conducts final launch team briefings
- .. Complete inertial measurement unit preflight alignments

**Resume countdown at T-20 minutes (9 p.m.)**

- .. Transition the orbiter's onboard computers to launch configuration
- .. Start fuel cell thermal conditioning
- .. Close orbiter cabin vent valves
- .. Transition backup flight system to launch configuration

**Enter estimated 45-minute hold at T-9 minutes (9:11 p.m.)**

- .. Launch Director, Mission Management Team and NASA Test Director conduct final polls for go/no go to launch

**Resume countdown at T-9 minutes (about 9:56 p.m.)**

- .. Start automatic ground launch sequencer (T-9:00 minutes)
- .. Retract orbiter crew access arm (T-7:30)
- .. Start mission recorders (T-6:15)
- .. Start Auxiliary Power Units (T-5:00)
- .. Arm SRB and ET range safety safe and arm devices (T-5:00)
- .. Start liquid oxygen drainback (T-4:55)
- .. Start orbiter aerosurface profile test (T-3:55)
- .. Start main engine gimbal profile test (T-3:30)

- .. Pressurize liquid oxygen tank (T-2:55)
- .. Begin retraction of the gaseous oxygen vent arm (T-2:55)
- .. Fuel cells to internal reactants (T-2:35)
- .. Pressurize liquid hydrogen tank (T-1:57)
- .. Deactivate SRB joint heaters (T-1:00)
- .. Orbiter transfers from ground to internal power (T-0:50 seconds)
- .. Ground Launch Sequencer go for auto sequence start (T-0:31 seconds)
- .. SRB gimbal profile (T-0:21 seconds)
- .. Ignition of three Space Shuttle main engines (T-6.6 seconds)
- .. SRB ignition and liftoff (T-0)

-- end --



**November 22, 2000**

**Bruce Buckingham**  
**Kennedy Space Center, FL**  
**(Phone: 321/867-2468)**

**KSC Release No. 101-00**

**NOTICE TO EDITORS/ NEWS DIRECTORS:**  
**MISSION STS-97 EVENTS, NEWS CENTER OPERATING HOURS SET**

News conferences, events and operating hours for KSC's News Center have been set for the Nov. 30 launch of the Space Shuttle Endeavour on Mission STS-97, the 101st launch in the Shuttle program. Launch on Nov. 30 is set for about 10:06 p.m. EST at the opening of a window that extends for about 2 ½ - 5 minutes. The news conferences and events listed below will be carried live on NASA Television (unless otherwise noted) and originate from the KSC Press Site.

The five-member STS-97 crew is scheduled to arrive at KSC on Monday, Nov. 27 at about 4:30 p.m. EST. News media representatives planning to cover the event must be at the KSC News Center by 3:30 p.m. (in the event of a possible early crew arrival) for transportation to the Shuttle Landing Facility. On launch day, the crew will depart their KSC living quarters and be driven to the launch pad at about 6:20 p.m. Media interested in attending this event should be at the News Center no later than 5:20 p.m.

News media representatives with proper authorization may obtain STS-97 mission credentials at the Pass and Identification Building on State Road 3 (south of KSC) on Merritt Island during published times. (Credential and badging hours are listed below.)

In addition to daily 9 a.m. countdown status briefings, a prelaunch press conference will be held two days before launch. The full briefing schedule is listed below.

-- end of general release --

**STS-97 BRIEFINGS & EVENTS SCHEDULE** (all times are EST)  
(All briefings are held inside the KSC Press Site auditorium and will be carried live on NASA TV unless otherwise noted)

**L-3 Days - Monday, Nov. 27**

4:30 p.m. ----- STS-97 Flight Crew Arrival (Live on NASA TV)

**L-2 Days - Tuesday, Nov. 28**

Launch countdown begins at 1 a.m. Codaphone will be updated with status (321/867-2525).

9 a.m. ----- Countdown Status Briefing

- \* Jeff Spaulding, NASA Test Director
- \* David Flowers, P-6 Truss Mission Integration Engineer
- \* Ed Priselac, Shuttle Weather Officer

4 p.m. ----- Prelaunch News Conference

- \* Ron Dittmore, Shuttle Program Manager, NASA, JSC
- \* Bob Cabana, Manager, Space Station Program, NASA, JSC
- \* Canadian Space Agency representative TBD
- \* Dave King, Director of Shuttle Processing, NASA, KSC
- \* Captain Clif Stargardt, Staff Meteorologist, 45th Weather Squadron, USAF

### **L-1 Day - Wednesday, Nov. 29**

9 a.m. ----- Countdown Status Briefing

- \* Steve Altemus, NASA Test Director
- \* David Flowers, P-6 Truss Mission Integration Engineer
- \* Ed Priselac, Shuttle Weather Officer

### **L-0 Day - Thursday, Nov. 30**

(Tanking begins at about 1 p.m.)

5 p.m. ----- NASA Television live launch programming begins

#### **Launch Day Crew activities :**

- 9:00 a.m. -----Wake up
- 9:30 a.m. -----Breakfast
- 2:00 p.m. -----Lunch
- \*5:10 p.m. -----Snack (Crew Photo)
- 5:40 p.m. -----Weather briefing
- \*5:50 p.m. -----Suit up photo
- \*6:20 p.m. ----- Walkout/depart for pad
- \*6:50 p.m. ----- Arrive at pad
- \*8:05 p.m. -----Close hatch
- \*10:06 p.m. --- Launch of Endeavour
- (\* Carried live on NASA TV)

11:00 p.m. ----- Post-launch Press Conference

- \* Jim Halsell, Shuttle Program Launch Integration Manager, KSC
- \* Mike Leinbach, Shuttle Launch Director, KSC

**NOTE:** STS-97 MISSION STATUS BRIEFINGS WILL BE HELD DAILY THROUGHOUT THE MISSION. TIMES OF THESE BRIEFINGS ARE AVAILABLE IN THE NASA TV SCHEDULE AT: <http://www.spaceflight.nasa.gov/realdata/nasatv/schedule.html>

#### **KSC News Center office hours for STS-97**

(Times may be adjusted in real time depending on mission events and timelines.)

- Monday, Nov. 27 (Launch minus 3 days) - 8 a.m. - 6:30 p.m.
- Tuesday, Nov. 28 (Launch minus 2 days) - 8 a.m. - 6:30 p.m.
- Wednesday, Nov. 29 (Launch minus 1 day) - 8 a.m. - 4:30 p.m.
- Thursday, Nov. 30 (Launch day) - 6 a.m. - 2 a.m. (Friday)
- [FOR MISSION DAY SCHEDULES SEE NOTE BELOW]
- Monday, Dec. 11 (Landing day) -- TBD

**NOTE:** The KSC News Center will be open for overnight and weekend STS-97 Mission Status Briefings and the in-flight crew news conference. The office typically opens one hour prior to the event and closes one hour after the conclusion of the event when they occur after normal office hours or on weekends. Times of these briefings are available in the NASA TV schedule at: <http://www.spaceflight.nasa.gov/realdata/nasatv/schedule.html>

**Pass and Identification Hours**

L-3 Monday, Nov. 27 --- 12 noon - 3:30 p.m.

L-2 Tuesday, Nov. 28 --- 8 a.m. - 4:30 p.m.

L-1 Wednesday, Nov. 29 --- 8 a.m. - 4:30 p.m.

L-0 Thursday, Nov. 30 --- 8 a.m. - 9 p.m.

News media may obtain STS-97 mission credentials at the Pass and Identification Building at Gate 2 on State Road 3, Merritt Island, during the above published times.

News media with annual Shuttle credentials are reminded to sign the logbook at the query counter in the News Center.

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**NEWS MEDIA ARE ALLOWED AT THE PRESS SITE ONLY WHEN THE KSC NEWS CENTER IS OPEN.**

-- end --



**November 27, 2000**

**Bruce Buckingham**  
**Kennedy Space Center, FL**  
**(Phone: 321/867-2468)**

**KSC Release No. 101-00, Rev. A**

**NOTICE TO EDITORS/ NEWS DIRECTORS:**  
**MISSION STS-97 EVENTS, NEWS CENTER OPERATING HOURS SET**

News conferences, events and operating hours for KSC's News Center have been set for the Nov. 30 launch of the Space Shuttle Endeavour on Mission STS-97, the 101st launch in the Shuttle program. Launch on Nov. 30 is set for about 10:06 p.m. EST at the opening of a window that extends for about 2 ½ - 5 minutes. The news conferences and events listed below will be carried live on NASA Television (unless otherwise noted) and originate from the KSC Press Site.

The five-member STS-97 crew is scheduled to arrive at KSC on Monday, Nov. 27 at about 4:30 p.m. EST. News media representatives planning to cover the event must be at the KSC News Center by 3:30 p.m. (in the event of a possible early crew arrival) for transportation to the Shuttle Landing Facility. On launch day, the crew will depart their KSC living quarters and be driven to the launch pad at about 6:20 p.m. Media interested in attending this event should be at the News Center no later than 5:20 p.m.

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In addition to daily 9 a.m. countdown status briefings, a prelaunch press conference will be held two days before launch. The full briefing schedule is listed below.

-- end of general release --

**STS-97 BRIEFINGS & EVENTS SCHEDULE** (all times are EST)  
(All briefings are held inside the KSC Press Site auditorium and will be carried live on NASA TV unless otherwise noted)

**L-3 Days - Monday, Nov. 27**

4:30 p.m. ----- STS-97 Flight Crew Arrival (Live on NASA TV)

**L-2 Days - Tuesday, Nov. 28**

Launch countdown begins at 1 a.m. Codaphone will be updated with status (321/867-2525).

9 a.m. ----- Countdown Status Briefing

- \* Jeff Spaulding, NASA Test Director
- \* David Flowers, P-6 Truss Mission Integration Engineer
- \* Ed Priselac, Shuttle Weather Officer

4 p.m. ----- Prelaunch News Conference

- \* Ron Dittmore, Shuttle Program Manager, NASA, JSC
- \* Bob Cabana, Manager, Space Station Program, NASA, JSC
- \* Michael Vachon, Director General, Canadian Astronaut Office, CSA
- \* Dave King, Director of Shuttle Processing, NASA, KSC
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- \* Jim Halsell, Shuttle Program Launch Integration Manager, KSC
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- [FOR MISSION DAY SCHEDULES SEE NOTE BELOW]
- Monday, Dec. 11 (Landing day) -- TBD

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**NEWS MEDIA ARE ALLOWED AT THE PRESS SITE ONLY WHEN THE KSC NEWS CENTER IS OPEN.**

-- end --



**November 22, 2000**

**Ken Thornsley  
Kennedy Space Center, Fla.  
(Phone: 321/867-7819)**

**KSC Release No. 102-00**

**Note to Editors/News Directors:**

**MISSION STS-97 ORIENTATION TOUR AND PHOTO OPPORTUNITIES  
FOR NEWS MEDIA SCHEDULED**

Accredited news media representatives are invited to participate in an orientation tour and a variety of photo opportunities for the launch of the Space Shuttle Endeavour on Mission STS-97. The launch on Nov. 30 is planned for 10:06 p.m. EST at the opening of a window that extends for about 2 ½ - 5 minutes. The tour and photo opportunities will originate from the KSC Press Site.

-- end of general release --

**STS-97 MEDIA EVENTS SCHEDULE**  
(all times are EST)

**L-3 Days - Monday, Nov. 27**

3:30 p.m. - Depart Press Site for crew arrival at the Shuttle Landing Facility

**L-2 Days - Tuesday, Nov. 28**

3:00 p.m. - Depart Press Site for T-38 flight. (All) (Wire News Service Only)

**L-1 Day - Wednesday, Nov. 29**

10:30 a.m. - Photographers with remote cameras and equipment should report to the bus loading area in the parking lot

11:00 a.m. - Depart Press Site for remote camera set up

1:00 p.m. - Depart Press Site for orientation tour

**L-0 Day - Thursday, Nov. 30**

6:30 a.m. - Depart Press Site for sunrise photography of Endeavour on Pad 39B with the Rotating Service Structure retracted. This period of time will also be used for remote camera reset and wipe down. We will need to be clear of the area by 8:30 a.m.

