Dec. 16, 2013

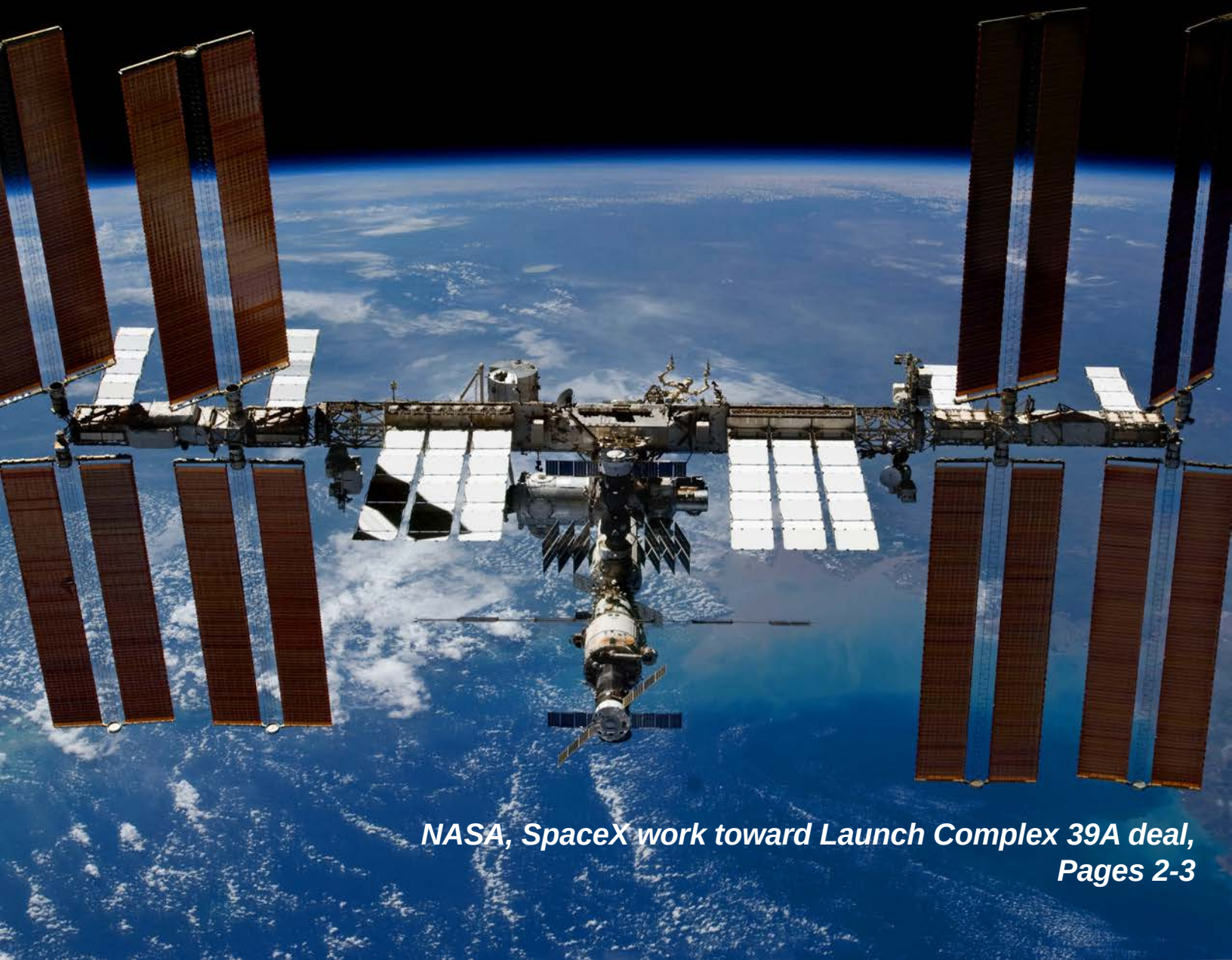
Vol. 53, No. 23

Spaceport News

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

International Space Station

15 years of science and cooperation



NASA, SpaceX work toward Launch Complex 39A deal, Pages 2-3

Negotiations to begin for SpaceX use of LC-39A

NASA News Report

NASA has selected Space Exploration Technologies Corporation (SpaceX) of Hawthorne, Calif., to begin negotiations on a lease to use and operate historic Launch Complex (LC) 39A at Kennedy Space Center.

Permitting use and operation of this valuable national asset by a private-sector, commercial space partner will ensure its continued viability and allow for its continued use in support of U.S. space activities.

The reuse of LC-39A is part of NASA's work to transform Kennedy into a 21st century launch complex capable of supporting both government and commercial users. Kennedy is having success attracting significant private sector interest in its unique facilities. The center is hard at work assembling NASA's Orion spacecraft and preparing its infrastructure for the Space Launch System rocket, which will launch from LC-39B and take American astronauts into deep space, including to an asteroid and Mars.

