



JOHN F. KENNEDY SPACE CENTER

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KSC Contact: Bruce Buckingham

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KSC PROCUREMENT BRIEFING TO INDUSTRY PLANNED

Kennedy Space Center will host the 8th Annual Procurement Briefing to Industry beginning at 10:30 a.m. on Friday Nov. 15, 1991, at Spaceport USA's Galaxy Theater.

Over the past several years, the annual procurement briefing has been a strong and effective part of KSC's aggressive outreach effort. It is one of the key components of the Space Center's commitment to continually increase competition and provide private industry with the maximum opportunity to do business at KSC.

During past briefings, over 450 companies have been represented. This briefing, like those of past years, is a tool for businesses of all sizes to use to identify procurement opportunities at KSC.

At 9:00 a.m. that morning prior to the briefing, KSC will host the Annual Small Business Awards Ceremony. During the ceremony small businesses in several categories will be recognized for their outstanding achievements at KSC during fiscal year 1991.

In addition to the briefing, the NASA-KSC Small and Small Disadvantaged Business Council will sponsor an expo for small businesses. "Small Business Expo '91" will be held at the U.S. Space Camp Facility in Titusville, on Thursday, Nov. 14, 1991, with events commencing at 9:00 a.m. KSC Center Director Forrest McCartney will take part in a ribbon cutting ceremony. Approximately 150 small and small disadvantaged businesses are expected to display their products and discuss their special capabilities. The expo is free and open to the public.

Following the Small Business Expo will be a Small Business Opportunities Forum and Reception hosted by the Brevard Small Business Assistance Council. The reception will be held at the Cocoa Beach Hilton Hotel on Nov. 14, beginning at 6:00 p.m. Featured speaker at the forum will be Gayle Sayers, former NFL football star and current President of Crest Computer Supply of Skokie, Il. Also, a panel of Small Business Specialists will be available late that evening to discuss procurement strategies for doing business with Government agencies and large prime contractors. There is no charge for attending the reception.

For more information on these events, contact Cristy McLaughlin at (407) 633-3920 or Bill Baker at (407) 799-7287.

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JOHN F. KENNEDY SPACE CENTER

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KSC CLOSES OUT ANOTHER SUCCESSFUL YEAR AND PREPARES FOR 1992

Kennedy Space Center ended the year 1991 with quality and success in mind. Throughout the past 12 months, the KSC team has responded to the challenges set forth by the space agency and in many cases exceeded those expectations.

KSC successfully launched six Space Shuttle missions during the past year, began flight processing for the newest orbiter in the fleet, and began construction of several facilities that will be key to America's future role in space.

The first Shuttle launch of 1991 did not occur as early as originally hoped. When cracks were found on the orbiter Discovery (STS-39) external tank door hinge mechanisms -- after the vehicle was at the pad -- the vehicle was returned to the Orbiter Processing Facility for repairs.

Processing was then focused on Atlantis' mission STS-37 and the Gamma Ray Observatory, which turned out to be the year's first mission. Thereafter, the launch team was able to meet the launch schedule and mission objectives for the rest of the year.

Later, another problem with cracks was overcome. This time microscopic cracks were found on several T-seals located between the orbiter's wing leading edge reinforced carbon-carbon thermal barrier panels. The seals were repaired or replaced and flight schedules resumed.

Also, for the first time since 1986, several Space Shuttle missions were scheduled for possible prime site landing not only at Edwards Air Force Base, Calif., but at KSC as well. Two flights did in fact make planned landings at Kennedy's shuttle landing facility in 1991.

A renewed confidence from the Shuttle program office to resume planned landings back at KSC was rewarded when Discovery (STS-39) and Atlantis (STS-43) made perfect touchdowns on the 15,000-foot-long runway.