5:20 p.m. - Depart Press Site for STS-97 crew walkout of O&C Building

8:35 p.m. - Depart Press Site for Banana Creek Viewing Site

8:35 p.m. - Depart Press Site for Fire Tower Road

9:05 p.m. - Depart Press Site for Astronaut Road

10:06 p.m. - Launch

**NEWS MEDIA ARE REQUIRED TO BE UNDER PUBLIC AFFAIRS ESCORT AT ALL TIMES WHILE AT KSC EXCEPT WHEN DRIVING TO THE NEWS CENTER OR THE COMPLEX 39 CAFETERIA.**

**NEWS MEDIA ARE ALLOWED AT THE PRESS SITE ONLY WHEN THE KSC NEWS**

**CENTER IS OPEN.**

-- end --



**November 29, 2000**

**George Diller  
Kennedy Space Center, FL  
(Phone: 321/867-2468)**

**KSC Release No. 15-00, Rev. A**

**SPACE SHUTTLE WEATHER LAUNCH COMMIT CRITERIA AND KSC END OF MISSION WEATHER LANDING CRITERIA**

The launch weather guidelines involving the Space Shuttle and expendable rockets are similar in many areas, but a distinction is made for the individual characteristics of each. The criteria are broadly conservative and assure avoidance of possibly adverse conditions. They are reviewed for each launch.

For the Space Shuttle, weather forecasts are provided by the U. S. Air Force Range Weather Operations Facility at Cape Canaveral beginning at Launch minus 3 days in coordination with the NOAA National Weather Service Space Flight Meteorology Group (SMG) at the Johnson Space Center in Houston. These include weather trends and their possible effects on launch day. A formal prelaunch weather briefing is held on Launch minus 1 day which is a specific weather briefing for all areas of Space Shuttle launch operations.

Launch weather forecasts, ground operations forecasts, and launch weather briefings for the Mission Management Team and the Space Shuttle Launch Director are prepared by the Range Weather Operations Facility. Forecasts which apply after launch are prepared by SMG. These include all emergency landing forecasts and the end of mission forecasts briefed by SMG to the astronauts, the Flight Director and Mission Management Team.

During the countdown, formal weather briefings occur approximately as follows:

L-24 hr 0 min: Briefing for Flight Director and astronauts  
L-21 hr 0 min: Briefing for removal of Rotating Service Structure  
L-9 hr 00 min: Briefing for external tank fuel loading  
L-4 hr 30 min: Briefing for Space Shuttle Launch Director  
L-3 hr 55 min: Briefing for astronauts  
L-2 hr 10 min: Briefing for Flight Director  
L-0 hr 35 min: Briefing for launch and RTLS  
L-0 hr 13 min: Poll all weather constraints

The basic weather launch commit criteria on the pad at liftoff must be:

**Temperature:** Prior to external tank propellant loading, tanking will not begin if the 24 hour average temperature has been below 41 degrees.

After tanking begins, the countdown shall not be continued nor the Shuttle launched if:

- a.) the temperature exceeds 99 degrees for more than 30 consecutive minutes.
- b.) the temperature is lower than the prescribed minimum value for longer than 30 minutes

unless sun angle, wind, temperature and relative humidity conditions permit recovery. The minimum temperature limit in degrees F. is specified by the table below and is a function of the five minute average of temperature, wind and humidity. The table becomes applicable when the observed temperature reaches 48 degrees. In no case may the Space Shuttle be launched if the temperature is 35 degrees or colder.

Wind Speed	Relative Humidity				
	0-64%	65-74%	75-79%	80-89%	90-100%
(kts)					
0 - 1	48	47	46	45	44
2	47	46	45	44	43
3	41	41	41	40	39
4	39	39	39	39	38
5 - 7	38	38	38	38	38
8 - 14	37	37	37	37	37
>14	36	36	36	36	36

The above table can be used to determine when conditions are again acceptable for launch if parameters have been out of limits for thirty minutes or less. If longer than thirty minutes, a mathematical recovery formula of the environmental conditions is used to determine if a return to acceptable parameters has been achieved. Launch conditions have been reached if the formula reaches a positive value.

**Wind:** Tanking will not begin if the wind is observed or forecast to exceed 42 knots for the next three hour period.

For launch the wind constraints at the launch pad will vary slightly for each mission. The peak wind speed allowable is 30 knots. However, when the wind direction is between 100 degrees and 260 degrees, the peak speed varies for each mission and may be as low as 24 knots.

The upper atmosphere wind profile must conform to either one of two wind loading programs developed by the Johnson Space Center. This profile is determined by a series of Jimsphere wind balloon releases from Cape Canaveral Air Station. A final recommendation is made by the JSC Launch Systems Evaluation Advisory Team (LSEAT) to the KSC launch director at Launch minus 30 minutes. The Space Shuttle will not be launched within 30 minutes of the time a determination has been made that the upper wind profile will adversely affect the performance of the launch vehicle.

A downrange weather advisory shall be issued by the Shuttle Weather Officer to the Mission Management Team for their consideration if the wind in the solid rocket booster recovery area is forecast to exceed 26 knots during retrieval operations. Seas in excess of Sea State 5 (8-13 feet) may also be a factor considered by the Mission Management Team.

**Precipitation:** None at the launch pad or within the flight path.

**Lightning (and electric fields with triggering potential):**

- Tanking will not begin if there is forecast to be greater than a 20% chance of lightning within five nautical miles of the launch pad during the first hour of tanking. The launch director with the concurrence of the safety director may make an exception after consultation with the Shuttle Weather Officer.
- Do not launch if lightning has been detected within 10 nautical miles of the pad or the planned flight path within 30 minutes prior to launch. Launch may occur if the source of lightning has moved more than 10 nautical miles away from the pad or the flight path and a field mill, used to measure electric fields, is located within 5 nautical

miles of the lightning flash.

- The one-minute average of the electric field mill network may not exceed -1 or +1 kilovolt per meter within five nautical miles of the launch pad or the lightning flash at any time within 15 minutes prior to launch. This field mill criteria becomes -1.5 or + 1.5 kilovolts per meter if there are no clouds within 10 nautical miles of the flight path except those which are transparent. Also excepted are clouds with tops below the 41 degrees F. temperature level that have not have been previously associated with a thunderstorm, or associated with convective clouds having tops above the 14 degrees F. temperature level during the last three hours.
- Do not launch when lightning is observed and the cloud which produced the lightning is within 10 nautical miles of the flight path. Launch may not occur until 30 minutes has elapsed since the lightning flash, or the cloud has moved more than 10 nautical miles away.

**Clouds:** (types known to contain hazardous electric fields)

- Do not launch if any part of the planned flight path is through a layer of clouds any part of which is within 5 nautical miles is 4,500 feet thick or greater and the temperature of any part of the layer is between 32 degrees F. and -4 degrees F. Launch may occur if the cloud layer is a cirrus-like cloud that has never been associated with convective clouds, is located entirely at temperatures of 5 degrees F. or colder, and shows no evidence of containing water droplets.
- Do not launch through cumulus type clouds with tops higher than the 41 degree F. temperature level. Launch may occur through clouds as cold as 23 degrees F. if the cloud is not producing precipitation, and all field mills within 5 nautical miles of the flight path and at least one field mill within 2 nautical miles of the cloud center read between -100 volts per meter and +500 volts per meter.
- Do not launch 1.) through or within 5 nautical miles of the nearest edge of cumulus type clouds with tops higher than the 14 degree F level; 2) through or within 10 nautical miles of the nearest edge of cumulus clouds with tops higher than the -4 degrees F. level.
- Do not launch if the flight path is through any non-transparent clouds that extend to altitudes at or above the 32 degrees F. level which are associated with disturbed weather producing moderate or greater precipitation, or melting precipitation, within five nautical miles of the flight path.
- Do not launch through an attached anvil cloud. If lightning occurs in the anvil or the associated main cloud, do not launch within 10 nautical miles for the first 30 minutes after lightning is observed, or within 5 nautical miles from 30 minutes to 3 hours after lightning is observed.
- Do not launch if the flight path will carry the vehicle:
  - a.) through non-transparent parts of a detached anvil for the first three hours after the anvil detaches from the parent cloud, or the first four hours after the last lightning occurs in the detached anvil.
  - b.) within 10 nautical miles of non-transparent parts of a detached anvil for the first thirty minutes after the time of the last lightning in the parent or anvil cloud before detachment, or the detached anvil after its detachment.
  - c.) within 5 nautical miles of non-transparent parts of a detached anvil for the first three hours after the time of the last lightning in the parent or anvil cloud before detachment, or the detached anvil after detachment, unless there is a field mill within 5 nautical miles of the detached anvil reading less than 1,000 volts per meter for the last 15 minutes and a maximum radar returns from any part of the detached anvil within 5 nautical miles of the flight path have been less than 10 dBZ (light rain) for 15 minutes.

- Do not launch if the flight path will carry the vehicle through a thunderstorm or cumulonimbus debris cloud which is not transparent and less than three hours old. Launch may not occur within five nautical miles of these debris clouds unless: 1) for 15 minutes preceding launch there is at least one working field mill within five nautical miles of the debris cloud; 2) all electric field mill readings are between -1 kilovolt and + 1 kilovolt per meter within five nautical miles of the flight path; 3) no precipitation has been detected in the debris cloud (less than 10 dbz by radar) within 5 nautical miles of the flight path.
- Do not launch if the flight path will carry the vehicle through any cumulus cloud that has developed from a smoke plume while the cloud is attached to the plume, or for the first 60 minutes after the cumulus cloud detaches from the smoke plume.

**Supporting Table:** KSC Seasonal Altitudes of Temperature Levels in thousands of feet

January				July			
Temp	Low	Avg	High	Temp	Low	Avg	High
-4 F	21 Kft	24 Kft	26 Kft	-4 F	23 Kft	27 Kft	29 Kft
14	13	18	21	14	18	21	23
23	9	15	18	23	16	18	20
32	sfc	12	16	32	13	15	18
41	sfc	9	14	41	10	12	15

**Range Safety Cloud Ceiling and Visibility constraints:**

- Direct visual observation of the Shuttle is required through 8,000 feet. This requirement may be satisfied using optical tracking sites or a forward observer
- For cloud ceilings of any thickness between 6,000 feet and 8,000 feet the following conditions must be met for launch to occur:
  - a.) the vehicle integrity can be observed without interruption through 6,000 feet.
  - b.) all required Range Safety instrumentation is functioning properly
  - c.) the U.S. Air Force 45th Space Wing Commander approves the decision to proceed
- For cloud ceilings between 4,000 feet and 6,000 feet the following conditions must be met for launch to proceed:
  - a.) the thickness of the clouds must be less than 500 feet
  - b.) the vehicle integrity can be monitored by the Eastern Range airborne and/or the ground forward observers through 8,000 feet
  - c.) all required Range Safety instrumentation is functioning properly
  - d.) the U.S. Air Force 45th Space Wing Commander approves the decision to proceed

A "Good Sense Rule" is in effect for launch which states: "Even when constraints are not violated, if any other hazardous conditions exist, the launch weather officer will report the threat to the launch director. The launch director may hold at any time based on the instability of the weather."

**CONTINGENCY FLIGHT RULES**

Weather criteria for an emergency landing must be considered along with launch criteria since the possibility exists for a Return To Launch Site abort (RTLS), landings at the Trans-Oceanic Abort Landing Sites (TAL), the Abort Once Around (AOA) sites and the first day Primary Landing Site (PLS). These forecasts are prepared by the NOAA National Weather Service Spaceflight Meteorology Group in Houston and briefed by them to the astronauts, Flight Director and Mission Management Team. All criteria refer to observed and forecast weather conditions except for the first day PLS which is forecast weather only.

