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Spaceport News

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

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New year brings new exploration goals, ideas

By Allard Beutel
Spaceport News

In 2010, Kennedy Space Center helped begin a new volume to the agency's space exploration book as the storied Space Shuttle Program entered into its final chapters.

Kennedy teams were involved in launching five missions last year; two on expendable launch vehicles and three on space shuttles. And on Dec. 8, SpaceX successfully launched its Falcon 9 rocket and Dragon capsule from Cape Canaveral Air Force Station (CCAFS). The flight was the first for NASA's Commercial Orbital Transportation Services (COTS) program, which is developing commercial supply services to the International Space Station. It also was the first time a commercial company launched and returned a spacecraft to Earth.

Commercial companies going to low Earth orbit for both cargo and crewed missions were the focus of a new direction for NASA announced in February by the White House. That was followed up by a visit by President Obama to Kennedy on April 15 to outline details of his plans for the future of U.S. leadership in human spaceflight. The president committed NASA to a series of developmental goals leading to new spacecraft for reaching low Earth orbit and new technology for potential missions beyond the moon.

See **EXPLORATION**, Page 2

NASA file photos

From top left: President Barack Obama speaks in the Operations and Checkout Building on April 15. A United Launch Alliance Atlas V launches with NASA's Solar Dynamics Observatory from Space Launch Complex-41 at Cape Canaveral Air Force Station on Feb. 11. On May 14, an exhaust plume surrounds the mobile launcher platform on Launch Pad 39A as space shuttle Atlantis lifts off on the STS-132 mission. The Dragon capsule that launched from Launch Complex-40 at Cape Canaveral Air Force Station aboard a SpaceX Falcon 9 rocket is recovered in the Pacific Ocean about 500 miles west of the coast of Mexico on Dec. 8.

Discovery closes in on mission

By Steven Siceloff
Spaceport News

Space shuttle Discovery remains in the Vehicle Assembly Building (VAB) as modifications and repairs are made to the external fuel tank's support beams known as "stringers." Additional support structures called radius blocks are being added to 94 stringers, meaning the entire circumference of the external tank will be strengthened by the time all the repairs and modifications are finished.

"The teams have done a tremendous job of staying focused and working this problem," said Bill Gerstenmaier, NASA's associate administrator for Space Operations. "There's been lots of ups and downs but the team has really stayed focused."

Meeting Monday, space shuttle management approved the modifications using the radius blocks. The repairs to the cracked stringers themselves have been finished.

"It's been a long road," said John

See **DISCOVERY**, Page 3

Inside this issue . . .

2010 great for Kennedy, but 2011 promises to be better

The future holds great things for Kennedy Space Center, and along the way, there will be some tough challenges and exciting opportunities. The KSC team will be key to making 2011 one of the most notable years in the space exploration history books.

This year, we have three main priorities. First, we must safely launch and land the final space shuttle missions. The Space Shuttle program closes out its historic three decades this year, and it's our responsibility and privilege to successfully see it through to the final "wheels stop."

Director's Note

Bob Cabana

Next, we need to provide the Launch Services Program with the same diligence we have in the past to ensure the success of NASA's science missions.

And, finally, we will continue the hard work and innovation required to transition from the Constellation Program to our new space exploration efforts. This transition is made even more challenging with the ongoing budget uncertainty, but that just means we'll have to get even more creative to make it work. I know we have the right people at KSC to make it happen, and we'll ensure they are in the right place to make these new ventures successful.

Change brings with it the opportunity to do our jobs even better. Through this year, we will continue to look at the organization structure of KSC and pursue efforts to align our assets to best accomplish our mission and goals.

More information will be released as the timeframe of these changes is solidified.

This is going to be a great year, and it's a privilege to be a part of this outstanding KSC team that will continue to do what is necessary to ensure the success of our Nation's human spaceflight and exploration programs.

Keep Charging!
Bob Cabana

From **EXPLORATION**, Page 1

NASA's Launch Services Program (LSP) based at Kennedy started its year on Feb. 11 by sending the agency's Solar Dynamics Observatory (SDO) into space aboard an Atlas V rocket from Launch Complex-41 at CCAFS. SDO is a first-of-its-kind mission to reveal the sun's inner workings in unprecedented detail.

Less than a month later, NASA's latest Geostationary Operational Environmental Satellite, or GOES-P, lifted off aboard a Delta IV rocket from Space Launch Complex-37 at CCAFS. The latest National Oceanic and Atmospheric Administration (NOAA) satellite joined four other similar spacecraft to improve weather forecasting and monitoring of environmental events.

