

# Spaceport News



John F. Kennedy Space Center - America's gateway to the universe

[http://www.nasa.gov/centers/kennedy/news/snews/spnews\\_toc.html](http://www.nasa.gov/centers/kennedy/news/snews/spnews_toc.html)

## Kennedy Space Center celebrates 45 years of excellence

By Bill Parsons  
Center Director

The men and women of Kennedy Space Center have been extending humanity's reach and knowledge for 45 years. As we push to return to the moon, it is important that we look back on a remarkable record of scientific and technological achievement for the United States.

The launch complexes dotting Cape Canaveral's shores had been launching rockets for 12 years before ground was broken in 1962 on what would become Kennedy Space Center. With a mandate to build a launch center, NASA and Kennedy's first director, Dr. Kurt H. Debus, set out to build an infrastructure to support the biggest rockets ever devised.

Facilities such as the Operations and Checkout Building, Launch Complex 39 and the landmark Vehicle Assembly Building quickly took shape on the barren sands of the northern tip of Merritt Island.

The agency's cutting-edge team of engineers, technicians and contractors launched astronauts aboard Redstone, Atlas and Titan rockets while the larger Apollo structures were built. They also sent the earliest unmanned spacecraft toward planets in our solar system that were previously out of reach. Missions to Mars, Venus, Mercury and Jupiter complemented the great strides of the manned programs.

Seven years from its inception, Kennedy Space Center would



dispatch the first of six teams of astronauts to the surface of the moon during the Apollo program.

The Kennedy Space Center work force next turned its focus to the space shuttle and the challenges of readying a reusable spacecraft for orbit. Columbia lifted off from Launch Complex 39A on April 12, 1981, to kick off a program that has seen 118 launches in 26 years. Complex missions called for Kennedy to ready spacecraft and equipment for flights that would launch planetary probes, repair the Hubble Space Telescope and process the largest space complex in history: the International Space Station.

NASA also evolved how it



FORMER PRESIDENT Lyndon Johnson (in blue suit above) and former Vice President Spiro Agnew (in beige suit) view the liftoff of Apollo 11 from the Kennedy Space Center VIP viewing site. The two political figures were at KSC to witness the launch of the first manned lunar landing mission, which took place from Pad 39A on July 16, 1969 (at left).

handled the business of launching planetary probes and satellites with the use of the Expendable Launch Vehicle program in the late 1980s. Private contractors took on a larger role in testing and processing spacecraft while NASA maintained oversight of the launch facilities.

As NASA readies new spacecraft for a return to the moon,

Kennedy workers continue to prepare the orbiter fleet for important missions to finish the International Space Station and modify facilities to handle the new Orion vehicles.

The record of success may seem like a finish line to some, but we see it as a starting point for NASA's explorations that power the future.



SPACE SHUTTLE Columbia arrives at Launch Pad 39A on Dec. 29, 1980. The orbiter lifted off on April 12, 1981.

### Special Issue

This commemorative issue of *Spaceport News* is a tribute to the achievements of the men and women who have worked at the Kennedy Space Center during the past 45 years. From the early achievements of the Apollo launches to the successes of the Space Shuttle Program, we salute the employees who have made spaceflight possible.

# Land purchased to give NASA space for new center

By Kay Grinter  
Reference Librarian

Some may not think of NASA as a real estate mogul, but in September 1961, the agency's focus was on the purchase of space. Eighty thousand acres of Florida land were needed for the creation of a large complex to support manned launches using the Saturn and Nova boosters already in their conceptual stages.

The property lay north and west of the U.S. Air Force Missile Test Center facilities at Cape Canaveral. Numerous privately owned homes and businesses were situated on the tract on Merritt Island. Approximately 50 homes comprised the Sunrise Beach housing development, near the location of Pad 41 today.

Space program employees Charlie and June Buchanan purchased a home in Sunrise Beach in 1959. Charlie transferred from Baltimore with the Martin Company on the Pershing project.

In the ensuing 48 years, he has remained an aerospace contractor and is currently with Space Gateway Support.

He recalled: "My daughter was born in 1960 while we were living in Sunrise Beach. When I visited the home site a few years ago, I could still make out her initials carved in the cement of the



THIS BUSINESS across from Sunrise Beach provided the community with groceries and services so families did not have to drive to Titusville driveway.

"Twenty miles was a significant distance. We only drove into Titusville twice a week: to the grocery store on Fridays and to church on Sundays."

June began her NASA career in Public Affairs. Retired since 1995, she recalled: "Sunrise Beach was an active community of young families. At its main entrance was a little restaurant where you could also buy milk and bread between trips into town."

ASRC Aerospace Corp.'s Terry Greenfield relocated from Huntsville, Ala., with the Redstone program in 1956 and still works in the space program 51 years later.

He recalled: "There was a barber shop, too. After NASA purchased the property, arrangements were made for the barber to continue cutting hair from a trailer installed beside the E&L Building. I



AN AERIAL view of the road construction for the intersection of 2nd Street and C Avenue in the center's industrial area.

appreciated NASA's efforts to keep him in business."

One of Greenfield's assignments was with the NASA team analyzing the mobile launch platform concept.