- For RTLS with redundant Microwave Landing System (MLS) capability and a weather reconnaissance aircraft, cloud coverage 4/8 or less below 5,000 feet and a visibility of 4 statute miles or greater are required. For AOA and PLS sites, cloud coverage 4/8 or less below 8,000 feet and a visibility of 5 statute miles or greater is required. For TAL sites, cloud coverage 4/8 or less below 5,000 feet and a visibility of 5 statute miles or greater are required.
- For landing on a hard surface runway without redundant Microwave Landing System (MLS) capability all sites require a ceiling not less than 10,000 feet and a visibility of at least 7 statute miles. Landing at night on a lake bed runway may occur if the ceiling is not lower than 15,000 feet and the visibility is 7 miles or greater with at least non-redundant MLS capability .
- For the RTLS site and TAL sites, no thunderstorms, lightning, or precipitation within 20 nautical miles of the runway, or within 10 nautical miles of the final approach path extending outward to 30 nautical miles from the end of the runway.
- An RTLS rule exception may be made for light precipitation within 20 nautical miles of the runway if the specific criteria listed below are met:
  - a.) The tops of the clouds containing precipitation do not extend into temperature regions colder than 41 (F.); they have not been colder than 14 (F. ) within 2.5 hours prior to launch; the radar reflectivity is less than 30 dbz at all levels within and below the clouds.
  - b.) Precipitation covers less than 10% of the area within 20 nautical miles of the runway, or multiple heading alignment circles are clear of showers.
  - c.) The movement of the showers is observed to be consistent and no additional convective development is forecast.
  - d.) Touchdown/rollout criteria and associated navigational aids meet the specified prelaunch go/no go requirements.

If showers exceed either parameter of part a.) above, an RTLS landing may still occur if a 2 nautical mile vertical clearance can be maintained from the top of any shower within 10 nautical miles of the approach paths.

- For RTLS and TAL sites, no detached opaque thunderstorm anvils less than three hours old within 15 nautical miles of the runway, or within 5 nautical miles of the final approach path extending outward to 30 nautical miles from the end of the runway.
- For AOA and PLS sites, no thunderstorms, lightning or precipitation within 30 nautical miles of the runway, or within 20 nautical miles of the final approach path extending to 30 nautical miles from the end of the runway.
- For RTLS and the TAL sites, no detached opaque thunderstorm anvil cloud less than 3 hours old within 15 nautical miles of the runway or within 5 nautical miles of the final approach path extending outward to 30 nautical miles from the end of the runway.
- For AOA and PLS sites, no detached opaque thunderstorm anvil cloud less than 3 hours old within 20 nautical miles of the runway or within 10 nautical miles of the final approach path extending to 30 nautical miles from the end of the runway.

- The RTLS and TAL crosswind component may not exceed 15 knots. If the astronaut flying weather reconnaissance in the Shuttle Training Aircraft executes the approach and considers the landing conditions to be acceptable, this limit may be increased to 17 knots. For the AOA and PLS sites, there is a night-time crosswind limit of 12 knots.
- **Headwind:** not to exceed 25 knots.
- **Tailwind:** not to exceed 10 knots average, 15 knots peak.
- **Turbulence:** conditions must be less than or equal to moderate intensity.

### **KSC END OF MISSION LANDING WEATHER FLIGHT RULES**

The end of mission landing weather forecast is prepared by the NOAA National Weather Service Spaceflight Meteorology Group in Houston for the astronauts, Flight Director and Mission Management Team. All criteria refer to observed and forecast weather conditions. Decision time for the deorbit burn is 70 - 90 minutes before landing. The weather criteria are:

- Cloud coverage of 4/8 or less below 8,000 feet and a visibility of 5 miles or greater required.
- The peak cross wind cannot exceed 15 knots, 12 knots at night. If the mission duration is greater than 20 days the limit is 12 knots, day and night.
- Headwind cannot exceed 25 knots.
- Tailwind cannot exceed 10 knots average, 15 knots peak.
- No thunderstorm, lightning, or precipitation activity is within 30 nautical miles of the Shuttle Landing Facility.
- Detached opaque thunderstorm anvils less than three hours old must not be within 20 nautical miles of the Shuttle Landing Facility, or within 10 nautical miles of the flight path when the orbiter is within 30 nautical miles of the runway.
- Turbulence must be less than or equal to moderate intensity.
- Consideration may be given for landing with a "no go" observation and a "go" forecast if at decision time analysis clearly indicates a continuing trend of improving weather conditions, and the forecast states that all weather criteria will be met at landing time.

### **WEATHER INSTRUMENTATION**

The weather equipment used by the forecasters to develop the launch and landing forecasts is:

- **Radar:** Launch forecasters located at Cape Canaveral Air Station and landing forecasters located in Houston can access displays from two different radar. One is located at Patrick Air Force Base south of Cocoa Beach. The other is located in Melbourne at the National Weather Service and is a NEXRAD Doppler radar. Each radar provides rain intensity and cloud top information out to a distance as far as 200 nautical miles. The NEXRAD radar can also provide estimates of total rainfall and radial wind velocities.
- **Field Mill Network:** Thirty-one advanced field mill sites around KSC and Cape Canaveral Air Station provide data on lightning activity and surface electric fields induced by charge aloft. This data helps forecasters determine when electric charge aloft may be sufficient to create triggered lightning during launch, and to determine when to issue and cancel lightning advisories and warnings.
- **Lightning Detection System:** Detects and plots cloud to ground lightning strikes

within 125 nautical miles of the Kennedy Space Center. Location accuracy is optimum within 30 nautical miles. Locations of strikes are color coded according to time of occurrence.

- **Lightning Detection And Ranging (LDAR):** Developed by NASA at the Kennedy Space Center, LDAR plots intracloud, cloud to cloud and cloud to ground lightning in three dimensions within 100 nautical miles of the Kennedy Space Center. Location accuracy is very high within 25 nautical miles. LDAR data is important in determining the beginning and end of lightning conditions.
- **National Lightning Detection Network:** Plots cloud to ground lightning nationwide. Used to help ensure safe transit of the Space Shuttle orbiter atop the Shuttle Carrier Aircraft between Edwards Air Force Base in California and the Kennedy Space Center in Florida. It is also used to assess lightning beyond the 125 mile range of the Lightning Detection System.
- **Rawinsonde:** A balloon with a tethered instrument package which radios its altitude to the ground together with temperature, dewpoint and humidity, wind speed and direction, and pressure data. Rawinsondes reach altitudes exceeding 100,000 feet.
- **Jimsphere balloon:** A reflective balloon made of mylar tracked by radar which provides highly accurate information on wind speed and wind direction up to 60,000 feet.
- **Doppler Radar Wind Profiler:** Measures upper level wind speed and direction over Kennedy Space Center from approximately 10,000 feet to 60,000 feet. The data, received every 5 minutes, is used to ensure the upper winds used to calculate wind loads on the shuttle vehicle have not significantly changed between balloon soundings. If data from the Doppler Radar Wind Profiler indicates a possible significant change, another Jimsphere balloon is released.
- **Rocketsonde:** A 12-foot-tall instrumented rocket is launched on L-1 day which senses and transmits data on temperature, wind speed and direction, wind shear, pressure, and air density at altitudes between 65,000 feet and 370,000 feet. A four-inch in diameter solid rocket motor separates at an altitude of about 5,000 feet, after which an "instrumented dart" coasts to apogee.
- **Satellite Images and Data:** Provided directly to the satellite terminal at USAF Range Weather Operations and NOAA National Weather Service Space Flight Meteorology Group in Houston by the geostationary GOES weather satellites. In addition high resolution images are received from spacecraft in low earth orbit including both the NOAA and the Defense Meteorological Support Program (DMSP) polar orbiting satellites.
- **Meteorological Interactive Data Display System (MIDDS):** Integrates diverse weather data on a single display terminal-- satellite images, radar, computer generated graphics of surface and upper air map features, numerical weather models, current weather observations, data from meteorological towers, lightning strikes and field mill information.
- **Towers:** 33 meteorological towers are located on Kennedy Space Center and Cape Canaveral Air Station, including two at each launch pad and three at the Shuttle Landing Facility. In addition to wind, most towers are also instrumented with temperature, and moisture sensors. The 60-foot towers at the launch pads and the 33-foot towers at the Shuttle Landing Facility are closely monitored for launch and landing criteria. In addition, on the mainland, there is a network of 19 wind towers which extend outward an additional twenty miles. Tower data is an important short-term forecasting tool and also helps determine the direction and distance of toxic corridors in the event of a mishap.
- **Buoys:** Meteorological buoys are anchored 20, 110 and 160 nautical miles east-northeast of Cape Canaveral. These buoys relay hourly measurements via satellite

of temperature, wind speed and direction, barometric pressure, precipitation, sea water temperature, and wave height and period. Buoy data is used for launch, landing, booster retrieval, and daily ground processing forecasts for the Kennedy Space Center and Cape Canaveral Air Station.

- **Solid Rocket Booster Retrieval Ships:** These vessels radio observed weather conditions and sea state from the booster impact area located up to 150 nautical miles downrange.
- **Weather Reconnaissance Aircraft:** A T-38 jet and the Shuttle Training Aircraft are flown by a weather support astronaut.

-- end --



**December 6, 2000**

George H. Diller  
NASA Kennedy Space Center  
321/867-2468

Captain Colleen Lehne  
United States Air Force  
310/363-6827

KSC Release No.: 104-00

## **KODIAK STAR PLANNED FOR LAUNCH FROM ALASKA IN 2001**

Kodiak Star, the first planned orbital launch from the new Kodiak Launch Complex in Alaska will be a NASA collaborative mission with the Department of Defense (DoD). The payload consists of four small satellites to be launched aboard a Lockheed Martin Athena I launch vehicle. The Athena I being used for this launch was reassigned from NASA's Vegetation Canopy Lidar (VCL) mission that is under review pending resolution of technical challenges associated with developing the science instruments.

NASA's spacecraft in the Kodiak Star mission is Starshine 3, a satellite program developed by the Rocky Mountain NASA Space Grant Consortium and built by the Naval Research Laboratory. The Starshine 3 satellite, about one meter in diameter and weighing about 200 pounds, is covered with front-surface aluminum mirrors. They are being machined by students in Utah and polished by participating grade schools and high schools from all over the world. Once the satellite is in orbit the students will visually track the satellite and report their findings on the project's web site. The high inclination that can be achieved by launching from Kodiak Island, AK, will allow students in Alaska, northern Canada, the British Isles, Scandinavia and Russia who cannot see the Starshine satellites deployed in lower latitude orbits to participate in the project.

PICOsat, the primary Department of Defense Satellite, is a technology demonstration satellite carrying four experiments in the areas of vibration isolation technology, ionospheric observations and polymer battery characteristics. PICOsat was built at Surrey Satellite Technology Limited (SSTL) in the United Kingdom.

The second DoD spacecraft is a Prototype Communications Satellite (PCSat), operating in the amateur radio band, designed and manufactured by Midshipmen of the United States Naval Academy. It will become part of the amateur radio community's Automatic Position Reporting System (APRS) in low earth orbit receiving digitized identity and position data from amateur radio operators and transmitting it to one or more ground stations.

The third DoD spacecraft is SAPPHIRE, a micro-satellite designed and built by students at Stanford University and Washington University-St. Louis. The primary mission of Sapphire is to space-qualify two sets of "Tunneling Horizon Detector" infrared sensors designed and built by the Jet Propulsion Laboratory and Stanford University. Secondary experiments include a digital camera and voice synthesizer.

The Kodiak Star is targeted for launch Aug. 31, 2001.