Just three days before the LSP's first flight of 2010, the Space Shuttle Program launched its first of three missions aboard shuttle Endeavour on Feb. 8. STS-130's six astronauts delivered the Tranquility node and cupola to the International Space Station (ISS) during the two-week flight.

On April 5, space shuttle Discovery launched on its STS-131 mission to deliver science experiments, equipment and supplies to the space station. Discovery and its seven-member astronaut crew landed at Kennedy 15 days later.

What turned out to be the final shuttle mission of the year, STS-132, lifted off on May 14. Shuttle Atlantis and its six astronauts delivered the Russian-built Mini Research Module, cargo and critical spare parts to the station. Atlantis touched down at Kennedy after the 12-day mission.

STS-132 was the last scheduled spaceflight for Atlantis. Currently, it's planned to be used as the "launch on need," or potential rescue mission for the final scheduled shuttle flight, Endeavour's STS-134 mission. Among the new directions in the NASA Authorization Act of 2010 passed by Congress in September and signed by President Obama in October was the approval to turn Atlantis' planned rescue mission into an actual flight to the space station this summer. NASA intends to fly this flight pending resolution of funding considerations.

The STS-133 mission will add the final pressurized module to the U.S. portion of the ISS is set to be the first flight of 2011. A hydrogen gas leak on Discovery's external fuel tank scrubbed a Nov. 5 launch attempt. On Dec. 22, Discovery was rolled off Launch Pad 39A and back into the Vehicle Assembly Building for more tank analysis and modifications.

Kennedy management also focused on bringing new commercial companies to the space center. In June, the official groundbreaking ceremony for NASA and Space Florida's new technology and commerce park, known as Exploration Park at Kennedy, was held outside the Space Life Sciences Laboratory. Exploration Park is designed to bring new aerospace work to the area and support space-related activities of NASA, other government agencies and the U.S. commercial space industry. They also set up a new Center Planning and Development Office to enhance the economic vitality of Kennedy.

After supporting its last space shuttle in 2009, Kennedy's Launch Pad 39B began being deconstructed this year to convert it from a shuttle launch pad to a commercial launch site that could host multiple launch vehicles. Phase one of NASA's new mobile launcher was completed this year, too. The 355-foot-tall tower could be converted to support commercial launch vehicles or possibly even large heavy-lift rockets.

Four years worth of upgrades to Kennedy's Launch Equipment Test Facility also were completed this summer. The LETF, which has fixtures that can simulate launch conditions, can support the Space Shuttle Program in its final months, as well as the Launch Services Program and commercial companies in the coming years.

To support the agency's new direction, the Space Transportation Planning Office was established at Kennedy to help develop a commercial capability to low Earth orbit leading to astronaut launch services that NASA could buy to the International Space Station in the 2015 time frame. The 21st Century Space Launch Complex program was established to help modernize Kennedy's infrastructure and facilities and transform them from a space shuttle launch port into a multipurpose launch complex. Kennedy also is working on technology demonstration spaceflight plans that will support NASA's new long-term exploration goals.

To help with the shuttle program retirement, Kennedy held two large-scale jobs fairs last year, one in May and the other in September, along with months of career-building courses and other work force support efforts. The Federal Aviation Administration also began establishing an office at Kennedy this year to help support the commercial human launch services endeavor.

Kennedy also expanded its "green space" efforts in 2010. On April 8, NASA, Florida Power & Light (FPL) and political leaders commissioned FPL's Space Coast Next Generation Solar Energy Center. In December, Kennedy's new Propellants North Administration and Maintenance Facility was reopened for business. It will be one of NASA's "greenest" facility, expected to achieve the U.S. Green Building Council's Leadership in Environmental and Energy Design (LEED) Platinum status, the highest rating. And this summer, Kennedy helped with the unprecedented effort to save wildlife from the effects of the BP Deepwater Horizon oil spill in the Gulf of Mexico. Hundreds of endangered sea turtle eggs were brought to a hatchery at Kennedy and then the baby turtles were released into the Atlantic Ocean.

On the education front, NASA's first Lunabotics Mining Competition, hosted by Kennedy's Education Programs and University Research Division, drew more than 20 university teams to design and build remote controlled or autonomous excavators, called lunabots, on May 28. The 2011 competition is expected to be even bigger.

And just like the Lunabotics Competition, Kennedy will build on the success and learn from the challenges of 2010 to make 2011 one for the history books.