"How do you best distribute the weight of the mobile launcher with the stacked vehicle on it?" was the question," he recalled. "Use of a crawler transporter, rather than a railway or a barge, was the most practical solution because you could spread the weight over its shoes."

All of the buildings were eventually removed to make way for the new launch pads and supporting infrastructure.

Dredged fill from the Banana River and surrounding area was used to alleviate the swampy conditions in the Launch Complex 39 area as site preparation began in 1962.

## Book review: 'A History of the Kennedy Space Center'

Publication of KSC's new history book, "A History of the Kennedy Space Center," is almost here after six years in the making.

Authors Kenneth Lipartito and Orville R. Butler have combed through the archives and interviewed key players in the daily drama of the launch center to capture the essence of Kennedy: "A spaceship has to fly on the ground before it can fly in space."

In the 469-page book, the writers display a kinship with the engineers and technicians processing the vehicles as they

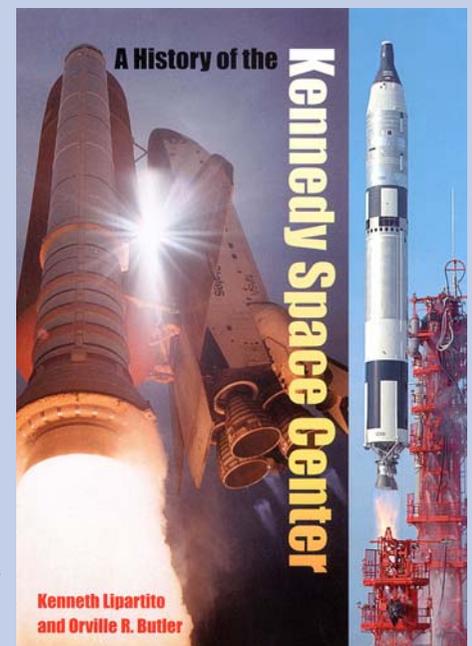
describe the events leading up to the Apollo 9 launch: "How did things look for this, the first mission to test all of the hardware for the moon descent and landing?"

"During a chill-down test, two of the three valves failed and had to be replaced. Workers discovered a fault in a spacecraft battery line, and the "Z" Pipa Bias was out of tolerance. In other words, pretty much the normal daily events of preparing for a launch."

Readers may feel a connection, as well, through this analogy from the post-Challenger era: "The shuttle went through some 1.25 million steps between landing

and launch, which were still taking about 1.25 million person-hours. With three shifts, seven days a week, and 10 percent or more overtime, it was just possible to get the job done, but each orbiter flow was like 'running on the beach with a backpack.'"

"A History of the Kennedy Space Center" will be available on Aug. 12 for \$39.95 in bookstores. Copies may also be purchased directly from the University Press of Florida by calling 800-226-3822 or by visiting the Web site, <http://www.upf.com/book.asp?id=LIPARS07>.



# Dr. Kurt H. Debus: The father of Kennedy Space Center

By Cheryl Mansfield  
Staff Writer

**D**r. Kurt H. Debus may have served a long tenure as the first center director of the John F. Kennedy Space Center, from 1962 to 1974, but his roots at Cape Canaveral and in the United States space program reach even further back in time.

Born in Frankfurt, Germany, in 1908, Debus' education and rocketry experience in his home country landed him in the post-World War II ballistic missile systems development program in the U.S. He and about 100 German colleagues, led by rocket pioneer Wernher von Braun, worked first at Fort Bliss, Texas, before relocating to Huntsville, Ala.

Their work became the focal point of the Army's rocket and space projects and Cape Canaveral became their launch site.

Debus came to the Cape in the early 1950s to set up a launch site, and permanently moved to the area with his family by the middle of the decade. By 1960, the Army Ballistic Missile Agency was

transferred to the National Aeronautics and Space Administration. On July 1, 1962, the Florida launch facility at Cape Canaveral was officially designated as NASA's Launch Operations Center and Debus was officially named its first center director.

By that time, construction of the spaceport under Debus' leadership was well under way. While the space hardware was under development, physical structures like the launch pads and the Vehicle Assembly Building rose on what had been coastal wilderness.

Amid the flurry of building facilities and developing rockets that would take men into orbit and on to the moon, Debus had the forethought to consider the natural environment that surrounded the center. He arranged for the U.S. Department of the Interior to establish and maintain a wildlife refuge at the space center. Thanks to his efforts, the 140,000-acre Merritt Island National Wildlife Nature Refuge exists today.

With growing pride on the part of the public toward the space

program, Debus secured support for the first visitor center, as well.

By the time Debus retired as center director in 1974, the list of human space achievements under his leadership represents some of the greatest in U.S. history. Among them:

- 1961: Alan Shepard Jr. became the first American in space
- 1962: John Glenn Jr. became the first American to orbit Earth
- 1969: The Apollo program's first lunar landing; Neil Armstrong was the first man on the moon
- 1973: Skylab, a science and engineering laboratory, was launched into Earth orbit

To this day, the landmarks accomplished in less than 20 years, from early rocket testing to man's first footprint on the moon, are still astonishing.