Late this year, NASA announced the Program Director for Space Shuttle will move office functions from Washington, D.C. to KSC. The post will be headed by Leonard S. Nicholson, currently the Space Shuttle Program Deputy Director. Nicholson will replace Robert L. Crippen in the position, but will be joining him in Florida as Crippen becomes KSC's new Center Director. The moves are effective Jan. 1, 1992.

Outgoing Center Director Forrest McCartney will leave KSC's top post at the end of the year. His tenure as KSC's fourth Center Director saw the space agency through 19 safe and successful Shuttle missions and numerous unmanned expendable vehicle launches.

1991 SPACE SHUTTLE MISSIONS:

The following is a brief summary of the 1991 Shuttle missions (all times are Eastern):

STS-37 -- Atlantis was launched at 9:22 a.m. on April 5. It landed at Edwards Air Force Base, Calif., at 9:55 a.m. on

April 11.

MISSION: The primary objective of this mission was to deploy the Gamma Ray Observatory into low earth orbit. The observatory, the second of NASA's four "Great Observatories," was designed to conduct an extensive on-orbit search for celestial gamma ray emissions over a two-year period. When the spacecraft's high gain antenna failed to deploy properly, crewmen Jerry Ross and Jay Apt made an unscheduled contingency spacewalk to free the antenna.

The spacecraft has already returned significant new information about the sources of gamma rays in the universe.

The next day after deployment of the observatory, Ross and Apt performed the first scheduled spacewalk since 1985 to test and judge various means for astronauts to move themselves and equipment on Space Station Freedom.

STS-39 -- Discovery was launched at 7:33 a.m. on April 28. It landed at KSC at 2:55 p.m. on May 6.

MISSION: This was the eighth mission dedicated to the Department of Defense, however, it was the first unclassified DOD mission. The unclassified payload consisted of Air Force Program-675; Infrared Background Signature Survey; and Space Test Pallet Satellite.

Discovery made an unplanned landing at KSC's shuttle landing facility when unacceptable weather conditions persisted at Edwards Air Force Base. This was the seventh time in 40 shuttle missions an orbiter landed at KSC.

STS-40 -- Columbia was launched at 9:24 a.m. on June 5. It landed at EAFB at 11:51 a.m. on June 14.

MISSION: The third Space Shuttle mission of the year was designed around the first Spacelab Life Sciences mission, SLS-1, the first spacelab dedicated entirely to life sciences research. During the mission's nine-day flight, the seven member crew performed about 18 different experiments to explore how the heart, lungs, blood vessels, and other body organs responded to microgravity.

The crew also studied possible causes of space sickness and the changes in muscles and bones during space flight and the readjustment to gravity once back on Earth. Twenty-nine rats were carried onboard to facilitate the experiments on bone and muscle.

STS-43 -- Atlantis was launched at 11:02 a.m. on Aug. 2. It landed at KSC at 8:23 a.m. on Aug. 11.

MISSION: The principal objective of this mission was the deployment of NASA's fourth Tracking and Data Relay Satellite (TDRS). Following deployment from the orbiter's payload bay, the Inertial Upper Stage Booster successfully placed the 4,905 pound communications satellite into geosynchronous orbit about 22,300 miles above the Earth.

Atlantis landed back at KSC's shuttle landing facility in the first planned end-of-mission landing at KSC since 1985.

STS-48 -- Discovery was launched at 7:11 p.m. on Sept. 12. It landed at EAFB at 3:38 a.m. on Sept. 18.

MISSION: The mission objectives of the Upper Atmosphere Research Satellite (UARS) are to better understand the character of the ozone depletion of the Earth's upper atmosphere and to continue the assessments of human activities in current atmospheric changes. UARS was successfully deployed on day three of this five-day mission. It will monitor events in the Earth's higher atmospheric regions over the north and south poles for two years. The satellite has performed flawlessly since launch.

STS-44 -- Atlantis was launched at 6:44 p.m. on Nov. 24. It landed at EAFB at 5:34 p.m. on Dec. 1.