-- end --



**December 7, 2000**

Bruce Buckingham  
NASA Kennedy Space Center  
321/867-2468

KSC Release No.: 105-00

## **KEY EMPLOYEES ATTAIN NEW POSITIONS AT KENNEDY SPACE CENTER**

NASA employees Michael Leinbach and Charles Abner were recently named to management positions within the Space Shuttle Program at Kennedy Space Center, Fla.

Leinbach was officially named NASA's Space Shuttle Launch Director at KSC. He rejoins the Space Shuttle Program after completing two years in support of the International Space Station. As Launch Director, Leinbach is responsible for overall Shuttle launch countdown policy, planning and executive activities. He will conduct and oversee the final readiness poll of the KSC launch team from the firing rooms prior to liftoff.

"I'm looking forward to my new role in the Space Station construction process," said Leinbach. "Being involved with the preparation of Station hardware and then helping it get off the ground and into orbit is a real privilege."

Though new to the position, Leinbach is no stranger to firing room activities on launch day. He served as NASA Test Director beginning in 1988 and was named Shuttle Test Director in 1991. In that role, he was responsible for conducting the terminal countdown and launch of 17 Shuttle missions. He served as Assistant Launch Director for mission STS-101 in May 2000 before being appointed to the Launch Director position for recent missions including STS-106, STS-92 and STS-97.

Charles Abner is NASA's new Chief Engineer for the Shuttle Processing Directorate at KSC. In this position he will be responsible for all engineering aspects related to processing flight hardware elements and facility/ground support equipment and for the integration of technical decisions made by both engineering and management personnel before and during launch.

Abner's long and rewarding career with NASA at KSC began in 1967 when he served as an Apollo spacecraft ground station engineer. He joined the Air Force in 1968, but returned to KSC in 1974 as part of the launch processing team to build the Space Shuttle test and checkout hardware and software.

"The space program has long been an integral part of my life," said Abner. "Helping develop processes needed to ensure the success of the Shuttle program is both exciting and challenging."

During the early Space Shuttle flights, Abner supervised teams responsible for the development of ground launch sequence software and the ground application software. He served as Chief of Shuttle Project Engineering Division at Vandenberg AFB, Calif., between 1985 and 1987, while building a joint NASA and Air Force Shuttle launch team. In 1997 he

was assigned to the position of Assistant Launch Director, responsible for assisting with the management and technical direction of the Shuttle program.

-- end --



**December 8, 2000**

Bruce Buckingham  
NASA Kennedy Space Center  
321/867-2468

KSC Release No.: 106-00

**Note to Editors:  
ENDEAVOUR SCHEDULED TO LAND AT KSC COMPLETING MISSION  
STS-97**

Landing at KSC's Shuttle Landing Facility (SLF) is slated to occur on orbit 171 at mission elapsed time 10 days, 19 hours, 58 minutes. Deorbit burn will occur at about 5 p.m. EST.

The two KSC landing opportunities Monday are: 6:04 p.m. and 7:40 p.m. EST.

If managers must keep Endeavour in orbit an additional day, two additional landing opportunities are available Tuesday at KSC at 4:53 p.m. and 6:28 p.m. EST.

Two landing opportunities also exist at the back-up landing location at Edwards Air Force Base (EAFB), Calif., on Monday and Tuesday.

Monday's landing opportunities will be nighttime events. If landing occurs on schedule, it will be the 16th nighttime Shuttle landing in the history of the program. It will also mark the 53rd landing at KSC.

**SLF and KSC Ground Operations**

The Shuttle Landing Facility was built in 1975. It is 300 feet wide and 15,000 feet long with 1,000-foot overruns at each end. The strip runs northwest to southeast and is located about 3 miles northwest of the 525-foot tall Vehicle Assembly Building.

Once the orbiter is on the ground, safing operations will commence and the flight crew will prepare the vehicle for post-landing operations. The Crew Transport Vehicle (CTV) will be used to assist the crew, allowing them to leave the vehicle and remove their launch and re-entry suits easier and quicker.

The CTV and other KSC landing convoy operations have been "on-call" since the launch of Endeavour. The primary functions of the Space Shuttle recovery convoy are to provide immediate service to the orbiter after landing, assist crew egress, and prepare the orbiter for towing to the Orbiter Processing Facility.

Convoy vehicles are stationed at the SLF's mid-point. About two hours prior to landing, convoy personnel will don SCAPE suits, or Self-Contained Atmospheric Protective Ensemble, and communications checks are made. A warming-up of coolant and purge equipment is conducted and nearly two-dozen convoy vehicles are positioned to move onto the runway as quickly and as safely as possible once the orbiter coasts to a stop. When the vehicle is deemed safe of all potential explosive hazards and toxic gases, the purge and coolant umbilical access vehicles move into position at the rear of the orbiter.

Following purge and coolant operations, flight crew egress preparations will begin and the CTV will be moved into position at the crew access hatch located on the orbiter's port side. A physician will board the Shuttle and conduct a brief preliminary examination of the astronauts. The crew will then make preparations to leave the vehicle.

Following departure from the SLF, the crew will be taken to their quarters in the O&C Building, meet with their families and undergo physical examinations. The crew is scheduled to remain at KSC overnight and depart for Johnson Space Center on Tuesday.

If Endeavour lands at Edwards, an augmented KSC convoy team will be on-site to safe the vehicle, disembark the crew and move the orbiter to the Mate/Demate Device. The turnaround team will be deployed to Edwards by charter aircraft on landing day.

About 3½ hours after Endeavour lands at KSC, the orbiter will be towed to the Orbiter Processing Facility for post-flight deservicing.

-- end --

**NOTICE TO EDITORS:** The KSC press site will be open this weekend at the following times for planned mission status briefings from JSC: Saturday from 4 to 6 p.m. and Sunday from 6:30 to 8:30 p.m. For landing, the press site will be open on Monday at 8 a.m. and remain open through 9 p.m. Accredited news media wishing to view Endeavour's landing should be at the KSC press site prior to 5 p.m. Monday for transport to the SLF.

Additional specific information regarding landing photo opportunities, post-landing press conferences and KSC News Center operational hours is available at the KSC News Center.

# NASA Facts

National Aeronautics and  
Space Administration

**John F. Kennedy Space Center**  
Kennedy Space Center, Florida 32899  
AC 321 867-2468



December 2000  
KSC Release No. 107-00

## STS-98/Atlantis

### The International Space Station Goes to Work

In the same way that the 19th century saw humans control pressure and temperature to harness steam power, the 21st century will see us control gravity to make new discoveries.

STS-98, the 23rd flight of Space Shuttle Atlantis, launches the second of the U.S. pressurized modules, the Destiny Laboratory. The U.S. Lab will be attached to the Unity node using the Shuttle's robotic arm. Atlantis and her crew of five will spend six days docked to the Space Station while the attachment is undertaken. Three extravehicular activities (EVA) will be conducted to complete its assembly. The addition of the Destiny module will expand the Station's power, life support and attitude control capabilities.

At 28 feet in length, 14 feet in diameter and weighing more than 32,000 pounds, the U.S. Lab is about the size of a large business jet's fuselage. It will be equipped with five of its 11 system's racks when it is carried into orbit during the STS-98 mission. Six additional racks will follow on a subsequent Shuttle mission and will be delivered in one of three Multi-Purpose Logistics Modules supplied to NASA by the Italian Space Agency.

Thirteen of Destiny's racks are specifically designed to initially support experiments in microgravity and life sciences. Eleven will house the systems and resources required for supporting the Lab including power, cooling water, temperature and humidity control, communications and tracking equipment, and air revitalization for removal of carbon dioxide and replenishment of oxygen. One of the racks will be used specifically for health maintenance of the crew and the control racks will be used for Canada's mobile servicing system.

The U.S. Lab's first major science facilities will



include the Human Research Facility - where scientists will assess crew health and how the human body responds and adapts to microgravity; the Fluids and Combustion Facility - where experiments will be conducted to study the uses of microgravity for improvements in production of semiconductor crystals, glass fiber and energy; the Biotechnology Facility - where research will be conducted for improved engineering and technology on protein crystal growth in microgravity for the development of more effective medications; the Materials Science Facility - where scientists will study the atomic and molecular structures of materials in microgravity; and the Optical Window Rack Facility - where crews will utilize the highest quality optical glass ever used for testing in space through the use of camera, sensors and other devices employed in the identification of pollution sources and monitoring of environmental conditions.

## The Crew

Commander Kenneth D. Cockrell is a veteran of three previous spaceflights and has logged more than 906 hours in space. Cockrell was born in Austin, Texas. He graduated from Rockdale High School in Rockdale, Texas and earned a bachelor of science degree in mechanical engineering from the University of Texas and a master of science degree in aeronautical systems from the University of West Florida.

Cockrell received his commission through the Naval Aviation Reserve Officer Candidate Program at Naval Air Station Pensacola, Fla., in 1972 and was designated a Naval Aviator in 1974. He resigned his commission in 1987 and accepted a position at the Aircraft Operations Division of the Johnson Space Center. NASA selected Cockrell in 1990 and he became an astronaut in 1991. He has served as assistant to the chief of the Astronaut Office for Shuttle Operations and Hardware as well as the chief of the Astronaut Office Operations Development Branch.

Mark L. Polansky will serve as pilot aboard the STS-98 flight. Born in Paterson, N.J., he considers Edison, N.J., as his hometown. Polansky graduated from John P. Stevens High School in Edison, N.J., in 1974. He received a bachelor of science degree in aeronautical and astronautical engineering and a master of science degree in aeronautics and astronautics from Purdue University, both in 1978.

Polansky was commissioned by the U.S. Air Force upon graduation from Purdue and earned his pilot wings in 1980 at Vance Air Force Base in Oklahoma. During his tenure with the Air Force, he logged more than 5,000 flight hours in 30 different aircraft. He joined NASA in 1992 as an aerospace engineer and research pilot with the Aircraft Operations Division at the Johnson Space Center where he was responsible for teaching the astronaut pilots Space Shuttle landing techniques in the Shuttle Trainer Aircraft as well as conducting flight testing of the NASA T-38 avionics upgrade aircraft. He was selected as an astronaut in 1996.

Mission Specialist Robert L. Curbeam Jr. (Com., USN) was born in Baltimore, Md. Curbeam graduated from Woodlawn High School in Baltimore, Md. He earned a bachelor of science degree in aerospace engineering from the United States Naval Academy in 1984 and a master of science degree in aeronautical engineering from the Naval Postgraduate School in 1990.

Upon graduation from the U.S. Naval Academy, Curbeam commenced Naval Flight Officer Training. In 1994, he became an instructor in the Weapons and Systems Engineering Department of the U.S. Naval Academy. He was selected by NASA in December of 1994 and has flown on one previous mission, STS-85. He most recently served as a spacecraft communicator (CAPCOM) responsible for relaying all voice communication between Mission Control and crews aboard the Space Shuttle.

Mission Specialist Thomas D. Jones, Ph.D., (Capt., USAF) was born in Baltimore, Md. This military history buff graduated from Kenwood Senior High School in Essex, Md., in 1973. He received a bachelor of science degree in basic sciences from the United States Air Force (USAF) Academy in 1977 and a doctorate in planetary science from the University of Arizona in Tucson in 1988.

Jones served on active duty as an Air Force officer for six years. As pilot and aircraft commander of a B-52 D Stratofortress, he led a combat crew of six, accumulating more than 2,000 hours of jet experience before resigning as a captain. He has served as mission specialist on three previous spaceflights - STS-59, STS-68 and STS-80. Jones has logged more than 40 days (963 hours) in space. He was selected as an astronaut in 1991.

Marsha S. Ivins will serve as a mission specialist aboard Space Shuttle Atlantis for STS-98. She is a veteran of four previous spaceflights - STS-32, STS-46, STS-62 and STS-81. She has logged more than 1,000 hours in space. Born in Baltimore, Md., Ivins graduated from Nether Providence High School in Wallingford, Pa. She earned a bachelor of science degree in aerospace engineering from the University of Colorado in 1973.