After leaving the space center in 1974, Debus continued to live in nearby Cocoa Beach until his death in 1983. Despite the vast accomplishments that occurred under his watch, his daughter, Sigi Northcutt, said he always emphasized that teamwork made it all possible. "He did not take credit himself; he felt it was everybody's baby," she said.

Northcutt describes her father's legacy in more down-to-Earth terms: "His main purpose in doing what he did was to further mankind's standard of living and standard of knowledge." She adds that he'd be proud to see all the



DR. KURT H. Debus, the first director of the Kennedy Space Center from 1962 until 1974.

everyday benefits that have come from the space program.

And what would her father think of the direction of space exploration today? "I think he'd be very excited about going to Mars, the prospect of going back to the moon, and going into outer space and discovering the universe," she said.

So it's fitting that the developments Debus helped mastermind in both facilities and rocketry live on today at KSC, helping to usher in NASA's new goals to go back to the moon, then travel to Mars and beyond.



DR. WERNHER von Braun (left) and Dr. Kurt H. Debus attend the Saturn 500F rollout from the Vehicle Assembly Building in May 1966.



AT THE opening of the Early Space Education and Conference Center in February 2000 at the KSC Visitor Complex, the facility is dedicated to Dr. Kurt H. Debus. Attending the dedication, from left, are former Delaware North President Rick Abramson, Ute Debus, former KSC Director Roy Bridges and Sigi Debus Northcutt. Ute and Sigi are the daughters of Debus.

# 1962-69: Transforming swamps into a spaceport

By Steven Siceloff  
Staff Writer

**W**e don't know exactly where the first fire was built, or who made it. But we know where humans turned that fire into thrust and rode it into the heavens.

That place is here, and there are still plenty of people to testify about the days when Kennedy Space Center was still emerging from an oceanside wilderness punctuated by the occasional citrus grove.

"The mosquitoes were horrible," said NASA retiree Charlie Parker. "If you think we've got mosquito problems now, multiply it by tenfold, or a hundredfold."

Parker came to the Cape Canaveral launch area in 1960 to work on the Army's Pershing missile program.

Ambitions to put men into space were tempered by the realization that there was still a lot to learn about even simple rockets before entrusting them with the lives of astronauts. This was a time when the health of a rocket's engine was judged by the knowing eye of an engineer looking at the color of the exhaust flame instead of by a studied reading of telemetry.

But it was also a time when global political ambitions dictated



THE LAUNCH Complex 39A area in 1964. The first Saturn V rocket lifted off two years later.

determination on the part of NASA. For the rocketeers, that meant making stronger engines, bigger fuel tanks and, above all, safer designs.

For the burgeoning space agency, it meant building a permanent launch base on Merritt Island while still launching satellites and astronauts from launch pads at Cape Canaveral Air Force Station.

The Army and Air Force had been launching missiles from Cape Canaveral for nine years by the time NASA selected its first elite

corps of astronauts in 1959. Still, Norris Gray, a former NASA rescue and safety officer known as "Chief," said the requirement for a permanent base was unexpected.

"We thought (spaceflight) was just a passing fancy," he said.

Kennedy Space Center officially opened as the NASA Launch Operations Center in 1962, when four astronauts had reached space and only two of them had seen orbit. But that didn't stop the rush of construction crews onto the base to build the Operations and Checkout Building and Headquarters Building.

The work force itself also saw fast changes. Dr. Kurt H. Debus directed fewer than 300 workers when NASA was chartered in 1958. Ten years later, his KSC work force peaked at more than 26,000,

including contractor employees.

Construction began for the monumental Vehicle Assembly Building in May 1963 with the driving of the first of 4,225 steel pipe piles. By the time it was finished, the structure had consumed enough steel in its frame to build 58,000 cars.

The launch pads of Launch Complex 39A and 39B for the Saturn V presented fresh challenges. The flame deflector alone for the Saturn V was half as tall as the whole Mercury-Redstone rocket that shot Alan Shepard into space in 1961.

Four years after Shepard's flight, NASA had its starting point for moon missions. Another year after that, 1966, saw the first Saturn V lift off the pad.

"The Saturn V had quite a big impact on the range," said Angelo J. Taiani, who worked on several projects back then and helped develop a weather balloon that is still used today.

It would be only a few more months before that optimism was tested on Jan. 27, 1967. "That was when we lost our three astronauts," Gray said.

There were plenty of tests during the first decade, but the spectacular successes of launching astronauts into space, then landing them on the moon, showed what the young agency and its fast-maturing cadre of workers could accomplish.

As big as the change was in less than a decade, it did not shock most of the folks closest to it. "Our technology was moving ahead; I expected to see it," Gray said.



ANGELO TAIANI (left), Charlie Parker and Norris Gray have worked at the center since the early 1960s. The three now volunteer to assist the KSC News Center during launches, landings and other events.



THIS JULY 1963 aerial photograph shows the early steel construction of the Operations and Checkout Building. The same building used to build Saturn V rockets will be utilized to construct the Orion spacecraft.