NASA made the selection decision Dec. 12 after the U.S. Government Accountability Office (GAO) denied a protest filed against the Agency by Blue Origin LLC on Sept. 13. In its protest, Blue Origin raised concerns about the competitive process NASA was using to try to secure a potential commercial partner or partners to lease and use LC-39A. Blue Origin had argued the language in the Announcement for Proposals (AFP) favored one proposed use of LC-39A over others. The GAO disagreed.

While the GAO protest was underway, NASA was prohibited from selecting a commercial partner for LC-39A from among the proposals submitted in response to the agency's AFP that had been issued on May 23. However, while the GAO considered the protest, NASA continued evaluating the proposals in order to be prepared to make a selection when permitted to do so. After the GAO rendered its decision Thursday in NASA's favor, the agency completed its evaluation and selection process.

NASA notified all proposers on Friday of its selection decision concerning LC-39A. Further details about NASA's decision will be provided to each proposer when NASA furnishes the source selection statement to the proposers. In addition, NASA will offer each the opportunity to meet to discuss NASA's findings related to the proposer's individual proposal. NASA will release the source selection statement to the public once each proposer has been consulted to ensure that any proprietary information has been appropriately redacted.

NASA will begin working with SpaceX to negotiate the terms of its lease for LC-39A. During those ongoing negotiations, NASA will not be able to discuss details of the pending lease agreement.

Since the late 1960s, Kennedy's launch pads 39 A and B have served as the starting point for America's most significant human spaceflight endeavors -- Apollo, Skylab, Apollo-Soyuz and all 135 space shuttle missions. LC-39A is the pad where Apollo 11 lifted off from on the first manned moon landing in 1969, as well as launching the first space shuttle mission in 1981 and the last in 2011.

More online

For more information about Kennedy's Launch Complex 39A and ongoing work to transform the center into a 21st century launch complex, visit: **http://www.nasa.gov/kennedy**.

For more information about NASA's missions and programs, visit: **http://www.nasa.gov**.

NASA file/2006

This aerial view, taken March 1, 2006, during the Space Shuttle Program, shows Launch Pad 39A at Kennedy Space Center. NASA has selected SpaceX to begin negotiations on the use of the historic launch pad.

Space station: 15 years and counting

By Bob Granath
Spaceport News

The first elements of the International Space Station now have been in orbit for 15 years. Assembly of the largest spacecraft ever built was a global, cooperative effort and began with the STS-88 space shuttle mission in December 1998.

The orbiting outpost now serves as a unique laboratory where teams from around the world are performing scientific research only possible in the microgravity environment of space.

Kennedy Space Center Director Bob Cabana, a former space shuttle astronaut, commanded the flight that began one of history's landmark engineering achievements.

"STS-88 was a phenomenal mission," said Cabana. "It was just perfect from start to finish. Everything just flowed, and it set the tone for the whole space station assembly."

NASA

Dr. Howard Levine, chief scientist in the International Space Station Ground Processing and Research Directorate, watches as Michele Koralewicz of QinetiQ North America assembles a Biological Research in Canisters, or BRIC, experiment package. BRIC-17 was delivered to the space station on the SpaceX CRS-2 mission March 1, 2013.

NASA file/1998

Once Unity and Zarya were docked, mission specialists Jerry Ross, left, and Jim Newman conducted three spacewalks to connect power and data cables between the two station elements. In this image they were photographed working together on the third spacewalk Dec. 12, 1998.

The first module placed in orbit was the functional cargo block, named "Zarya" -- Russian for dawn. It was built by Boeing and the Russian Federal Space Agency and launched by a Proton rocket from the Baikonur Cosmodrome in Kazakhstan on Nov. 20, 1998.

Two weeks later, on Dec. 4, 1998, the space shuttle Endeavour lifted off from Kennedy with Cabana, pilot Rick Sturckow, mission specialists Nancy Currie, Jerry Ross, Jim Newman and Russian cosmonaut Sergei Krikalev. They carried with them the first American-launched station element, node 1, called "Unity." The 12-day STS-88 shuttle flight was highlighted by connecting Unity to Zarya.

"We had to take Unity out of the payload bay and attach it to the orbiter docking station," Cabana said. "Then, we had to rendezvous with the Russian functional cargo block."

Next, came one of the most challenging portions of the operation. Mission specialist Currie used the remote manipulator system robotic arm to capture the Zarya module even though the view for Endeavour's crew was partially obscured by the large Unity module.

"Here's this 45,000 pound mass (Zarya), and you can't see it out the window because Unity was there," Cabana said. "There's a point where you lose sight of it in the overhead windows and you're relying on the centerline television cameras (in the payload bay) and on the end of the arm and two TV monitors to keep us precisely positioned. So when it is about three feet from the end of the arm, Nancy Currie can move in and grab it."