Safe driving habits number one goal on Kennedy roads

By Linda Herridge
Spaceport News

With safety being NASA's primary core value, Kennedy Space Center workers exercise great care as they process and prepare America's spacecraft for launch. Now more than ever it is also important that Kennedy workers exercise the same degree of care when driving on the center's roadways, 52 miles of which are open to the general public. Several recent traffic crashes on Kennedy roads, two resulting in fatalities, emphasize the importance of driving safely, on and off the center.

According to NASA Special Agent Robert Schmidt, in Kennedy's Protective Services Office, on Dec. 30, a non-badged driver transiting through the public area of Kennedy mistakenly drove south in the northbound lanes of State Road 3, resulting in a head-on collision with a northbound vehicle near the solar farm. The driver of the northbound vehicle was killed and the Florida Highway Patrol is investigating this crash for the possibility of DUI involvement. Neither driver was wearing a seat belt.

NASA/Kim Shiflett

A Kennedy Protective Services officer uses a radar device to detect speeds of drivers on Jan. 10. There were nearly 1,000 speeding citations issued to badged employees in 2010, down from the 1,772 issued in 2009. Fifty-five drivers were suspended from driving on Kennedy property.

On New Year's Day, another suspected drunk driver was detected driving south in the northbound lanes of State Road 3, but this time Kennedy Protective Services officers were able to stop and arrest the driver before another tragedy occurred. These suspected DUI drivers were not badged Kennedy workers.

In yet another December incident, a badged employee in the Industrial Area, apparently distracted by an electronic device, ran a stop sign and was struck by another vehicle, resulting in a rollover crash. Schmidt said that two people were transported to the hospital for medical treatment.

In November, an off-duty Kennedy contractor was arrested for DUI on Space Commerce Way.

On Sept. 16, another fatal Kennedy traffic crash occurred on State Road 405 westbound, just before the Indian River Bridge. A young visitor ran off the road, overcorrected, and ended up rolling a rented vehicle into the river. Although Kennedy employees performed a dramatic water rescue of a trapped passenger, the driver's young brother died the next day.

"The focus of our traffic enforcement program is saving lives and all of our enforcement measures are designed to improve traffic safety for everyone using Kennedy roads," Schmidt said. "We realize that anyone can make a mistake while driving, but unsafe or erratic driving behavior draws special attention and can result in a traffic stop. In fact, it's not at all unusual for other drivers to call and alert us to look out for a particularly unsafe driver."

Schmidt said the Protective Services Office implements several enforcement practices and techniques intended to encourage safe driving habits. These include the use of unmarked patrol cars, laser and radar speed enforcement, issuing administrative citations with points added to a worker's Kennedy driving record, and participation in the Federal Magistrate Program.

According to Schmidt, the Federal Magistrate Program allows Kennedy officers to issue citations for certain criminal offenses, such as reckless driving, failing to stop for an officer, and driving under the influence, potentially resulting in a trip to jail, monetary fines, and points applied to state driving records.

Schmidt said traffic points can be added to a Kennedy driving record for violations, including driving while intoxicated (12 points), reckless driving (12 points), speeding (3 to 12 points, depending on speed), and use of a non-hands-free cell phone while operating a motor vehicle (2 points). Speeding, combined with tailgating, unlawful lane change, or other moving violations, is considered "aggressive careless driving" and can result in increased penalty points.

If a driver accumulates 12 points within 12 months, it can result in a 30-day suspension of driving privileges on Kennedy and Cape Canaveral Air Force Station roads.

Drivers and passengers also can be cited and fined up to $169 for not wearing a seatbelt, if they are detected by any state law enforcement officer transiting Kennedy. According to Special Agent Ana Contreras, in the Protective Services Office, there were about 127 traffic crashes on Kennedy during 2010. Contreras further advised there were nearly 1,000 speeding citations issued to badged employees in 2010, down from the 1,772 issued in 2009. Fifty-five drivers were suspended from driving on Kennedy property.

Schmidt added: "We would like to remind drivers that if they treat other drivers with courtesy and respect they won't have to worry when they see traffic enforcement officers on the road."

From **DISCOVERY**, Page 1

Shannon, Space Shuttle Program manager. "I'm very confident we have it finally figured out and we have a fix. We're going to fly with a lot of confidence in this tank."

The radius blocks are 6-inch-long aluminum pieces that are only about a fifth of an inch thick. However, that is thick enough to keep the stringers flat as the liquid oxygen tank shrinks when the super-cold propellant is loaded before launch, Shannon said.

Without the radius blocks, the end of the stringers were bending in slightly as the tank contracted and the stress was causing the cracks to develop, Shannon said.

"It's a very simple, elegant fix to the problem," Shannon said.