MISSION: The second non-classified Department of Defense payload to be launched aboard the Shuttle this year featured the Defense Support Program (DSP) satellite. This spacecraft was designed to detect nuclear detonations and missile launches while stationed about 22,000 miles above the earth. Following DSP deployment on the first day of flight, the crew concentrated on a variety of secondary military and medical payloads and experiments on board.

The mission was cut short by three days due to the failure of one of three Inertial Measurement Units. Landing had

been scheduled for KSC. Due to the failed instrument, flight rules dictated a landing at EAFB on the next opportunity available.

NEW KSC FACILITIES AND MODIFICATIONS

After Discovery (STS-48) landed at Edwards Air Force Base and was ferried back to KSC on Sept. 26, the vehicle was towed to the newest of KSC's Orbiter Processing Facility (OPF) bays. First flow processing went well for the new bay. Discovery, now slated for mission STS-42 in Jan. 1992, was transferred to the Vehicle Assembly Building on Dec. 13.

The new OPF bay, located north of the VAB, is the most modern of the three processing facility bays. It is about the same size as the other two and adjacent to a new two-story support area. OPF bay 3 was initially used for off-line orbiter inspections, repair work and vehicle modifications. It was upgraded to full support status in September and will greatly enhance KSC's efficiency and ability to process vehicles for launch.

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In anticipation of the time NASA will begin launching elements for the assembly of Space Station Freedom, construction began on the half-million-square-foot Space Station Processing Facility (SSPF) located in KSC's Industrial Area. Ground was broken on March 26 for the facility which, when complete, will be occupied by about 1,000 NASA and contractor employees.

The three-story SSPF will have over 63,000 square feet of dedicated payload processing space. It is the largest new construction facility undertaken at KSC since the Apollo era. The total cost of construction is valued at about \$56 million. It is due to be completed in late 1994.

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In May, ground was broken for the Canister Cleaning and Rotation Facility (CCRF). The multi-purpose facility will be used for cleaning and maintaining KSC's twin payload transport canisters. Each canister is 65 feet long and is used to transfer both horizontal and vertical payloads between payload and orbiter processing facilities and the launch pads.

The new CCRF will allow workers the necessary space to properly store, clean and when necessary rotate to horizontal or vertical the canisters without having to make unnecessary trips to the VAB to use the overhead bridge cranes. The CCRF will have 7,200 square feet of high bay outfitted with a 100-ton crane for lifting and rotation. The facility will be located in the KSC Industrial Area behind the Headquarters Building. The total construction cost of the CCRF is about \$5.3 million. It is scheduled to be operational by mid-1992.

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Also in May, ground was broken for KSC's new Space Shuttle Processing Control Center (PCC). This three-story, 99,000-square-foot facility will be dedicated to orbiter testing, launch team training and Launch Processing Systems maintenance for the Space Shuttle. The PCC will be located between the OPF and the Operations Support Building in the Launch Complex 39 area.

The \$8.9 million facility is scheduled to be operational by June 1992. It will compliment the existing Launch Control Center in performing the hundreds of Shuttle tests required during processing flows each year.

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Modifications were made to Launch pad 39-B, causing the pad to go off-line for about six months this year. About 50 modification and repair contracts were earmarked for pad work. Modifications and improvements were made to the environmental control system, the payload changeout room, the rotating service structure, and hardware and electrical systems. This down-time also provided an opportunity to make improvements to the safety and overall efficiency of the launch facility.

The estimated cost of the modifications is about \$3.3 million. The first Space Shuttle to be launched from pad 39-B following this work will be Endeavour's maiden flight, scheduled for next year on mission STS-49.

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Several enhancements are underway for KSC's shuttle landing facility. Increases to the safety margins for Space Shuttle landings include improved lighting systems, re-paving both ends of the runway, and shoring-up the 3-mile-long landing strip's shoulders. The estimated cost of the project is about \$350,000.