# The '70s: Apollo lessons contribute to shuttle program

By Jennifer Wolfinger  
Staff Writer

The 1970s marked a decade of multitasking, and spaceport workers perfected that skill. They juggled the alpha and omega of several programs, were responsible for all aspects of a mission from design through landing, created many programs still supported today, and built a strong foundation for future exploration endeavors.

The agency began the 1970s with the development of the Titan-Centaur, an unmanned expendable launch vehicle that provided unprecedented strength for missions to the sun, Mars, Jupiter, Saturn, Uranus and Neptune. These missions are in addition to the dozens of spacecraft launched during the decade, by vehicles such as the Delta and Atlas-Centaur, which provided photographs and original scientific data of our solar system.

Exotic regions like the Descartes Highlands, Hadley-Apennine and Fra Mauro may sound like a tourist's dream destinations, but these are lunar

surfaces that NASA astronauts explored in the 1970s. During the decade, NASA launched five Apollo missions including the triumphant Apollo 13 and the program's final mission, Apollo 17. Via these missions, 15 astronauts journeyed into space and eight actually walked on the moon. Also, a small sub-satellite was left in lunar orbit and crews drove the lunar roving vehicle.

Russel Rhodes, a technical management aerospace technologist in the Engineering Directorate, said that before and during this era, NASA disproved preconceived notions about spaceflight and the work force was immersed in all mission phases. This allowed him to perform daunting tasks such as independently fueling a Saturn rocket in 1962.

"We were breaking new ground and many people thought we were crazy for attempting to travel to the moon," said Rhodes, who was a U.S. Army draftee assigned to the space program in 1959.

Long before the International Space Station's Expedition crews started calling space a second home, NASA proved humans could thrive in space through the Skylab Program. When NASA's first space station was launched into orbit on May 14, 1973, it suffered damage that made its temperatures soar to an uninhabitable 126 F. Once these issues were resolved, three different three-man crews lived on the outpost between May 1973 and February 1974 conducting nearly 300 experiments.

At the decade's midpoint, the U.S. and Russia began their first joint effort, known as the Apollo-Soyuz Test Project, to test compatibility of the rendezvous and docking systems of two spacecraft. For two days between July 15 and 24, 1975, the Apollo and Soyuz spacecraft were joined while crew members conducted experiments.

During the late '70s, NASA focused on and embraced the new space shuttle era. Warren Wiley, special assistant for engineering and technical operations, fondly



IN PREPARATION for their April 16, 1972, launch, Apollo 16 astronauts Charles Duke and John Young simulate navigating the lunar surface at a training area located at KSC.

recalled many firsts from the decade. These included supporting the first space shuttle main engine test, accepting delivery of the original three Columbia engines for NASA, testing new methods to remove engine components, and developing new heat shields. Wiley, who joined NASA in 1971 as a systems engineer, sees many parallels between the transition to the shuttle and the current segue to Constellation Program work.

"We went to reusable aircraft-like spacecraft from traditional rocket systems and the discontinu-

ance of the launch umbilical tower, and now we're returning to those systems and rebuilding the umbilical tower," Wiley said.

"It feels really good to watch the programs come along. From Apollo to Skylab to shuttle, it was very busy, but there was some downtime regarding launches during these transitions. We're going to see that again, but people will be motivated by the exciting exploration goals and the development and activation of new facilities."



ON AUG. 20, 1977, the Voyager 2 mission launched from Complex 41 at Cape Canaveral Air Force Station aboard a Titan III-Centaur-7 launch vehicle.



A PLANE flies over the developing Launch Complex 39 area, including the Vehicle Assembly Building on May 21, 1976. After President Gerald Ford selected KSC as the site of the U.S. Bicentennial Exposition on Science and Technology, exhibit domes were erected and the assembly building became a canvas for the largest American flag ever painted.

# A look back at 45 years of the k



AN ATLAS-AGENA 5 carrying the Mariner 1 spacecraft lifted off July 22, 1962 from Cape Kennedy Launch Complex 12. The Mariner spacecraft was the first to orbit Venus.



THIS AERIAL view of Missile Row at the Cape Canaveral Air Force Station was photographed Nov. 13, 1964. The view is looking north.



THE APOLLO Saturn V 500F facilities test vehicle after conducting stacking operations inside the Vehicle Assembly Building, rolls out to Pad 39B on crawler, launch umbilical tower and operations in May 1965.



A VIEW from inside bay three of the Vehicle Assembly Building shows Space Shuttle Discovery as it makes a nighttime departure on its way to Pad 39B on July 4, 1988. Discovery flew on mission STS-26 with a five-man crew in September 1988, the first flight after the Challenger accident.

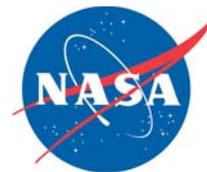


THE SPACE Shuttle Atlantis thunders skyward from Launch Pad 39A. Liftoff of Mission STS-45 occurred on March 24, 1992. On board for the 46th shuttle flight were a crew of seven and the Atmospheric Laboratory for Applications and Science-1.



IN SPACECRAFT Assembly and Encapsulation Facility petals of the Mars Pathfinder lander in October 1996 are visible on one of the three petals.

# Kennedy Space Center



OVERALL VIEW of Firing Room 2 in the Launch Control Center during the countdown demonstration test for the Apollo 12 mission in October 1969.