The radius block modifications are not thought necessary for the tank to be used on STS-134 because it was made with a different batch of materials. However, the modifications will be made for the third of the three available tanks, Shannon said. That tank is set to fly on STS-135 later this year.

Discovery will not launch on the STS-133 mission before Feb. 24, but shuttle managers have not yet chosen a target date for the mission. The schedule depends in part on traffic at the International Space Station during that time frame. A European cargo spacecraft, ATV-2, is scheduled to launch to the station Feb. 15 carrying supplies and equipment.

The stringers became the focus of launch preparation when cracks were discovered in two of them following fueling operations during a Nov. 5 launch attempt. That attempt was scrubbed because of an unrelated problem with the ground umbilical carrier plate.

Since then, the shuttle's intertank region, the ribbed portion that connects the liquid oxygen and liquid hydrogen tanks, were surveyed with two types of powerful X-ray devices at the launch pad. The launch team also performed a fueling test Dec. 17, with 89 temperature and motion sensors on parts of the tank's aluminum skin.

Discovery was rolled back to the VAB on Dec. 22 for more inspections and scans of areas that were not accessible at the pad. Those scans showed four more small cracks in three stringers on the portion of the intertank opposite Discovery.

While the scans and repairs took place at Kennedy, teams of engineers and managers at NASA's Marshall Space Flight Center in Alabama and the Michoud Assembly Facility in Louisiana have been analyzing the results and testing theories in lab settings to find a root cause and prove the fixes will work.

Discovery and its six-member astronaut crew will deliver experiments, supplies and equipment to the station during the 11-day mission, along with an experimental robotic crew member called "Robonaut 2."

Scenes Around Kennedy Space Center

Retirement celebrations

Reader-submitted photo

Ron Simons celebrates with friends and coworkers during a retirement coffee held in his honor Dec. 15 at Kennedy's Shuttle Landing Facility. Simons is retiring from Space Gateway Support after more than 25 years of service. Simons was the contingency landing sites security manager for more than 108 emergency landing sites worldwide and when he was not supporting launches at one of NASA's four transoceanic aboard landing sites, he supervised the Resource Protection Office, the KSC Lock Shop and supported the SGS Emergency Management Office.

Reader-submitted photo

June Perez is retiring from NASA after 22 years of service with the federal government. Kennedy's Human Resources Office hosted a retirement celebration in Perez's honor Dec. 10 at the Kennedy Learning Institute.

Reader-submitted photo

Kennedy workers, families and friends attend NASA Day at Sun Life Stadium in Miami on Dec. 19. The group received on-field recognition for their contributions to the nation's space program during the Miami Dolphins/Buffalo Bills divisional matchup. The event was sponsored by the NASA Exchange.

For NASA

Hundreds of Kennedy workers, families and friends attended the "Extreme Makeover: Home Edition" pep rally in the Visitor Complex's Rocket Garden on Jan 3. Hundreds volunteered to build a new home for a family in Cocoa, Fla.

NASA/Kim Shiflett

Donna Oddy, left, and Karen Holloway, biologists with Innovative Health Applications at Kennedy, stand ready to release an endangered green sea turtle into the Mosquito Lagoon on Jan. 5. The lagoon is part of Florida's Indian River. The turtle was one of more than 300 that were "stunned" during two cold snaps in December 2010. Turtles that were stunned multiple times will be released in the Sebastian area of the Indian River, which often offers warmer water and could help prevent future stuns as winter progresses.

2010 Kennedy Awards

This award is intended to recognize contributions made by NASA employees, citizens, contractors or public organizations to Kennedy endeavors.

NASA
Charles Abell
Lisa Arnold
Miles Ashley
David Board
Jacqueline Brooks
Gregory Dawes
Michael Deliz
Richard Dobbs
Stephen Ernest
Lakeesha Flowers
Craig Fortier
Sheila Frowiss
Mary Hanna
Anthony Harris
Scott Hunt
Charmel Jones
Jack King
Anton Kiriwas
Charles Lostroscio
John Matthews
Bruce McBride
Michael Miller
Paul Mogan
Michun North
Nicole Otermat
Charles Quincy
Bruce Reid
Ruthanne Shuey-Moss
Daniel Shultz
Amy Simpson
Taya Stokes
Michael Thornton
Craig Whittaker
Donald Wood

ABACUS TECHNOLOGY
Linda Herridge
Stephen Pantano

ANALEX
Frank Billingham
Michelle Dailey
John Glass
Charles Moore
Kristina Nelson
Margaret Persinger
Kenneth Watts