Since 1974, Ivins has been employed at the Lyndon B. Johnson Space Center as an engineer with the Crew Station Design Branch working on Orbiter Displays and Controls and Man Machine Engineering. She holds a multi-engine Airline Transport Pilot License and has logged more than 5,700 hours in civilian and NASA aircraft. She was selected in the NASA astronaut class of 1984 as a mission specialist. Ivins has also served as the lead of the Astronaut Support Personnel Team at the Kennedy Space Center, supporting Space Shuttle launches and landings.

### **Related NASA Web sites**

#### **Mission and crew press kit:**

[www.shuttlepresskit.com/](http://www.shuttlepresskit.com/)

#### **Mission and crew - Johnson Space Center:**

[www.spaceflight.nasa.gov/](http://www.spaceflight.nasa.gov/)

#### **Shuttle countdown - Kennedy Space Center:**

[www.ksc.nasa.gov/shuttle/countdown/](http://www.ksc.nasa.gov/shuttle/countdown/)

#### **Multimedia prelaunch guest presentation:**

[www-pao.ksc.nasa.gov/kscpao/briefing/](http://www-pao.ksc.nasa.gov/kscpao/briefing/)



**December 14, 2000**

Bruce Buckingham  
NASA Kennedy Space Center  
321/867-2468

KSC Release No.: 108-00

## **KENNEDY SPACE CENTER LOOKS BACK ON ACCOMPLISHMENTS IN 2000**

During the past year, Kennedy Space Center began an ambitious schedule of Space Shuttle launches as construction of the International Space Station shifted into high gear. Five Shuttle missions were launched in 2000 and eight missions are planned for 2001.

The Center also enhanced its capabilities for management of NASA's Expendable Launch Vehicle Program. Six expendable launch vehicle (ELV) missions were managed during 2000 and 13 ELV missions, including the 2001 Mars Odyssey orbiter, are currently scheduled for 2001.

In addition to providing those safe, successful launches, the Center moved forward in its quest to enhance its mission as a Spaceport Technology Center. A number of partnerships with other government agencies, commercial enterprises and academia were strengthened or formed.

"The team has come a long way this year, and we should really be proud," said Center Director Roy Bridges. "We've had a great year in terms of the success of our operational missions as well as our technology development projects. We reorganized the Center's management structure to better focus our resources, and we strengthened our strategic partnerships to better leverage those resources. We've laid the groundwork for more great things in the coming years."

KSC was positioned for a productive future through a reorganization effort called KSC 2000. The reorganization is enabling the Center to participate in NASA's cutting edge engineering initiatives in its role as a Spaceport Technology Center. Hundreds of workers were moved to new locations on Center as part of the reorganization.

The Center and the Air Force's 45th Space Wing joined forces on several new enhancements to the Cape Canaveral Spaceport during 2000. They jointly celebrated the 50th Anniversary of the launch of Bumper 8, the first rocket launched from the Cape. They also worked together to lay the groundwork for developing a comprehensive master plan for the Spaceport.

### **Space Shuttle**

The first Shuttle mission of the year, the Shuttle Radar Topography mission, STS-99, gathered billions of measurements of the Earth's surface for government and public use.

Three missions that followed - STS-101, STS-106 and STS-92 - enabled astronauts to continue to build, outfit and prepare the International Space Station for its first set of long-term occupants, the Expedition One crew. The Expedition One trio took residence in

November after being launched from Baikonur Cosmodrome, Kazakhstan.

KSC's most recent launch, STS-97 in late November, allowed astronauts to deliver and attach the P6 truss segment to the International Space Station. Two 108.6-foot-long solar array wings were also delivered and activated, providing the Station with power for both habitation and Station science experiments.

Orbiters launched by the KSC Team during 2000 carried 32 crew members into space, logged more than 23.4 million miles and carried many major payloads into orbit. Four of the five missions landed at KSC. Poor weather conditions at KSC forced the landing of Discovery at Edwards Air Force Base in California completing STS-92.

### **Expendable Launch Vehicles**

As lead center for NASA's acquisition and management of expendable vehicle launch services, KSC enjoyed a third successful year and moved headquarters into a refurbished E&O Building at the Cape Canaveral Air Force Station (CCAFS).

For the first time, NASA KSC remotely managed a rocket launch. The High-Energy Transient Explorer 2 (HETE-2) launched from the Kwajalein Missile Range in the South Pacific in October. Because the Kwajalein site does not have a monitoring setup necessary for the level of management required by NASA, a system for remotely monitoring the launch was created at the Spaceport from Hangar AE.

KSC's Expendable Launch Vehicle team supported two missions launched from CCAFS. Satellites launched were the GOES-L weather satellite in May and the latest Tracking and Data Relay Satellite (TDRS-H) in June.

From Vandenberg Air Force Base in California, the KSC expendable launch team supported the successful launch of the Imager for Magnetopause-to-Aurora Global Exploration (IMAGE) in March; the National Oceanic and Atmospheric Administration's NOAA-L spacecraft in September; and the Earth Observing (EO-1) satellite and SAC-C in November.

### **International Space Station**

Several series of Multi-Element Integration Tests on Space Station components were held during the year to help avoid problems that would be costly to address in space.

Vacuum chamber tests using a reactivated Apollo-era high altitude chamber were also held to ensure that Station elements, including the U.S. Laboratory Destiny, were airtight.

Several Station components were officially transferred to NASA from The Boeing Co., including the Zenith 1 and P6 Integrated Truss Structures. In addition, a number of other Station components arrived at KSC for processing. Among major components delivered to KSC were the P1, P4 and S3 Integrated Truss Structures and the Joint Airlock Module.

### **Spaceport Technology and Technology Transfer**

KSC leadership continued to foster KSC's development as a Spaceport Technology Center. Specific technology areas targeted for emphasis were Fluid System Technologies; Spaceport Structures and Materials; Process Engineering; Command, Control, Monitoring and Range Technology; and Plant and Microbiological Sciences.

KSC led the Agency in the number of technology licenses generated. Notable among new KSC-developed technologies:

The Personal Cabin Pressure Altitude Monitor was offered for licensing. The monitor, which is about the size of a hand-held pager, is designed to warn individuals of potentially dangerous or deteriorating aircraft cabin pressure altitude conditions through audio,

vibratory and visual alarms. In addition, a lighted digital screen displays a text message of the warning and the specific condition causing the alarm.

The Medevac Oxygen System was shared with the Air Force through a technology transfer agreement with the KSC Technology Programs and Commercialization Office. The system was originally designed to provide therapeutic oxygen to astronauts being evacuated by aircraft following a Shuttle landing at a Transatlantic Abort Landing site. The U.S. Air Force Air Mobility Command will now use it on C-130 and C-141 aircraft.

A new nitrogen oxide scrubber for converting toxic vapors from the Shuttle's hypergolic oxidizer into fertilizer was installed at Launch Pad 39A and the technology licensed to Phoenix Systems International, Inc. of McDonald, Ohio. KSC plans to install the system at all scrubbers, and Cape Canaveral Air Force Station plans to install the system at the Titan Launch Complex 40. Phoenix Systems anticipates applying the technology to at least 40 percent of the country's coal-, oil-, and gas-fired boilers.

### **Contracts, Agreements and Facilities**

NASA selected Boeing Delta Launch Services Inc. and Lockheed Martin Commercial Launch Services Inc. for the NASA Launch Services contract awards. An Indefinite Delivery/Indefinite Quantity contract was awarded to each contractor with a minimum of one launch service over 10 years. NASA is authorized to order a total of 70 launch services under all the contracts bringing the total estimated value to \$5 billion.

KSC and the 45th Space Wing marked the second full year under the Joint Base Operations and Support Contract (J-BOSC). Through J-BOSC, a single set of base operations and support service requirements have been established for KSC, CCAFS and Patrick Air Force Base (PAFB). Eighteen different contractors, often with overlapping and duplicate responsibilities, previously performed these services.

The two organizations further strengthened their partnership by signing an interagency agreement that established the Joint Planning and Customer Service (JPCS) office. The agreement brings together an integrated staff into a single office to represent both agencies at the Spaceport. The JPCS serves as a "one-stop shop" for new customers of the two federal agencies.

The two organizations also signed the Consolidated Comprehensive Emergency Management Plan (CCEMP). The CCEMP established uniform policy guidelines for the effective mitigation of, preparation for, response to and recovery from a variety of emergency situations at the Spaceport.

Emergency Preparedness at the Spaceport was further enhanced by the acquisition of the Mobile Command Center (MCC), a specially equipped emergency response vehicle. The MCC allows the emergency response team to better respond when emergencies at the Cape Canaveral Spaceport require a mobile field command center. The vehicle was purchased by the J-BOSC contractor Space Gateway Support through J-BOSC contract savings.

The State of Florida appropriated \$14 million to help fund construction of the Space Experiment Research and Processing Laboratory (SERPL), a magnet facility for KSC's planned Space Station Commerce Park. The SERPL, being designed by NASA, will support life sciences and biological flight experiment processing and research for the Space Station.

The Cryogenics Testbed Facility was unveiled in April. The facility provides a resource for collaborative research and development in the areas of thermal insulation systems, cryogenic components, propellant process systems and low-temperature applications.

The new Vapor Containment Facility, adjacent to the Space Station Processing Facility, opened in July. Ammonia servicing equipment used to perform preflight tests and service of ISS hardware is now housed in the facility.

The Vehicle Assembly Building's "Safe Haven" modifications were tested in August. For the first time in Space Shuttle history, a fully stacked Shuttle rolled into High Bay 2 of the VAB. Modifications to the VAB and nearby rock-paved crawlerway were completed, allowing more storage space and protection for Shuttle flight hardware from hurricanes or tropical storms.

The new Checkout and Launch Control System (CLCS) at the Hypergolic Maintenance Facility was declared operational in September. It was the first of several new CLCS designs scheduled to come on line in the coming months. CLCS is a multi-year project designed to upgrade outdated control systems at KSC with highly sophisticated computer systems and software.

A new high-pressure helium pipeline to service launch needs at the new Delta IV launch complex, Complex 37 at CCAFS, was commissioned in November. The nine-mile-long, buried pipeline for Complex 37 will save NASA money through sharing use and costs of the KSC Helium Facility. It will also serve as a backup helium resource for Shuttle launches.

Also in November, a ribbon cutting was held for the refurbished E&O Building. Home for NASA's unmanned missions since 1964, the building was renovated to host the Expendable Launch Vehicle Program at KSC.

### **Tourist Destination Upgrades**

Several new exhibits, an Astronaut Encounter show and the Dr. Kurt Debus Conference Facility opened at the KSC Visitor Complex. The additions represented the final phase of a \$120 million redevelopment project by Delaware North Parks Services of Spaceport Inc. The new conference facility features an Early Space Exploration exhibit, which highlights early missions. A second new exhibit, Exploration in the New Millennium, showcases explorations to Mars.

To ensure funding for future upgrades to the Visitor Complex, a new admissions policy went into effect. An all-inclusive admission ticket now provides access to the KSC bus tour, IMAX films and the Robot Scouts and Universe Theater attractions.

### **Community Outreach and Education**

KSC's contributions through the 2000 Combined Federal Campaign exceeded its goal of \$220,000, with more than \$260,000 given by KSC Civil Service employees. In addition, 1,174 KSC, CCAFS and PAFB employees joined the National Marrow Donor Program at KSC's third annual registration drive.

KSC and CCAFS jointly hosted a Community Appreciation Day on Nov. 4. More than 43,000 Brevard County residents, in addition to thousands of KSC and CCAFS employees, attended.

KSC hosted the first Florida Space Summit in January. The summit looked at the future of space as it relates to the state of Florida. Then in August, KSC hosted the annual Community Leaders Briefing. KSC executives met with various community leaders from across Brevard County and the State of Florida about long-term viability of KSC and benefits the space program contributes to the community.