IN AUGUST 1972, Apollo 17 Commander Gene Cernan and Lunar Module Pilot Harrison Schmitt prepare the Lunar Roving Vehicle and the Communications Relay Unit. Astronaut Gordon Fullerton, standing at left, discusses test procedures to be performed in the high bay of the Manned Spacecraft Operations Building, now called the Operations and Checkout Building.



IN NOVEMBER 2004, the Delta II launch vehicle for NASA's Swift spacecraft is silhouetted against a rosy sky at sunrise, waiting for liftoff from Launch Pad 17-A on the Cape Canaveral Air Force Station. Swift was a first-of-its-kind multi-wavelength observatory dedicated to the study of gamma-ray burst science.



THIS MOTHER eagle turns away from one of her offspring, at left, in their nest at the north end of State Road 3 near Kennedy Space Center. The refuge includes several wading bird rookeries and approximately 2,500 Florida scrub jays. It also is a major wintering area for migratory birds. More than 500 species of wildlife inhabit the refuge, with 14 considered federally threatened or endangered.

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# 1980-89: Space shuttle, ELV programs accomplish many firsts

By Linda Herridge  
Staff Writer

NASA ushered in a new era of spaceflight with the space shuttle's inaugural launch in 1981, setting the pace for a decade that would bring monumental leaps in aeronautic achievements.

After a two-year checkout of the orbiter, the program kicked off on April 12, 1981, with the successful launch of Space Shuttle Columbia on mission STS-1. The first operational test flight from Kennedy Space Center's Launch Pad 39A carried Commander John Young and Pilot Bob Crippen into orbit.

Young said KSC did a lot of work to prepare the vehicle for launch after it arrived in 1978. "We were delighted when we got into orbit," Young said.

"We learned that we can build a complicated vehicle and make it work very well."

The early flights helped NASA build on its knowledge of the vehicle and its capabilities.

"We learned that humans in space are very adaptable and capable. And we also learned that the vehicle required a lot of care and was not forgiving of mis-



TO HONOR the 25th anniversary of the first space shuttle launch on April 12, 1981 (pictured left), STS-1 Pilot Bob Crippen (below left) and Commander John Young sit in front of a mockup of a shuttle at the Kennedy Space Center Visitor Complex in April 2006 to share their experiences on that historic flight.



takes," Crippen said.

Dr. Guion Bluford, the first African-American astronaut to fly on a space shuttle, was a mission specialist on STS-8, launching aboard Challenger on Aug. 30, 1983. "I wanted to set the standards of excellence for African-American astronauts and to help

demonstrate the benefits of diversity in manned space operations," Bluford said.

The agency accomplished many firsts, such as retrieving solid rocket boosters, landing the shuttle at White Sands, New Mexico, deploying two commercial communications satellites, and performing tethered and untethered spacewalks. The first deep-space probe (Magellan) was carried aboard Atlantis on mission STS-30 on May 4, 1989.

After 18 operational flights that safely carried 116 astronauts and more than 30 major payloads into orbit aboard shuttles Columbia, Challenger, Discovery and Atlantis, challenging times arrived.

The NASA family lost the seven-member crew of Challenger on Jan. 28, 1986, when a solid rocket booster failure caused the shuttle to break apart just 73 seconds after launch on mission 51-L. Gene Thomas was launch director on that fateful day.

"We learned the reality of space travel can be extremely hazardous and that it will never be completely safe and routine," Thomas said. After the agency investigation, he led the effort to reorganize the center's safety,

quality and reliability operations.

Space shuttle flights resumed with the launch of Discovery on mission STS-26 on Sept. 29, 1988.

During the '80s, expendable launch vehicle operations at KSC were evolving into what would later become NASA's Launch Services Program. KSC planned and conducted 47 launches from Launch Complexes 17, 36 and 41 at Cape Canaveral Air Force Station, and from Space Launch Complex 2 at Vandenberg Air Force Base, Calif.

Atlas-Centaurs launched Intelsat international communications satellites into orbit, while Delta vehicles launched SATCOM domestic communications satellites.

During the 1988-89 timeframe, the agency took initial steps to transition from owning and directing the flight hardware to the role of buying a launch service. The Delta and Atlas launch teams were merged into one launch operations division and the launch pads were transferred to the U.S. Air Force.

This progression led to the overall Expendable Launch Vehicle program's location at KSC.



THE EXPENDABLE Launch Vehicle program relied upon the Atlas (at left, launching Intelsat V in December 1981) and Delta (launching the Solar Maximum Mission in February 1980) launch vehicles in the '80s.

# The '90s: A decade of renewal for NASA

By Anita Barrett  
Staff Writer

The Space Shuttle Program of the 1990s was a rebirth following the Challenger accident in 1986. It was not easy, according to former Shuttle Launch Director Bob Sieck, now retired.

“We had to ramp up to a realistic launch schedule and needed to meet new requirements in safety resulting from Challenger, as well as new tools and upgrades.” The team was learning to service complex vehicles under challenging conditions.

Sieck considers the results of the ramping up a real milestone as the program achieved six launches in 1990 and 1991, eight in 1992, seven per year from 1993 to 1996, and eight again in 1997.