ASRC AEROSPACE CORP.
Betty Lee
Donna O'Neill
Jeanette Silvas
Ivan Townsend
Angel Vazquez Cruz
Timothy White

THE BOEING CO.
Maxine Daniels
Ernest Rodriguez

INNOVATIVE HEALTH APPLICATIONS
Mark Mercadante

C&C INTERNATIONAL
Graciela Derry
Amanda Gilmore
Leila LeePow
Barbara McCormack
Melissa Pederzani
Angela Solorio

LOCKHEED MARTIN
Adam McCullough

MILLENNIUM ENGINEERING INTEGRATION and TECHNOLOGY
Michael Blankenship
Joseph Hamilton
Megan Jaunich
Thomas Miller
James Shearer

SCIENCE APPLICATIONS INTERNATIONAL CORP.
Catherine Bond
Harold Donald
Neil Elton
Randy Hancock
Roger Hill

NELSON ENGINEERING
Jonathan Lisak

REDE/CRITIQUE, JV
Patrick Feeney
Amanda Griffin
Holly Hicks
Brandi Roberts

UNITED SPACE ALLIANCE
George Atkins
Richard Baz
William Brim
Lori Carey
Thomas Clark
Ira Erteschik
Paul Espy
Chris Hasselbring
Peter Klonowski
James Little
Bradley McCain
Michael Palmer
Matthew Pringle
Shelby Roberts
Tony Shibly
Richard Walls
Hannah Wise

URS FEDERAL TECHNICAL SERVICES
Dale Meneau

ENVIRONMENTAL AWARDS
Mary McMains
Jane Provancha
The Helium Conservation Test Team
Phil D'Andreamatteo
Kevin "Bert" Cummings
Mike Guthrie
Walt Hatfield
Brian Hunter
Kevin Jumper
Barry Meneghelli
Matthew Nugent
Jeffrey Tuttle
Mark Velasco
Gary Walls

SMALL BUSINESS PRIME CONTRACTOR OF THE YEAR
REDE/Critique, JV

SMALL BUSINESS SUBCONTRACTOR OF THE YEAR
MIL-CON

LARGE BUSINESS PRIME CONTRACTOR OF THE YEAR
The Boeing Co.

SECRETARIAL EXCELLENCE AWARD
Janette Martin

ENGINEER/SCIENTIST OF THE YEAR AWARD NASA
David Cox
Innovative Health Applications
Jane Provancha

EMPLOYEE OF THE YEAR
Pamela Zeitler

Engine installation has come a long way since broomsticks

By Steven Siceloff
Spaceport News

The first time anyone installed a main engine in a space shuttle in 1980, it took three days and prompted a series of changes that quickly became standard practice.

" 'There's the orbiter, go put a motor in it,' " recalled Robert "Bob" Rysdyk, a lead engine technician for Pratt & Whitney Rocketdyne of his initial instructions before helping install that first engine.

There were laser instruments galore marking off all sorts of measurements as technicians tried to set the first engine carefully inside shuttle Columbia's aft compartment.

Rysdyk credits engineer Roy Austin with working out a simple solution.

"He actually went down to the janitor's closet and cut two broomsticks the same length and used those to align the pump to the orbiter," Rysdyk said.

Thirty years and more than 130 missions later, Rysdyk was part of the team that installed what's expected to be the last set of main engines in a shuttle, this time in Atlantis. It took less than four hours and the team used the same measurements that Austin came up with when he cut the broom handles.

Michael Kerasotis, a quality inspector with Pratt & Whitney Rocketdyne, came to Kennedy in 1979 as part of a summer program. He started working on the shuttle's tiles but migrated to engine work within a couple years of Columbia's first launch.

One of the most carefully choreographed aspects of preparing a shuttle for launch involves placing three 7,700-pound main engines into the back of the spacecraft.

It takes eight people and a lot of patience.

The machinery involved starts with a cone-shaped fitting specially made to handle a main engine. Because the engines face slightly up toward the rudder, they have to be installed at an angle. So the fitting is welded to a sliding rack. The rack and fitting are, in turn, positioned on the front of a huge forklift known as the "Hyster" for the engine installation.

The engine installer, forklift driver and the technicians who oversee an installation preach careful control anytime an engine is on the move.

The installer has seen very few changes since it was brought to Kennedy in the late '70s, Rysdyk said.

"Every other piece of ground support equipment has gone through a lot of changes," Rysdyk said. "That thing right there is almost exactly like it was in 1978."