On the education front, the NASA KSC Property Disposal Office coordinated the donation of 1,501 computers to students during fiscal year 2000, which ended Sept. 30. Major donations were made to schools in Pike County, Ala., and Memphis, Tenn.

Students from all over the country gathered for the FIRST (For Inspiration and Recognition of Science and Technology) regional competition at the KSC Visitor Complex in March. Thirty teams of high school students tested the limits of their imagination using robots they designed to compete in a technological battle against other schools' robots.

To educate employees and help facilitate the changing Spaceport culture, "7 Habits" personal mastery training of all civil service employees was completed.

Through these efforts and others, KSC began the new millennium with a reinvigorated sense of destiny and a clear plan for continuing excellence in launch operations and technology development.

-- end --



**December 14, 2000**

Bruce Buckingham  
NASA Kennedy Space Center  
321/867-2468

KSC Release No.: 109-00

**Note to Editors:  
KSC 2001 ANNUAL BADGES READY FOR DISTRIBUTION TO  
ACCREDITED MEDIA**

Accredited members of the media who request and qualify for annual badges at Kennedy Space Center, Fla., may pick up their year 2001 annual credentials beginning today.

All current annual badge holders must reapply for the 2001 annual badges. Applications are to be made by submitting a letter on company letterhead with the following information: Full name and mailing address, Social Security number, date of birth, and position at the news organization. Letters can be mailed to the KSC Press Site, Attention Patti Beck, Mail Code XA-E1, Kennedy Space Center, Fla., 32899. Letters can also be faxed to: 321-867-2692.

Year 2000 annual badges are valid through Jan. 31, 2001.

Media requesting annual badges are reminded of the NASA criteria for media accreditation. See the NASA media accreditation policy at: <http://www-pao.ksc.nasa.gov/kscpao/kscpao.htm> .

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**December 19, 2000**

George Diller  
NASA Kennedy Space Center  
321/867-2468

KSC Release No.: 110-00

**Note to Editors/News Directors:  
STS-98 "DESTINY" MEDIA OPPORTUNITY AT KSC DEC. 20**

The U.S. science laboratory Destiny, considered the centerpiece of the International Space Station for the United States, is the focus of a press opportunity on Wednesday, Dec. 20 at KSC's Space Station Processing Facility.

Destiny is nearing readiness for its upcoming launch. The two crew access hatches have been closed and sealed for flight -- a final milestone event culminating over two years of launch processing. On Wednesday, the Destiny laboratory will be moved from its test and integration stand into the Launch Package Integration Stand (LPIS) in preparation for a weight and center of gravity determination. Destiny will be installed into the payload transportation canister the next day and taken to Launch Pad 39-A after the holidays for placement into Space Shuttle Atlantis' payload bay.

Media are invited to witness this milestone in International Space Station processing as the Destiny laboratory is hoisted and moved to the LPIS stand. Spokespersons from NASA and Boeing will be available for interviews.

Media representatives interested in attending the event are required to wear long pants and closed-toe shoes while inside the Space Station Processing Facility. Clean room attire will not be required for this event; however, no food, tobacco, lighters or matches are permitted inside the high bay. Electronic flash photography is permitted. The lighting in the facility is mercury.

Those planning to attend should be at the KSC News Center Wednesday, Dec. 20, at 12:45 p.m. to be taken to the Space Station Processing Facility. Media should check the recorded status line at 867-2525 after 9 a.m. to ensure the time of the event has not changed due to the readiness preparations underway for the activity.

The Destiny laboratory module is 28 feet in length, 14 feet in diameter, and weighs 32,000 pounds. It is to be a world-class, state-of-the-art research facility functioning in microgravity. The lab will provide astronauts a shirtsleeve environment for research in many areas including life and microgravity sciences, Earth science, and space science research.

-- end --





**December 20, 2000**

George Diller  
NASA Kennedy Space Center  
321/867-2468

KSC Release No.: 110-00, Rev. A

**Note to Editors/News Directors:  
STS-98 "DESTINY" MEDIA OPPORTUNITY RESCHEDULED FOR  
THURSDAY, DEC. 21**

The U.S. science laboratory Destiny, considered the centerpiece of the International Space Station for the United States, will be the subject of a press opportunity to be held Thursday, Dec. 21 at KSC's Space Station Processing Facility. This event was scheduled for today, Dec. 20, but for operational reasons has been rescheduled for Thursday, Dec. 21.

Destiny is nearing readiness for its upcoming launch. The two crew access hatches have been closed and sealed for flight, the final milestone event culminating over two years of launch processing. On Thursday morning, the Destiny laboratory will be moved from its test and integration stand into the Launch Package Integration Stand (LPIS) in for a weight and center of gravity determination. This will be followed by installation into the payload transportation canister later Thursday afternoon or early Friday morning. Destiny will be taken to launch pad 39-A after the holidays for placement into Space Shuttle Atlantis' payload bay.

Media are invited to witness this milestone in International Space Station processing as the Destiny laboratory is hoisted and moved to the LPIS stand. Spokespersons from NASA and Boeing will be available to answer questions and for interviews.

Media representatives present for the event are requested to wear long pants and closed-toe shoes while inside the Space Station Processing Facility. Clean room attire will not be required for this event, however as is customary, no food, tobacco, lighters or matches are permitted inside the high bay. Electronic flash photography is permitted. The lighting in the facility is mercury.

Those planning to attend should be at the KSC News Center Thursday, Dec. 21 at 6:30 a.m. to be taken to the Space Station Processing Facility.

The Destiny laboratory module is 28 feet in length, 14 feet in diameter, and weighs 32,000 pounds. It is to be a world-class, state-of-the-art research facility functioning in microgravity. The lab will provide astronauts a shirtsleeve environment for research in many areas including life and microgravity sciences, Earth science, and space science research.

-- end --





**December 20, 2000**

George Diller  
NASA Kennedy Space Center  
321/867-2468

KSC Release No.: 111-00

**NASA EXERCISES DELTA II CONTRACT OPTION FOR MARS 2003 ROVER**

NASA today announced that it is exercising a contract option with the Boeing Company for a Delta II vehicle to launch the Mars Exploration Rover 2 (MER-B). The spacecraft is scheduled for launch at the beginning of a 21-day planetary window that opens on June 27, 2003. This firm-fixed price option is covered under the NASA Launch Services contract (NAS10-00-001) officially awarded by NASA's Kennedy Space Center on June 16,2000 to:

Delta Launch Services, Inc.  
5301 Bolsa Avenue  
Huntington Beach, CA 92647-2099

NASA's total launch services budget for the MER-B campaign is approximately \$68 million dollars.

The goals of the Mars Exploration Rover 2003 mission are to land a roving vehicle on Mars for science observations that will help determine the water, climatic and geological history of a site on Mars where conditions may have been favorable to the preservation of evidence of life or associated pre-biotic processes.

NASA's Mars Program is managed by the NASA Headquarters Office of Space Science, Washington, D.C. The MER-B spacecraft project is managed for NASA by the Jet Propulsion Laboratory, Pasadena, Calif.

-- end --



**December 20, 2000**

**Lisa Fowler  
NASA Kennedy Space Center  
321/867-1883**

**KSC Release No.: 112A-00**

## **KENNETH E. TENBUSCH HONORED FOR ROLE IN SPACE PROGRAM**

Kenneth Tenbusch, a native of Flint, Mich., was among several Kennedy Space Center (KSC) employees who were honored recently for their exemplary work at the nation's spaceport.

Tenbusch received a bachelor's degree in aerospace engineering from the University of Florida and an M.B.A. from the University of Central Florida. He is the son of Gerald and Jo Ann Tenbusch.

At KSC, Tenbusch is employed by NASA as landing recovery director in the Launch and Landing Division of the Shuttle Process Integration Directorate. He is responsible for coordinating landing and recovery support, providing control room communications for runway operations, developing contingency plans and assisting in the training of flight crew rescue procedures. He joined the space center in 1989.

Tenbusch currently resides in Melbourne with his wife Andrea and their three children Daniel, 4, Steven, 3, and Catherine, 6 months.

The Honoree Award is the highest form of recognition bestowed upon an employee by the NASA Space Flight Awareness Program. The 43 employees selected were part of a contingent of some 250 NASA and contractor employees from throughout the space agency being honored for their professional dedication and outstanding achievement in support of the human space flight program.

The Honorees were given a VIP tour of the Kennedy Space Center and were honored by astronauts and senior NASA and contractor officials at a special reception. They were also taken to a special VIP viewing area to witness the STS-92 launch of the Space Shuttle Discovery.

-- end --



**December 20, 2000**

**Lisa Fowler  
NASA Kennedy Space Center  
321/867-1883**

**KSC Release No.: 112B-00**

## **WELMON V. SPEED, JR. HONORED FOR ROLE IN SPACE PROGRAM**

Welmon Speed, a native of Rockledge, Fla., was among several Kennedy Space Center (KSC) employees who were honored recently for their exemplary work at the nation's spaceport.

Welmon received a bachelor's degree in industrial engineering from Georgia Tech and a master's degree from Florida Tech.

At KSC, Welmon is employed by NASA as senior operations engineer in the International Space Station Payload Processing Directorate. He is responsible for management and coordination of all activities involved in the initial processing of Space Station flight elements. He joined the space center in 1983.

Welmon currently resides in Rockledge with his wife Jerinae and their two children Willie, 16 and Simaya, 4.

The Honoree Award is the highest form of recognition bestowed upon an employee by the NASA Space Flight Awareness Program. The 43 employees selected were part of a contingent of some 250 NASA and contractor employees from throughout the space agency being honored for their professional dedication and outstanding achievement in support of the human space flight program.

The Honorees were given a VIP tour of the Kennedy Space Center and were honored by astronauts and senior NASA and contractor officials at a special reception. They were also taken to a special VIP viewing area to witness the STS-92 launch of the Space Shuttle Discovery.

-- end --



**December 20, 2000**

**Lisa Fowler  
NASA Kennedy Space Center  
321/867-1883**

**KSC Release No.: 112C-00**

## **DONNA LOWE MCFARR HONORED FOR ROLE IN SPACE PROGRAM**

Donna Lowe McFarr, a native of Altoona, Pa., was among several Kennedy Space Center (KSC) employees who were honored recently for their exemplary work at the nation's spaceport.

At KSC, McFarr is employed by NASA as a program analyst in the Programs resources Management Office. She supports the Deputy Chief Financial Officers for Resources by providing timely, accurate analysis of the monthly fiscal phasing plan and budget for the Checkout and Launch Control System, the Integrated Network Control System, the Complex Control System and other related simulation activities, civil service travel and civil service overtime. She joined the space center in 1985.

McFarr currently resides in Merritt Island with her husband Tony. They have two children, Dawn, age 28, and Antonio, age 24.

The Honoree Award is the highest form of recognition bestowed upon an employee by the NASA Space Flight Awareness Program. The 43 employees selected were part of a contingent of some 250 NASA and contractor employees from throughout the space agency being honored for their professional dedication and outstanding achievement in support of the human space flight program.

The Honorees were given a VIP tour of the Kennedy Space Center and were honored by astronauts and senior NASA and contractor officials at a special reception. They were also taken to a special VIP viewing area to witness the STS-92 launch of Space Shuttle Discovery.

-- end --



**December 21, 2000**

Joel Wells  
NASA Kennedy Space Center  
321/867-2468

KSC Release No.: 113-00

## **SANTA BECOMES TEST PILOT IN KSC AIRSPACE ON CHRISTMAS EVE**

Not only does Santa Claus know when you are sleeping or awake -- bad or good, he also knows with pinpoint accuracy the exact location of each planned delivery stop. With a newly installed Global Positioning System (GPS) on his sleigh, Santa plans to fly by the Kennedy Space Center's Shuttle Landing Facility (SLF) to test his space-age equipment against KSC's upgraded system.