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The four-lane widening of Kennedy Parkway South (State Road 3), one of KSC's busiest highways, was completed this past summer giving long awaited relief from severe traffic congestion during rush hours. The \$3.2 million project was coupled with Brevard County's commitment to widen its portion of the much traveled Route 3. With work on KSC's portion of the highway complete, KSC employees are assured of a safer and quicker drive to and from work.

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At KSC's Spaceport USA, NASA and the Astronauts Memorial Foundation (AMF) completed construction of a monument dedicated to fallen astronauts titled, "Space Mirror."

Vice-President Dan Quayle joined NASA Administrator Richard Truly to visit the monument on opening day, May 9, 1991. They addressed a crowd of nearly two thousand who had gathered on the six-acre tract to see the 42-foot-high by 50-foot-wide wall of polished granite. Etched on the "Space Mirror" are the names of 14 astronauts who have died while furthering the cause of space exploration. Mechanically driven and computer controlled, the mirror rotates in sequence with the rising and setting of the sun each day.

ECONOMIC IMPACT

Space-related employment and contracts at KSC boosted Florida's economy by \$1.4 billion during fiscal year 1991. This represents an increase of about \$100 million over the previous year.

Employment numbers at KSC also rose. Permanent federal employees at KSC now number about 2,700. Nearly 3,500 people were employed through construction and tenant jobs at KSC. The majority of workers at KSC are employed by on-site contractors and total about 12,900. Overall, approximately 19,050 workers were employed at KSC through the close of the fiscal year on September 30.

SPECIAL PROGRAMS AND PROJECTS

RECYCLING

KSC entered 1991 on a major paper recycling drive that has only grown during the past 12 months. In February the General Services Administration contracted with East Coast Paper Stock Inc. of Rockledge, Fla., to purchase waste paper generated at KSC. To date the KSC paper recycling program has exceeded one million pounds of reusable paper and the number is growing daily. Estimates indicate KSC could recycle nearly 50,000 pounds of paper every week once the paper program is fully operational.

TASK TEAM LEADER

A revolutionary concept in management has taken hold in the Shuttle processing world. Task team leaders are being assigned to various qualifying functions and jobs with the purpose of streamlining resources, focusing management oversight and reducing paperwork. As jobs are scheduled, a task leader is assigned to track its progress. With the assistance of team members, this individual has the authority to make decisions and arrange for help to keep the job moving. This person will help focus the work and be responsible for the entire operation from start to finish.

Currently, more than 1,800 jobs on the Space Shuttle have been targeted for a task team leader. The intent of the task leader is to make work in the OPF more efficient. The long term effect will ultimately reduce the amount of time a vehicle spends in the OPF, allowing the program a higher flight rate.

The task team leader concept is credited for contributing to the record OPF flow of Atlantis for mission STS-43. Atlantis was in the OPF for a record low 59 days, besting the post-Challenger record by 10 days. Originally, managers had hoped for a 65-day flow at best. The relatively small number of orbiter problems was also a help in breaking the record, giving workers a jump on the major tasks and shortening the schedule.

TOTAL QUALITY MANAGEMENT

Another major thrust within KSC management in 1991 is the Total Quality Management concept. TQM teams are being formed weekly as KSC strives to implement this new way of management.

The initial teams are being formed by non-management-level workers. More and more of that is giving way to a rise in teams formed from management levels down as supervisors and managers become familiar with TQM principles.

MILESTONES REACHED

NASA's newest Space Shuttle orbiter, Endeavour, was delivered to KSC on May 7. The new orbiter was rolled out of the Rockwell manufacturing facility in Palmdale, Calif., on April 25, and ferried cross-country on NASA's newest modified 747 Shuttle Carrier Aircraft.

Endeavour is the fifth Space Shuttle to be built -- the first in over four years. Endeavour was funded as a replacement vehicle for the Space Shuttle Challenger, following its loss in January 1986.