The machinery also got a lot more use than designers thought it would, although it has held up just fine. That's because the shuttle's main engines originally were not expected to be removed after each flight. Instead, the main engines are taken out soon after a shuttle returns so their components can be inspected closely and without the engines in the way, making processing for the shuttle safer and quicker. The main engines for the initial five missions were inspected in-place without removal from Columbia.

"We literally in the first few operational flights after that, used up the whole design life of the engine installer," Rysdyk said.

More than equipment changed, too.

One of the most common sights during an installation process is an engineer sitting on top of the engine installer in a posture reminiscent of "Dr. Strangelove."

"That came about by accident," Rysdyk said.

Basically, the engineer leading the first engine installation ran out of room to stand, so he hopped up on the installer to get out of the way. Although some folks didn't want anyone on top of the installer for fear of falling, the advantages became apparent instantly.

"Suddenly, he sees he can see a lot better up there," Rysdyk said. "He can run the job better."

Both Rysdyk and Kerasotis said the stress of handling the machinery regularly on tight schedules and in changing situations gives the engine teams a strong sense of camaraderie.

"There are personal sacrifices," Rysdyk said. "Kids' rehearsals go out the window, trips go out the window, birthdays go out the window because what's important is that this gets done."

Some of the launches during the early part of the Space Shuttle Program were scrubbed a few seconds before liftoff, after the main engines had ignited but were shut down for a problem. Called a "pad abort," the situation meant a mandatory engine change at the launch pad, with the shuttle in its launch position.

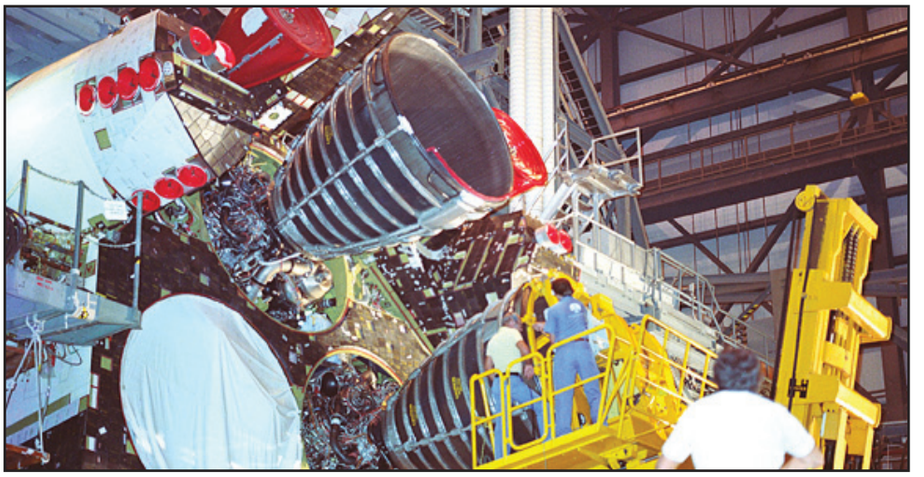
"If you have a pad abort, your life comes to a stop except for that engine," Rysdyk said. "There were nights when you'd come in at midnight and come out at noon. There was nothing but, 'Get it done.'"

While the vast majority of installations have been completed in the confines of an orbiter processing facility, replacing an engine at the launch pad requires just as much precision, but in an environment that is hardly hospitable, especially in the winter.

"That flame trench works both ways," Kerasotis said, explaining that just as the flame trench funnels fire and exhaust away from the shuttle at launch, it collects frigid air from the north in the winter and shoots it up into the bottom of the shuttle stack.

The workers endure the harsh environment because the engines are not just important, they are incredibly complex machines that are at once more than 99 percent efficient and unforgiving. In other words, the technicians know they are one of the last to touch the engines to ensure mission success and no flaws in installation.

"It's never normal, but you get used to it," Rysdyk said.



NASA file/1980

Engines No. 1 and No. 3 are installed in shuttle Columbia on July 19, 1980.

NASA/Kim Shiflett

An engineer on a headset helps guide a space shuttle main engine into shuttle Atlantis on Dec. 8. The decision to have someone on top of the engine installer came about by accident during the first shuttle engine installation 30 years ago.

Remembering Our Heritage

Voyager spacecraft continue to explore, inspire scientists

By Kay Grinter
Reference Librarian

More than 33 years have flown by since the odyssey of NASA's Voyager spacecraft began, but their contributions to our scientific knowledge base continue.

When launched aboard Titan III/Centaur rockets from Pad 41 on Cape Canaveral Air Force Station in 1977, the interplanetary probes had an initial goal of exploring two planets in about five years. Today, they survive as NASA's longest-lived spacecraft after Pioneer 10, launched March 2, 1972, sent its last signal in 2003.