A look at the launch history in the decade reveals technical problems that delayed liftoffs, such as hydrogen leaks.

According to current Shuttle Launch Director Mike Leinbach, “Each instance was an opportunity to learn the nuances of the hardware and software in order to overcome the problems.” For

instance, hydrogen leaks were traced to plate attachments, which were redesigned. The result of this and other lessons learned were fewer launch delays after 1995, other than those caused by weather.

Even the weather has been less of an issue, Leinbach said, as there have been improvements in weather forecasting.

Sieck points to another technical milestone of the modification of the landing equipment. “The drag chute modification was the result of lessons learned about the need to relieve some of the stress on the main landing gear system on landing,” he said.

Leinbach added that lessons learned and resilience of the team contributed to the STS-83 mission in 1997 “when one of the fuel cells failed shortly after launch.” The shuttle flight rules require all three fuel cells to be functioning well to ensure crew safety and provide sufficient backup capability during reentry and landing.

“In the event of a failure, the rules say to return as soon as possible. Since the trans-Atlantic landing site was not available, we were told to wait a day,” said Leinbach. “The orbiter continued to function well, so landing was put off another day. The team’s understanding of the hardware enabled a consensus decision to change the rules and allowed the mission to continue a few days.”



FRAMED BY the Vehicle Assembly Building (above), Space Shuttle Columbia glides onto the Shuttle Landing Facility on July 17, 1997, at the end of mission STS-83.



FORMER KSC Director of Shuttle Operations Robert Sieck (center) shakes hands with former Secretary of State Madeleine Albright after launch of Space Shuttle Endeavour on mission STS-88 in December 1998.

The mission management team finally opted to end the mission early, four days after launch, but a number of experiments planned for the mission were completed in that time.

### Expendable Launch Vehicles

On the expendable launch vehicle side, the late '90s offered the major milestone of the decade, according to Ray Lugo, deputy manager of the Launch Services Program.

“That was when KSC transitioned from a launch-only site to one providing processing, spacecraft integration and launch services,” said Lugo, who was the NASA launch manager at the time.

“Executing the transition plan was a big effort to work out

the details with Goddard (Space Flight Center) and Lewis (now NASA Glenn Research Center) of what models, tools and codes, and what people to include. From an original organization of 50 employees, we had to recruit and hire, then find office space.

“It was an exciting time putting something new together. Looking back, we did OK,” said Lugo.

The transition also enabled lessons learned to come into play. The transition team benchmarked procedures at the other sites and adopted the best of each. According to Lugo, they were able to document what worked or didn't. “We tried to take the variability out of the processes, using lessons learned of the people involved.”

A successful milestone was the launch of the Cassini spacecraft on Oct. 15, 1997, which Lugo oversaw. “It was the last big planetary mission, a multibillion-dollar one, and the first launch of a Titan IV rocket,” said Lugo.



EMPLOYEES PROCESS NASA's Cassini spacecraft (above) in the Payload Hazardous Servicing Facility in June 1997. Cassini launched aboard an Air Force Titan IV rocket Oct. 15, 1997 (left). The mission was the first launch of a Titan IV rocket.

# Kennedy gains newfound strength in new millennium

By Anna Heiney  
Staff Writer

Robert Curbeam and Christer Fuglesang had their work cut out for them.

With mission STS-116 drawing to an end, time was running out to retract the P6 solar array. It had to be retracted completely to allow station assembly to continue. The world waited as the two mission specialists used their gloved hands to work the kinks out of the balky array in the vacuum of space. Finally, after six-and-a-half hours, controllers applauded as the arrays were retracted and safely tucked away.

That spacewalk represents a triumph over adversity that exemplifies the NASA spirit. As we stand on the edge of a new challenge, we should reflect on some of the highlights of NASA's many achievements since the turn of the new century.

Assembly of the International Space Station took center stage early in the decade. As the space shuttle fleet carried new residents and hardware to the station, high-flying construction crews expanded the orbiting lab's capabilities. The STS-101 mission marked the first servicing mission. Mission STS-92, the 100th shuttle flight, delivered the Z-1 truss segment. Subsequent missions brought the installation of the Destiny lab, the first crew shift change in orbit, and other station components.

During the same period,



IN THE Space Station Processing Facility (left), workers and the STS-98 crew gather for a ceremony to turn over the key for the U.S. Lab Destiny to NASA. Above is Stephanie Stilson, Discovery flow director. Stilson oversaw many modifications to the orbiter, including changes to the wing leading edge sensor system.

NASA's Launch Services Program launched several spacecraft on expendable vehicles. Many were Earth-observing spacecraft, including a series of weather forecasting satellites. A host of scientific and planetary missions featured the Mars Odyssey spacecraft and Genesis. The HETE-2 launch in 2000 marked NASA's remotely managed liftoff and first launch from the Kwajalein Missile Range in the South Pacific.

The NASA family was dealt a heavy blow when foam from Space Shuttle Columbia's external tank punctured the orbiter's left wing

during launch, leading to the loss of seven astronauts and Columbia on Feb. 1, 2003. The shuttle fleet was grounded as the agency coped with the loss and began working on safety improvements and modifications.