The new orbiter features two distinct differences from its three sister ships. Endeavour, designated OV-105, sports a drag chute modification to aid in decelerations and reduce loads on the brakes and landing gear. Endeavour also has been equipped with additional internal plumbing and electrical connections to support extended duration missions of two weeks or more.

The vehicle was temporarily located in the Vehicle Assembly Building when first delivered to KSC. While there several major components were installed including the liquid hydrogen 17-inch disconnect, ammonia boiler, flash evaporator and external tank door drive mechanisms.

On July 25, Endeavour was transferred to OPF bay 1. It was powered up for the first time at KSC on August 8. This milestone in the first flow processing of the new vehicle signified the kick-off of major electrical tests.

Endeavour is targeted to be rolled out of the OPF and to the VAB for solid rocket booster and external tank stacking early next year. Endeavour will then be moved out to the newly modified pad 39-B for the mandatory Flight Readiness Firing of the three main engines.

Endeavour's first mission, STS-49, is currently targeted for May 1992. The primary objective of the mission involves the retrieval, repair and re-boosting of the INTELSAT-VI communications satellite. Extra-vehicular activity, or spacewalks, will be required to successfully perform this objective.

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The first of NASA's operational Space Shuttle orbiters, Columbia, was sent off to the Rockwell Facility in Palmdale, Calif., about two months following the delivery of Endeavour to KSC. At Palmdale, Columbia has been treated to extensive modifications to support extended duration missions. The oldest of NASA's orbiters will also undergo structural inspections and systems maintenance.

About 50 modifications are planned for Columbia. These include the installation of improved nose wheel steering capability, carbon brakes on the main landing gear and five new general purpose computers. Columbia also will be

outfitted with the drag chute modification and its thermal protection system will be upgraded.

Part of NASA's long range plans involve keeping Shuttles in space for longer periods of time. Columbia, with its new capacity for extended flight, will be the first orbiter to fly a planned 13-day mission -- the United States Microgravity Laboratory-1, scheduled for the summer of 1992.

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The \$40 million complex of Spaceport USA, the NASA visitors center at Kennedy Space Center, celebrated its 25th anniversary July 16. The first tour of Kennedy Space Center occurred in 1966 and the first permanent facility was opened at the present location of Spaceport USA in 1967. This year alone, nearly 2 million people have trekked through Florida's fourth most popular tourist attraction.

WHAT'S AHEAD

KSC continues to keep an eye on the future as planning and scheduling for the next year proceeds. NASA has manifested eight Space Shuttle missions in 1992 and three expendable vehicle launches from Cape Canaveral Air Force Station.

The 1992 expendable schedule begins with NASA's Extreme Ultraviolet Explorer (EUVE) scheduled for launch in May aboard an Air Force Delta 2. This spacecraft will identify, map and catalog extreme ultraviolet sources in the universe.

Other expendable missions include Geotail to be launched on a McDonnell Douglas Delta 2 and the Mars Observer to be launched on a Martin Marietta Titan III.

Half of the Space Shuttle missions scheduled for next year will feature spacelab components. The majority of astronauts' time on missions STS-42, STS-45, STS-50 and STS-47 will be spent in spacelab modules housed in the payload bay of the orbiters. These modules are currently under build-up at KSC.

The eight Shuttle missions scheduled for 1992 are (in launch order):

STS-42 -- Discovery will carry into orbit the first International Microgravity Laboratory (IML) mission. The seven member crew will spend seven days in space conducting a variety of experiments on materials and life sciences. These experiments are designed to accommodate research in the zero gravity environment of space.

IML-1 is an international research endeavor combining the efforts of hundreds of scientists from 18 countries. The week long mission will have experiments conducted 24 hours a day.

Following this mission, Discovery will be returned to the OPF for refurbishments and modifications similar to those currently in work on Columbia.