Voyager 2 was first to launch Aug. 20, with Voyager 1 following Sept. 5.

The Voyagers were built by NASA's Jet Propulsion Laboratory (JPL) in Pasadena, Calif., which continues to operate both spacecraft.

Following different trajectories at different speeds, Voyager 1 is traveling faster, at a speed of about 38,000 mph, compared to Voyager 2's velocity of 35,000 mph.

Encounters with only two planets, Jupiter and Saturn, were originally planned. Additional flybys by Voyager 2 of the two outermost giant planets, Uranus and Neptune, proved possible -- and irresistible to mission scientists -- after the successful completion of its primary objectives. No other spacecraft have visited these two outer planets.

Between them, Voyagers 1 and 2 explored all the giant outer planets of our solar system, 49 of their moons, and the unique systems of rings and magnetic fields those planets possess.

In 1990, Voyager 1 took an unprecedented family portrait of most of the planets in the solar system from a unique point of view -- looking down on the solar system from a position 32 degrees above the ecliptic plane in which the planets orbit the sun. No other spacecraft has ever been in a position to attempt a similar series of photos.

Today, five science investigation teams, four from NASA and one from France, continue to participate in Voyager 1's interstellar mission, engaged in the study of magnetic fields, low-energy charged particles, cosmic rays, plasma and ultraviolet waves. Voyager 2 currently operates a slightly different set of instruments, with an extra plasma instrument and no ultraviolet spectrometer.

Last month, NASA announced that Voyager 1, the most distant human-made object in the universe, had reached a point at the edge of our solar system, 10.8 billion miles from the sun, where there is no outward motion of solar wind.

Voyager 1 crossed the termination shock line of the Heliosphere in December 2004 into the the interstellar medium, the outer region of the sun's solar wind influence. Scientists have used data from its Low-Energy Charged Particle Instrument to deduce the solar wind's velocity.

A scientist could devote his entire career to analyzing the data returned from the Voyager missions, and in fact, three principal investigators have been with the Voyager project since its beginnings.

Ed Stone, of the California Institute of Technology, is the Voyager project scientist and principal investigator (PI) of the Cosmic Ray Subsystem (CRS).

"Over and over, the spacecraft revealed so many unexpected things that it often took days, months and even years to figure them out," Stone said.

Another veteran, Tom Krimigis of the Applied Physics Laboratory at Johns Hopkins University, is PI of the low-energy charged particles (LECP) investigation. The PI for the magnetometer (MAG) is Norman Ness of the Bartol Research Institute at the University of Delaware, another original team member.

Things have come full circle for Suzanne Dodd, who was appointed Voyager's project manager at JPL in October. In 1984, her first job at JPL involved sequencing science and engineering commands for Voyager 1 and 2.

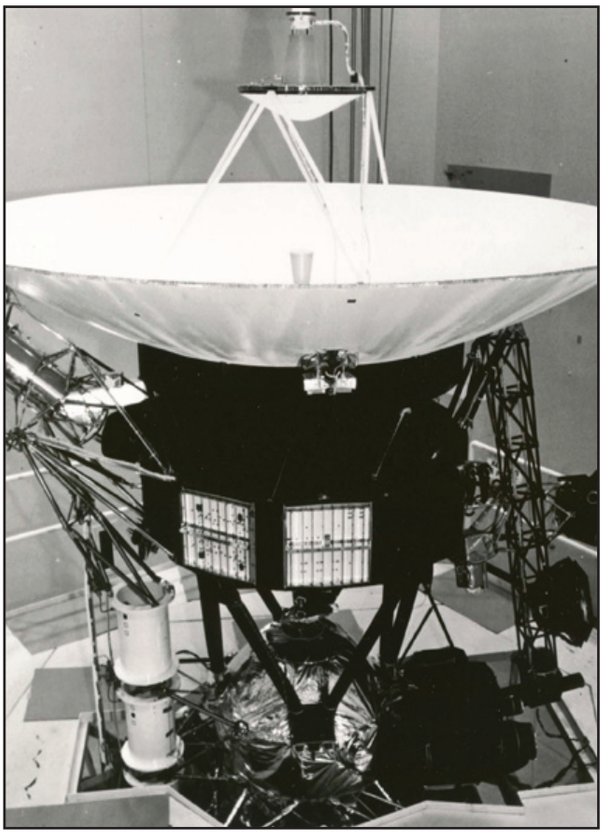
"We can't wait for the Voyager spacecraft to enter interstellar space -- true outer space -- and make more unexpected discoveries," Dodd said.