Two bright sources of light in a dark year for NASA were the launches of the twin Mars Exploration Rovers, Spirit and Opportunity. The duo lifted off on separate vehicles one month apart during the summer of 2003 and embarked on a journey to the red planet.

Spirit descended through the Martian atmosphere on Jan. 4, 2004, and quickly began beaming breathtaking photographs to delighted scientists on Earth. Spirit's twin, Opportunity, followed with a landing on Jan. 25.

On Jan. 14, only 10 days after Spirit's arrival at Mars, President George W. Bush announced the nation's Vision for Space Exploration: to build new vehicles for journeys to the moon and beyond.

The first step — returning the shuttle fleet safely to flight and completing the station — prompted extensive shuttle and external tank upgrades and redesigns.

"Changes to the external tank gave us confidence," explained

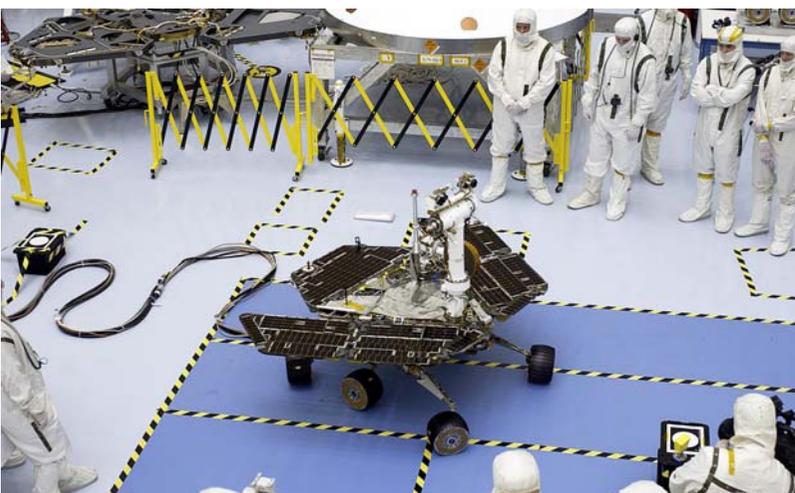
Discovery Flow Director Stephanie Stilson. "In addition, modifications such as the orbiter boom subsystem and wing leading edge sensor system gave us the ability to search for damage while on orbit and evaluate any areas of interest prior to reentry.

"These modifications paved the way for getting the fleet back in space to continue the all-important task of building the International Space Station," she added.

Discovery lifted off on STS-114 on July 26, 2005, on a mission highlighted by an orbital backflip, new equipment and procedures, and the first in-space orbiter repair. But a chunk of foam came off the tank during liftoff, touching off several additional months of redesign work.

On July 4, 2006, Discovery again blazed a trail toward orbit on STS-121. The tank performed well and regular shuttle flights and station assembly resumed.

Meanwhile, the Launch Services Program sent an impressive array of spacecraft on a variety of Earth-observing, scientific and planetary missions. These included MESSENGER, Deep Impact, New Horizons, STEREO and many others.



IN THE Payload Hazardous Servicing Facility at KSC, the Mars Exploration Rover-2, also known as Opportunity, is tested for mobility and maneuverability. The spacecraft lifted off in the summer of 2003.

# Dignitaries discover out-of-this-world experience at spaceport

By Elaine Marconi  
Staff Writer

If there was an eighth wonder of the world, some might argue it could be Kennedy Space Center, the launch capital of the United States.

Where else on Earth have so many kings, queens, presidents, heads of state, politicians, movie stars, musicians and everyday people stared in awe at the vehicles that soar into space?

Visitors to Kennedy Space Center have numbered in the tens of millions throughout the 45 years the center has served the nation's space program.

During those years, many distinguished visitors and VIPs have been given a "red carpet" tour of the center.

President John F. Kennedy was the first dignitary to visit KSC in 1962. Since then, the KSC guest book has read like a "who's who" of the world. Other U.S. presidential visits to the center included Lyndon Johnson, Jimmy Carter, George Bush Sr. and Bill Clinton.

First Lady Laura Bush witnessed the historic launch of Space Shuttle Discovery on return-to-flight mission STS-114 in July 2004. She is only the third First Lady to attend a shuttle launch. More recently, Vice President Dick Cheney was on hand in July 2006

to view the first attempt of the STS-121 launch.

Kennedy has hosted tours and events for musicians like Jerry Vale, Gary "U.S." Bonds, the 5th Dimension, Paul Revere and the Raiders, Donny Osmond and Aerosmith.

Manny Virata, who leads media projects for KSC Public Affairs, has escorted hundreds of notables in his 30-plus years with NASA. "Singer Jerry Vale was in awe of the space center after finding out what we did here," said Virata. John Denver was a "space nut" who came to many launches with his son Zack, Virata said.

Royalty included Emperor Haile Salassie I of Ethiopia, Prince Philip of England, Nehru of India, King Hussein of Jordan and Queen Beatrix of the Netherlands. The Saudi royal family was at Kennedy for the launch of Discovery on mission STS-51G in June 1985 to support family member Sultan Salman Abdulaziz Al-Saud. The sultan flew as a payload specialist representing the Arab Satellite Communications Organization.