STS-45 -- Atlantis will carry into orbit the Atmospheric Laboratory for Applications and Sciences (ATLAS-1). The seven member crew on this eight-day mission will concentrate their efforts on measuring the effects of the sun on the Earth's atmosphere and climate. Effects of industrial facilities and agricultural activities on our planet will also be evaluated. Additional studies will focus on various sources of ultraviolet light in the universe and determine what effect the Earth's electric and magnetic fields have on each other. Around the clock experimentation is scheduled.

STS-49 -- Endeavour's maiden flight will feature the most complex satellite retrieval mission ever undertaken by NASA. This seven-day mission will involve spacewalking astronauts to rendezvous with the stranded INTELSAT-VI (International Telecommunications Satellite) and attach to it a solid rocket motor for re-boosting.

INTELSAT was launched aboard a Titan vehicle in March 1990. Due to a satellite/launch vehicle separation problem, the spacecraft was left stranded in low Earth orbit. The orbit was stabilized and plans worked out to perform the rescue in space.

Endeavour will carry into orbit a 23,000 pound perigee kick motor in a specially designed cradle located in the payload bay of the orbiter. Using special power tools with extensions and electrical connectors, two astronauts will capture the INTELSAT and attach to it the new kick motor. The mission is scheduled to conclude with a landing at Edwards Air Force Base. Upon landing, the new orbiter drag chute modification will be deployed.

[STS-50](#) -- Making the first return to flight since extensive modification and refurbishment is the Space Shuttle Columbia. Modifications to Columbia allow this to be the first extended duration orbiter (EDO) flight. The mission is scheduled to last 13 days. Two additional days in flight are possible with provisions added for potential contingency.

Columbia's mission is to take into orbit the United States Microgravity Laboratory (USML-1). These spacelab mounted experiments will center on microgravity materials processing technology and science and research requiring a low-gravity environment. Space station technology and applications will be emphasized during the flight. USML consists of 10 scientific experiments and associated hardware housed in a long spacelab module. A crew of seven will operate the experiments during the possible record breaking mission.

[STS-46](#) -- Atlantis will deploy EURECA (European Retrievable Carrier) on flight day 1 of the mission and the TSS (Tethered Satellite System) on flight day 4. EURECA is currently at the Astrotech payload processing facility in Titusville, Fla. TSS is a cooperative NASA/Italian project and is currently being processed for launch in the Operations and Checkout Building.

EURECA is a European Space Agency sponsored, reusable, free- flying platform. It will be deployed from the payload bay and retrieved about a year later by the Space Shuttle. TSS is a 5- foot in diameter spherical satellite weighing about 1,140 pounds. It will be doled out on a superstrong conducting cord, a Kevlar cord about the diameter of pencil lead. Then, like trolling for fish, it will dangle from the payload bay at a length of about 12 miles before being reeled back in.

The tether reel is designed to hold up to 68 miles of tether. The TSS satellite itself is composed of eight exterior sections with access doors for servicing batteries, windows for sun and Earth sensors, and surface mounted umbilical connectors.

[STS-47](#) -- Endeavour, on its second mission, will carry into orbit Spacelab-J (Japan) on a seven-day flight. This cooperative effort between NASA and NASDA (National Space Development Agency of Japan) will feature 22 materials experiments and 12 life sciences experiments. STS-47 payload specialist Mamoru Mohri will be the first Japanese astronaut to fly aboard the Shuttle.

[STS-52](#) -- Columbia will deploy the Laser Geodynamic Satellite, or LAGEOS, spacecraft. LAGEOS is designed to help establish a system of very precise Earth geodesy. LAGEOS is a passive payload with its entire surface covered with special reflectors. The spacecraft is scheduled to arrive at KSC early next year for processing. The mission is scheduled to last nine days and carry a crew of six.

[STS-53](#) -- The last mission manifested for next year is the Space Shuttle Discovery, returning to service following extensive modifications. Discovery is slated for a four-day flight dedicated to the Department of Defense. A crew of five is scheduled to fly.

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