With successful power management, the Voyagers are expected to continue returning data until 2020.

No one knows what they will encounter once they are out of touch with their home planet. In the event they should cross paths with intelligent life, each of the Voyagers carries a golden record with greetings, images and sounds from Earth.

The record also has directions on how to find Earth if the spacecraft is recovered by something or someone with the technology to "return to sender."

Future Voyager project scientists can only hope.



NASA file/1977

A prototype Voyager spacecraft is shown at NASA's Jet Propulsion Laboratory in Pasadena, Calif., as it successfully passed vibration tests that simulated the expected launch environment in 1977. The large parabolic antenna at the top is 3.7 meters in diameter and was used at both S-band and X-band radio frequencies for communicating with Earth over the great distances from the outer planets. The spacecraft received electrical power from three nuclear power sources.

A golden record

Both Voyager spacecraft carry a greeting to any form of life, should that be encountered. The message is carried by a phonograph record -- a 12-inch gold-plated copper disk containing sounds and images selected to portray the diversity of life and culture on Earth. The contents were selected for NASA by a committee chaired by Dr. Carl Sagan of Cornell University. Sagan and his associates assembled 115 images and a variety of natural sounds. To this they added musical selections from different cultures and eras, and spoken greetings in 55 languages.

NASA file/1969

Extreme Planet Makeover

The new "Extreme Planet Makeover" on the NASA/JPL PlanetQuest site lets you roll up your sleeves and create your very own planet.

Balance five factors to create an Earth-like habitable world, or get wild and make your own extreme exoplanet. Use the "Image Gallery" feature to compare your creation with those of other Earthlings. Once you've finished creating the exoplanet of your dreams, download a picture of your custom world for posterity.

For more information, visit:
http://planetquest.jpl.nasa.gov/planetMakeover/planetMakeover.html.

NASA Employees of the Month: January

NASA/ Tom Farrar

Employees for the month of January are, from left, William Little, Information Technology and Communications Services; Eric Perritt, Constellation Project Office; Michele Taylor, Engineering Directorate; Jennifer Nufer, Launch Vehicle Processing Directorate; Tiffaney Alexander, Safety and Mission Assurance; Margaret Dutczak, Engineering Directorate; and Brian Graf, Center Operations. Not pictured are Rayelle Thomas (Employee of the Quarter), Space Transportation Planning Office; Eric Poole, Launch Services Program; and Helena Jo Wilkas, Launch Vehicle Processing Directorate.

Looking up and ahead . . .

Targeted for Jan. 22	Launch/CCAFS: Atlas V, SBIRS GEO-1; TBD
Targeted for February	Launch/CCAFS: Atlas V, GPS IIF-2; TBD
Feb. 23	Launch/VAFB: Taurus, Glory; 5:10 a.m. EST
No Earlier Than Feb. 24	Launch/KSC: Discovery, STS-133; 4:50 p.m. EST
No Earlier Than April 1	Launch/KSC: Endeavour, STS-134; 3:15 a.m. EDT
No Earlier Than April 14	Launch/CCAFS: SpaceX Falcon 9, Dragon C2; TBD
No Earlier Than June 6	Launch/CCAFS: SpaceX Falcon 9, Dragon C3; TBD
No Earlier Than June 9	Launch/VAFB: Delta II, Aquarius / SAC-D Satellite; TBD
Aug. 5	Launch/CCAFS: Atlas V, Juno; Launch Window 11:54 a.m. to 12:24 p.m. EDT
Aug.15	Launch/ Kwajalein Atoll, Reagan Test Site: Pegasus, NuSTAR; TBD
Sept. 8	Launch/CCAFS: Delta II Heavy, GRAIL; 8:35:52 a.m. to 9:14:35 a.m. EDT
Oct. 18	Launch/VAFB: Delta II, NPP; TBD
No Earlier Than Nov. 25	Launch/CCAFS: Atlas V, Mars Science Laboratory; TBD

Kennedy celebrates 2010 holidays

NASA/ Troy Cryder

Kennedy's Child Development Center hosted its annual holiday celebration Dec. 17. Activities included a gift exchange and a party. Infants, toddlers and preschool classes had the opportunity to meet Santa Claus and share their holiday wish list. The children also put on a special program for parents that drew cheers and laughs.

NASA/Jim Grossmann

Civil service and contractor employees enjoy refreshments and other goodies at the 31st Annual KSC Holiday Coffee on Dec. 8 in the Operations and Checkout Building's Mission Briefing Room and the lobby of the Operations Support Building II (above).

John F. Kennedy Space Center

Spaceport News

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