Three differential GPS (DGPS) antennas, called Remote Satellite Measurement Units (RSMUs), were erected north of the mid-field point at the SLF during 2000. DGPS equipment is more accurate than the conventional GPS equipment used as navigational aids in automobiles and boats because each antenna sits on top of three survey points.

Both the SLF and the Skid Strip at Cape Canaveral Air Force Station will be available to Santa after the facilities close down for the holidays. "Both of these landing strips can be used to support a pit stop for Santa and his team while in the Central Florida area," said Bob Bryan, the Airfield Services Manager for Space Gateway Support. "No additional expense to the taxpayers during this time of stress to family budgets will be incurred," he added. Bryan, assigned as manager of the landing strips during 2000, continues a tradition that started shortly after the opening of the SLF in the 1970s.

It is rumored that Santa is considering a "glass cockpit" upgrade to his sleigh before the 2001 Christmas deliveries begin. The new system would bring the sleigh up to par with fighter jets and Space Shuttle Atlantis. Atlantis underwent the "glass cockpit" modification during its last Orbiter Maintenance Down Period. Ann Beach, spokesperson for The Boeing Co. at KSC, said that she could not confirm, but neither would she deny, the report.

-- end --



# Facts



National Aeronautics and  
Space Administration

**John F. Kennedy Space Center**  
Kennedy Space Center, Florida 32899

January 2000  
KSC Release No. 1-00

## STS-99/Endeavour

### Shuttle Radar Topography Mission: Putting our planet on the map

The Space Shuttle Endeavour mission will chart a new course, using two antennae and a 200-foot-long mast protruding from its payload bay to produce unrivaled 3-D images of the Earth's surface.

The result of the Shuttle Radar Topography Mission could be close to 1 trillion measurements of the Earth's topography. Besides contributing to the production of better maps, these measurements could lead to improved water drainage modeling, more realistic flight simulators, better locations for cell phone towers, and enhanced navigation safety.

Just about any project that requires accurate knowledge of the shape and height of the land can benefit from the data. Some examples are flood control, soil conservation, reforestation, volcano monitoring, earthquake research, and glacier movement monitoring. The measurements, which once processed are expected to be accurate to within 50 feet, may be tailored to meet the needs of the military, civil, and scientific user communities, bettering the lives of people across the planet.

Other possible uses of the information include aiding the selection of locations for cellular phone towers and improving topographical maps for backpackers, firefighters and geologists.

The 11-day mission is a partnership between NASA and the Department of Defense's National Imagery and Mapping Agency (NIMA), together with the German and Italian space agencies. The U.S. military, the primary customer of the data gathered during the mission, will use the 3-D pictures, called visualizations, to help in mission planning and rehearsal, modeling and simulation.

Creating these 3-D images of the Earth's surface will require the first on-orbit use of a technique called single-pass radar interferometry. Radar beams will be bounced off the surface and received by two antennae -- one by the same radar antennae used to take radar images from the Shuttle's payload bay on STS-59 and STS-68, and another by a similar antenna at the end of the 60-meter mast extending from the payload bay.

Deploying the mast, which is two-thirds as long as the International Space Station, will be an accomplishment in



itself. Extending the longest rigid structure ever flown in space -- stored accordion-style inside a canister attached to the side of the main antenna -- will require the first use of a new Shuttle piloting technique called the "flycast maneuver." The maneuver, practiced on STS-93, will help reduce structural loads on the mast.

Endeavour will be launched in an orbit with an inclination of 57 degrees to allow the entire land surface that lies between 60 degrees north and 56 degrees south latitude to be covered.

Radar imaging was used previously by NASA's uncrewed Magellan spacecraft to map the surface of Venus. A key advantage to radar technology is that it can "see" the Earth's surface through the clouds, which cover nearly 40 percent of the planet, and in darkness.

The crew will spend approximately 80 hours traveling 145 statute miles (126 nautical miles/233 kilometers) above the Earth, making observations.

During a minimum of 159 consecutive orbits, Endeavour will map 30-meter squares of the planet's surface at a time. In order to maintain the continuous

observations, the crew will divide into a pair of three-person teams to conduct two work shifts of 12 hours each day. The resulting collection of information is expected to total 9.8 terabytes -- enough material to fill 15,000 compact discs. It will take scientists at least one year to process the massive volume of data recorded during the mission.

No spacewalks are planned during the mission. The crew, however, will be prepared for the possibility of as many as three spacewalks if it becomes necessary to deploy or retract parts of the radar systems manually. The crew's responsibilities include activating the payload, deploying and stowing the mast, aligning the inboard and outboard structures, monitoring payload flight systems, operating the on-board computers and recorders and handling any contingencies that arise.

The 97th Space Shuttle launch and the 14th flight of Endeavour will begin with a liftoff from Launch Pad 39A. Endeavour will ascend at a 57-degree inclination to the equator for direct insertion into orbit. The mission is scheduled for 11 days.

Landing is planned at Kennedy Space Center's Shuttle Landing Facility.

## The Crew

**Commander Kevin R. Kregel** is an experienced space flier who has been a pilot on two previous missions and a commander on another. During a distinguished career as a U.S. Air Force pilot, the New York native accumulated more than 5,000 flight hours in 30 different aircraft.

Kregel left active service in 1990 to join NASA as an aerospace engineer and instructor pilot, flying in the Shuttle Training Aircraft and conducting the initial flight test of the T-38 avionics upgrade aircraft. He entered the astronaut program in 1992. Kregel holds degrees in astronautical engineering and public administration.

**Pilot Dominic Gorie (Cmdr., U.S. Navy)** will make his second space flight since joining the astronaut program in 1995. He served the same role on STS-91, the final docking mission to the Russian space station Mir.

Gorie, who attended high school in Miami, earned numerous honors as a naval aviator and flew 38 combat missions during Operation Desert Storm. He has a master's degree in aviation systems. While awaiting his first Shuttle flight, he served as a spacecraft communicator in Mission Control for numerous missions.

**Mission Specialist Janet L. Kavandi, Ph.D.**, also served on STS-91, her first space flight. She joined the space program in 1995 and worked in payload integration for the International Space Station before receiving her first flight assignment. The Missouri native has a doctorate in analytical chemistry.

During more than a decade of work as an engineer in industry, she contributed to a variety of projects, including Space Station, Lunar and Mars Base studies, Inertial Upper Stage, Advanced Orbital Transfer Vehicle, Get-Away Specials, Small Spacecraft, Air Launched Cruise Missile, Minuteman and Peacekeeper. Her work on pressure-indicating paints has resulted in two patents.

**Mission Specialist Janice Voss, Ph.D.**, is the crew's most experienced member, having logged more than 909 hours in space on four previous missions. She earned a master's degree in electrical engineering from Massachusetts Institute of Technology in 1977 and obtained a doctorate in aeronautics/astronautics from MIT 10 years later.

Since she joined the astronaut program in 1991, her technical assignments have included working on Spacelab/Spacehab issues for the Astronaut Office Mission Development Branch and on robotics issues for the EVA/Robotics Branch. Her most recent mission, STS-94, was a completion of the shortened STS-83 flight.

**Mission Specialist Mamoru Mohri, Ph.D.**, represents NASDA, the Japanese space agency, on his second space flight. He holds a doctorate in chemistry and has published more than 100 papers in the fields of material and vacuum sciences. He established himself as an expert in nuclear fusion during an academic career and was selected in 1980 to participate in the first group of exchange scientists under the U.S./Japan Nuclear Fusion Collaboration Program.

Mohri served as a prime payload specialist on STS-47, a cooperative mission between the United States and Japan launched in 1992. He was selected to NASA's astronaut program in 1996.

**Mission Specialist Gerhard P.J. Thiele, Ph.D.**, makes his first space flight as a representative of the European Space Agency (ESA). With a doctorate in environmental physics, he has written extensively on physical and chemical oceanography.

He served as an alternate payload specialist on the STS-55 Spacelab D-2 mission. Since 1994, Thiele has served as an active member of the International Academy of Astronautics Subcommittee on Lunar Development. He joined ESA in 1998.

## Other Experiments

The secondary objectives of the mission include crew support of EarthKAM, an ongoing experiment to provide middle school students with observations of the planet from space. EarthKAM stands for Earth Knowledge Acquired by Middle School Students, and it was first flown on STS-89. As part of the experiment, the crew will point a digital camera toward Earth. Students will use these images as part of their Earth Science lessons.

### Related NASA web sites

Mission and crew press kit:

[www.shuttlepresskit.com/](http://www.shuttlepresskit.com/)

Mission and crew - Johnson Space Center:

[spaceflight.nasa.gov/](http://spaceflight.nasa.gov/)

Shuttle countdown - Kennedy Space Center:

[www.ksc.nasa.gov/shuttle/countdown/](http://www.ksc.nasa.gov/shuttle/countdown/)

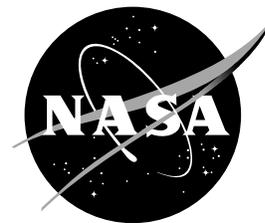
Multimedia prelaunch guest presentation:

[www-pao.ksc.nasa.gov/kscpao/briefing/](http://www-pao.ksc.nasa.gov/kscpao/briefing/)

# NASA Facts

National Aeronautics and  
Space Administration

**John F. Kennedy Space Center**  
Kennedy Space Center, Florida 32899  
AC 321 867-2468



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## STS-92/Discovery

### 100<sup>th</sup> Mission Highlighted by Delivery of Z1 Truss

Space Shuttle Discovery, the third operational Shuttle built, will undertake the 100<sup>th</sup> Shuttle mission to be launched from Kennedy Space Center. Discovery's mission, STS-92, plays a pivotal role in the continued construction of the International Space Station because of its critical payloads, the Zenith (Z1) Integrated Truss and the third Pressurized Mating Adapter (PMA3).

The Z1 Truss will carry components of the Station's attitude, communications, thermal and power control systems including four control moment gyroscopes as well as high and low gain antenna systems. The Z1 Truss and the PMA3 will be the first U.S.-built cargo elements to be flown to the International Space Station since the successful launch of the Unity element in late 1998.

The STS-92 mission signals the beginning of work on the major elements of the International Space Station that will make it more than just a vision but a long-awaited reality and marks a dramatic turn in the assembly process. The mission kicks off a series of assembly flights that will include such Station elements as a scientific research laboratory, solar arrays and additional truss structures. Eight Space Shuttle missions will be required to deliver and assemble the structure's ten pre-integrated truss segments. These missions will be spread out over a four-year period.

Once completed, the combination of trusses will be the length of a football field. Labs, living quarters, payloads and systems equipment will be directly or indirectly attached to it. The U.S. solar arrays, which will be delivered to the structure in late November aboard Space Shuttle Endeavor on STS-97, will supply the International Space Station with enough power to light up an entire town.



The Pressurized Mating Adapter (PMA3), also being delivered to the Station on this mission, will mirror the existing two adapters already in place at opposite ends of the Unity module. These adapters essentially act as pressurized pathways or hallways for the astronauts to use when accessing connecting modules. Because they are pressurized, heated and supplied with handhold grips, these tunnel-like sections allow the crew to move easily between the Shuttle and different areas of the Station. One of the existing adapters serves as a docking site for the Shuttle fleet while the opposing adapter provides the linkage for the Zarya module.

The 28<sup>th</sup> flight of Discovery will begin with a liftoff from Launch Pad 39A. Discovery will ascend at a 51.6-degree inclination to the equator for direct insertion into orbit. The mission is scheduled for 11 days. Landing is planned for the Kennedy Space Center's Shuttle Landing Facility.