Major television journalists including Walter Cronkite, Peter Jennings, Katie Couric, David Hartman, Charles Gibson and news anchors from around the world have traveled to KSC to report on the exciting launches and participate in special events held at



FORMER PRESIDENT Jimmy Carter (second from right) and former First Lady Rosalyn Carter listen to NASA employee Bill Dowdell's explanation of the modules in the Space Station Processing Facility in January 2002. With them are former Center Director Roy Bridges Jr. (right of Jimmy Carter) and Tip Talone (left of Rosalyn Carter), now associate manager of the Constellation Program at KSC.

the center.

Virata remembers touring race car drivers Ryan Newman and Jimmy Johnson. He said he showed them "our race car, which was the crawler (transporter)," and kidded them, "We get 38 feet per gallon." He remembers how much they enjoyed exploring the crawler.

Space-related movies like "Apollo 13," "Contact," "Space Cowboys," "Armageddon" and "The Right Stuff" brought film crews here. The fascinating activities at Kennedy enticed visits by celebrities such as Tom Hanks,

Ron Howard, Steven Spielberg, George Lucas, Warren Beatty, James Garner, Bruce Willis and Tommy Lee Jones, to name just a few.

"Hanks is a huge supporter of the space program," said Virata.

Crews from the Discovery Channel and CNN are two of many media outlets that have come to KSC to film documentaries about the space program and the shuttle.

After 45 years, visitors to the space center, whether well-known or not, still leave with a keener understanding and deeper interest in the nation's space program.



ACTOR TOM Hanks (left), film director Ron Howard (wearing hat) and a production crew film scenes at KSC in December 1994 for the movie "Apollo 13."



NASCAR DRIVER Jimmie Johnson tries out a seat of another vehicle known for speed: the orbiter Endeavour. Johnson and other drivers were on a tour of KSC in July 2003.

# Constellation Program to transform Kennedy's landscape

By *Corey Schubert*  
Copy Editor

**D**on't believe your eyes. That may be the best advice to give anyone who gazes upon the Kennedy Space Center skyline in the coming months, and wonders when its appearance will transform for NASA's Constellation Program.

It might appear at first glance that little has changed at KSC's facilities to prepare for launching the next generation of spacecraft that will take mankind back to the moon, then to Mars and beyond. But many of the most sweeping future advancements already are in motion.

Now, as the center celebrates its 45th successful year as the agency's launch operations center, those upcoming changes – including a revamped launch pad, a new mobile launcher and a different layout in the Vehicle Assembly Building – mainly involve improving existing facilities and concepts instead of creating new ones from scratch.

"We're trying to pretty much build on what we have, drawing from the best ideas out there," said

Scott Colloredo, NASA's senior project integrator for Constellation ground systems. "Our budget is limited early in the program, and we're trying as best we can to reuse KSC infrastructure and only replace what makes sense."

The biggest and perhaps most noticeable conversions will be Launch Pad 39B, which will become what's known as a "clean pad," and a new mobile launcher. Almost everything the vehicle needs for liftoff will be on the mobile launcher, including the launch tower.

The new mobile launcher will more closely resemble the kind used for the Saturn V rather than the launcher platform now used to lift off the shuttle. The crawler transporter's service will be extended once again to transport the Ares I launcher to and from the pad.

While most of the pad's new look will be in the design phase for at least two years, KSC plans to begin building one aspect of it later this year: a new lightning protection system at the pad with three massive towers, each about 600 feet tall, that will form a protective shield around the vehicle.

The pad and launcher will work together to support an emergency egress known as a "rail system," which resembles a rollercoaster, for flight and ground crews to quickly leave the pad if necessary.

Engineers already have started designing the basic infrastructure of the mobile launcher, with fabrication planned to begin in a year. Employees will be able to see the launcher being built at a site currently used to park one of the mobile launcher platforms, just north of the Vehicle Assembly Building.

Although specific changes to the Vehicle



THIS ARTIST concept reveals major changes to Launch Pad 39B, including a new lightning protection and emergency egress systems.

Assembly Building are still being considered, the current plan calls for modifying high bay 3, Colloredo said.

"Today, you have a set of eight big platforms that service the shuttle and wrap around it," he said. "As of today, our plan is to take those out and replace them with new platforms that go much higher to service the much taller Ares I."

Those upgrades, if approved in the design phase, will begin in about two to three years.

The Launch Control Center's Firing Room 1 is being remodeled

to serve as the initial firing room for the Constellation Program. Workers have removed the equipment used to launch the shuttle and the room will be modernized with a different launch team layout, and new command and control systems, consoles and architectural designs.

Other KSC facilities, including the Operations and Checkout Building's high bay, will receive upgrades.

"Even though a lot of people aren't seeing visible changes right now, it's an exciting time," Colloredo said.



SCOTT COLLOREDO (left), NASA senior project integrator for Constellation ground systems, examines Launch Pad 39B with Don Burris, NASA engineer, and Curt Satterthwaite of Science Applications International Corporation.



John F. Kennedy Space Center

## Spaceport News

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