## The Crew

**Commander Brian Duffy (Col., USAF)**, a veteran of three previous space flights, has logged more than 667 hours in space as both a commander and pilot. Most recently Duffy served as the Acting Deputy Director of the Johnson Space Center. He has participated in the development and testing of displays, flight crew procedures and computer software for Shuttle flights. Born in Boston, Mass, he received a bachelor of science degree in mathematics from the United States Air Force (USAF) Academy and a master of science degree in systems management from the University of Southern California. NASA selected Duffy as an astronaut in June 1985.

**Pilot Pamela Melroy (Lt. Col., USAF)** will make her first Shuttle flight aboard Discovery on mission STS-92. Prior to joining NASA, she was assigned to the C-17 Combined Test Force where she served as a test pilot. Melroy has logged more than 4,000 hours of flight time in 45 different aircraft. Though born in Palo Alto, Calif., she considers Rochester, N.Y., to be her hometown. She received a bachelor of science degree in physics and astronomy from Wellesley College and a master of science in earth and planetary sciences from Massachusetts Institute of Technology. In December 1994, she was selected to be an astronaut candidate by NASA.

**Mission Specialist Koichi Wakata (National Space Development Agency of Japan NASDA)** served as mission specialist aboard STS-72 in 1996 and logged more than 214 hours in space including two space walks. Born in Omiya, Saitama, Japan, Wakata received a bachelor of science in aeronautical engineering and a master of science degree in applied mechanics from Kyushu University. Before joining NASA, he was assigned as a structural engineer for Japan Airlines to research the structural integrity of transport aircraft. He was selected as an astronaut candidate by NASDA in June 1992.

**Mission Specialist Leroy Chiao (Ph.D.)** has flown on two previous missions and has logged 567 hours in space. Though born in Milwaukee, Wis., he considers Danville, Calif., to be his hometown. Chiao has had diverse technical assignments including Space Shuttle flight software verification, crew equipment, training and flight data file issues, and

Extravehicular Activities (EVA) or space walks for the EVA Branch. He received a bachelor of science in chemical engineering from the University of California, Berkley and a master of science and doctorate in chemical engineering from the University of California, Santa Barbara. Selected by NASA in January 1990, Chiao became an astronaut in July 1991.

**Mission Specialist Peter "Jeff" Wisoff (Ph.D.)**, a veteran of three space flights, STS-57, STS-68 and STS-81, has logged more than 754 hours in space. Born in Norfolk, Va., Wisoff received a bachelor of science in physics from the University of Virginia and a master of science and a doctorate in applied physics from Stanford University. His technical assignments to date include spacecraft communicator (CAPCOM) in Mission Control, coordinating flight crew equipment and evaluating extravehicular activity (EVA) techniques for the International Space Station. Wisoff became an astronaut in July 1991.

**Mission Specialist Michael Lopez-Alegria (Cmdr., USN)** will be making his second flight aboard the Space Shuttle on STS-92. Though born in Madrid, Spain, he considers both Madrid and Mission Viejo, Calif., to be his hometown. Lopez-Alegria received a bachelor of science in systems engineering from the U.S. Naval Academy and a master of science in aeronautical engineering from the U.S. Naval Postgraduate School. Most recently, he served as NASA Director of Operations at the Yuri Gagarin Cosmonaut Training Center in Star City, Russia. NASA selected him as an astronaut in March 1992.

**Mission Specialist William (Bill) McArthur Jr. (Col., USA)** is a veteran of two previous space flights and has traveled 9.2 million miles in space. Though born in Laurinburg, N.C., he considers Wakulla, N.C., to be his hometown. McArthur received a bachelor of science in applied science and engineering from the United States Military Academy, West Point, N.Y., and a master of science in aerospace engineering from the Georgia Institute of Technology. Most recently he served as Chief of the Astronaut Office Flight Support Branch, supervising astronaut support of the Mission Control Center. He was selected to be an astronaut by NASA in January 1990.

# Facts



National Aeronautics and  
Space Administration

**John F. Kennedy Space Center**  
Kennedy Space Center, Florida 32899

April 2000  
KSC Release No.34-00

## STS-101/Atlantis

### Newly Upgraded Shuttle To Dock With International Space Station

Space Shuttle Atlantis - the most updated Space Shuttle ever to fly with more than 100 new modifications, including a state-of-the-art "glass cockpit" - will dock with the International Space Station, setting the stage for the arrival of the Russian-made Zvezda service module this summer.

Zvezda, scheduled for launch in July, will serve as the early living quarters and lab space for the first long-duration crews to reside aboard the Station beginning in the fall.

The Atlantis crew will perform maintenance tasks on board the Station and deliver approximately one ton of a variety of logistics and supplies to the orbiting outpost. Maintenance tasks will include replacing up to four new batteries and associated electronics in the Russian Zarya control module.

Four cooling fans, three fire extinguishers, 10 smoke detectors and an on-board computer will also be installed on Zarya. In addition, a suspect radio frequency power distribution box will be replaced on Unity's six-sided docking node.

Equipment includes personal clothing and hygiene gear, medical and exercise equipment, computer equipment and printers, and hardware for the Station's Ku-band communication system. Also to be delivered: a centerline camera for Unity's common berthing mechanisms to which other Station components will be attached.

After docking, one six-and-a-half hour spacewalk is planned. The Russian "Strela" cargo boom, which will assist in further station assembly and outfitting, will be installed on the outside of Zarya, and a faulty radio antenna on Unity will be replaced.

The International Space Station represents a global partnership of 16 nations. The million-pound Station will include six laboratories and provide more space for research than any spacecraft ever built. Internal volume of the Station will be roughly equal to the passenger cabin volume of a 747 jumbo jet.



More than 40 space flights and multiple space vehicles - the Space Shuttle, the Russian Soyuz rocket, the Russian Proton rocket, the European Space Agency's Ariane 5 and the Japanese H-II rocket - will deliver the various Space Station components to Earth orbit. Assembly of the more than 100 components will require a combination of human spacewalks and robot technologies. When the ISS is completed, an international crew of up to seven will live and work in space for durations of three to six months.

STS-101 will also feature the first flight of the new Shuttle "glass cockpit," technically called the Multifunction Electronic Display Subsystem. This new system replaces obsolete instruments and three monochrome computer screens with 11 full-color graphical displays. The new cockpit weighs less, uses less electricity, provides more backup instruments and sets the stage for a future "smart cockpit" now in development for the Shuttle.

After a 10-month refurbishment period, Atlantis' more than 100 new modifications include: an airlock relocated to the payload bay to prepare for Station assembly flights; an updated communications system; installation of several weight reduction enhancements; additional protection for the cooling

system; and strengthening of the crew cabin floor.

STS-101 will take flight with the 98th Shuttle launch. The 21st flight of Atlantis will begin with a liftoff from Launch Pad 39A. Atlantis will ascend at a 51.6-degree inclination to the equator for direct insertion into orbit. The mission is scheduled for ten days.

Landing is planned for Kennedy Space Center's Shuttle Landing Facility.

## The Crew

Commander James Halsell Jr. (Col., USAF), a veteran of four space flights, has logged over 1,021 hours in space. He was pilot on STS-65 and STS-74 and was mission commander on STS-83 and STS-94. From February-August 1998, he served as NASA Director of Operations at the Yuri Gagarin Cosmonaut Training Center in Star City, Russia.

The Louisiana native graduated first in his test pilot school class and has performed test flights in F-4, F-16 and SR-71 aircraft. He has a bachelor of science degree in engineering from the United States Air Force Academy, a master of science degree in management from Troy University and a master of science degree in space operations from the Air Force Institute of Technology. He became an astronaut in July 1991.

Pilot Scott Horowitz (Lt. Col., USAF), Ph.D., has flown as pilot on two other missions, STS-75 and STS-82. Born in Philadelphia, Horowitz considers Thousand Oaks, Calif., to be his hometown.

Horowitz has a bachelor of science degree in engineering from California State University at Northridge and master of science and doctorate degrees in aerospace engineering from Georgia Institute of Technology. He served as a research scientist in the aerospace industry and was a professor for two universities. During his Air Force career, Horowitz served as a T-38 instructor pilot, an F-15 fighter pilot and a test pilot for A-7s and T-38s. Horowitz began his astronaut training in August 1992.

Mission Specialist Susan J. Helms (Lt. Col., USAF) is veteran of three space flights, STS-54, STS-64 and STS-78. She was born in Charlotte, N.C., but considers Portland, Ore., to be her hometown.

Helms has a bachelor of science degree in aeronautical engineering from the U.S. Air Force Academy and a master of science degree in aeronautics and astronautics from Stanford University. As a flight test engineer, Helms has flown in 30 different types of U.S. and Canadian military aircraft. She became an astronaut in July 1991.

Mission Specialist Yuri Vladimirovich Usachev is a cosmonaut for the Russian Aviation and Space Agency. During his two stays aboard the Russian space station Mir, Usachev logged 376 days in space and performed six spacewalks. This is his first Space Shuttle flight.

Usachev was born in Donetsk, Rostov on Don

Region, Russia, and has a degree in engineering from Moscow Aviation Institute. Upon graduation, he went to work for Energia, participating in groups working with EVA training, future construction in space, public relations and ergonomics. He was chosen as a cosmonaut candidate in 1989.

Mission Specialist James S. Voss (Col., USA, ret.) is a veteran of three space flights. He flew as a mission specialist on STS-44 and STS-53 and was the payload commander on STS-69. He was born in Cordova, Ala., but considers Opelika, Ala., to be his hometown.

Voss earned a bachelor of science degree in aerospace engineering from Auburn University and a master of science degree in aerospace engineering sciences from the University of Colorado in 1974. He has worked at the Johnson Space Center since November 1984 and was selected as an astronaut candidate by NASA in June 1987. Voss and Williams will conduct the space walk on the fourth day of the STS-101 mission.

Mission Specialist Mary Ellen Weber, Ph.D., has made one previous spaceflight, STS-70. She was born in Cleveland, but Bedford Heights, Ohio, is her hometown.

Weber has a bachelor of science degree in chemical engineering from Purdue University and a Ph.D. in physical chemistry from the University of California at Berkeley. She worked in research and development in the computer chip industry before being selected for astronaut training in 1992.

Mission Specialist Jeff Williams (Lt. Col., USA) will be making his first space flight. He was born in Superior, Wis., but considers Winter, Wis., to be his hometown.

Williams has a bachelor of science degree in applied science and engineering from the U.S. Military Academy, a master of science degree in aeronautical engineering from the U.S. Naval Postgraduate School and a master of arts degree in national security and strategic studies from the U.S. Naval War College. Williams, who served as a test pilot, has logged approximately 2,000 hours in more than 50 different aircraft. He was selected for an Army assignment at Johnson Space Center in 1987 and for astronaut training by NASA in May 1996.

### Related NASA web sites

Mission and crew press kit:

[www.shuttlepresskit.com/](http://www.shuttlepresskit.com/)

Mission and crew - Johnson Space Center:

[spaceflight.nasa.gov/](http://spaceflight.nasa.gov/)

Shuttle countdown - Kennedy Space Center:

[www.ksc.nasa.gov/shuttle/countdown/](http://www.ksc.nasa.gov/shuttle/countdown/)

Multimedia prelaunch guest presentation:

[www-pao.ksc.nasa.gov/kscpao/briefing/](http://www-pao.ksc.nasa.gov/kscpao/briefing/)

## **Note to Editors**

June 27, 2000

6:15 p.m. ET

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Following the Tracking and Data Relay Satellite (TDRS) and the Atlas IIA (AC-139) Launch Readiness Review today, NASA managers decided to postpone launch 24 hours to June 30 at 8:38 a.m. EDT. The delay is due to additional time necessary to review data from an additional test required on the centaur-stage engines.

The pre-launch press conference set for Wednesday at 10 a.m. at KSC will go on as scheduled. Other media activities including remote camera set-up will be postponed 24 hours.

Additional information regarding the mission and specifics involving the reason for the postponement will be addressed at the press conference Wednesday.

Bruce Buckingham