Once Zarya and Unity were joined together, mission specialists Ross and Newman conducted three spacewalks to begin activation of systems between the two modules.

"The spacewalks were designed to attach all the electrical and data connectors before we went inside," said Cabana. "Part of what they did was to ensure the pieces could never come apart."

Flight day eight was a historic milestone as the International Space Station was opened for the first time.

"I think it was really special when we got to go inside the space station," Cabana said. "When it came time to actually go through the hatch, I waved Sergei up and opened the hatch and the two of us went in side by side -- a Russian and an American into a space station. It was an International Space Station and international crew. We were setting the tone for the future. It was one team working together."

Together with other members of the crew, they started unpacking gear to activate the station to prepare it for the inhabitants of the first expedition.

NASA file/1998

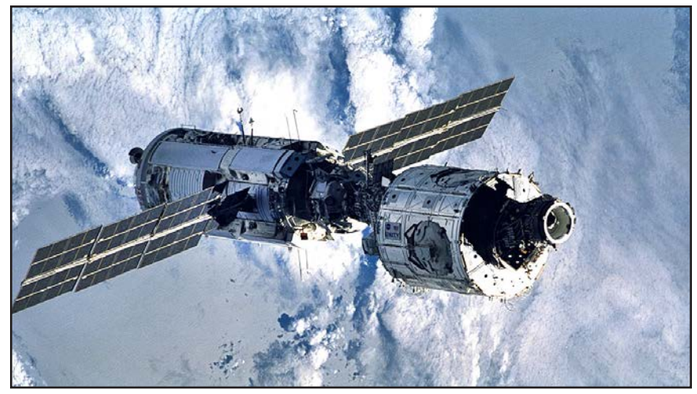
In this large-format IMAX camera view from the Space Shuttle Endeavour's cargo bay, the crew of STS-88 began construction of the International Space Station. Mission specialist Nancy Currie used Endeavour's Canadarm remote manipulator system to grapple Zarya and join it to the U.S.-built Unity node Dec. 6, 1008.

After 12 days in space, the STS-88 crew returned to Kennedy, landing Dec. 15, 1998. According to Cabana, teamwork was the key to the highly successful mission.

"It went so well because of the team -- the crew working together with the ground, the engineers, everybody," he said.

Permanent occupancy of the space station began with the Expedition 1 crew, launched Oct. 31, 2000, establishing a continuous human presence in space that endures today.

While ISS expedition crews came and went, assembly continued through the final space shuttle mission, STS-135, in July 2011. During that time the station grew from two modules to having more livable room than a conventional five-bedroom house, with two bathrooms, a gymnasium and a 360-degree bay window.



NASA file/2011

Orbiting by Earth's horizon and the blackness of space, the almost-complete International Space Station is featured in this image photographed May 29, 2011, by an STS-134 crew member on Endeavour. At 357 feet end-to-end, it almost spans the length of a football field, including the end zones. With 33,023 cubic feet of pressurized volume the space station now has more livable room than a conventional five-bedroom house.

"It is truly incredible when you think about when Zarya launched fifteen years ago and where it is now," said current station resident Mike Hopkins, an Expedition 37/38 flight engineer. "It is a testament to the work of people from all the participating countries, all the crews, all the flights from shuttles to Soyuz to resupply vehicles."

Cabana considers international cooperation an essential element of space exploration going forward.

"I believe it's the model for how we are going to explore beyond planet Earth," he said. "Right now we've got the United States, Japan, Canada, Russia, ESA and all its partners working together as one up there. When we leave planet Earth, we're not going to leave as any one nation, we're going to leave as the people from planet Earth."

The 11 members of ESA -- the European Space Agency -- include Belgium, Denmark, France, Germany, Italy, the Netherlands, Norway, Spain, Sweden, Switzerland and the United Kingdom. More than 100,000 people in space agencies and contractor facilities in 37 U.S. states and throughout the world are involved in this massive endeavor.

Expedition 38 commander Oleg Kotov believes the space station's value goes well into the future as an inspiration to the next generation of space explorers.

NASA file/1998

STS-88 commander Bob Cabana, left, and Russian cosmonaut Sergei Krikalev prepare to move from shuttle Endeavour's airlock into the U.S.-built node 1, also known as the Unity module Dec. 10, 1998. Soon after, they entered the Russian-built Functional Cargo Block module, also known as Zarya.

"I want to show and tell children on Earth what life in space looks like, how space is wonderful, how our planet is wonderful," he said in a preflight interview.

Krikalev sees the station as part of a logical progression in explorations beyond Earth.

"Bringing our efforts together to build the International Space Station, I would say, is just the next step to joint exploration of the universe," he said,

Cabana agrees that the space station can be a stepping stone in venturing beyond humankind's current reach.

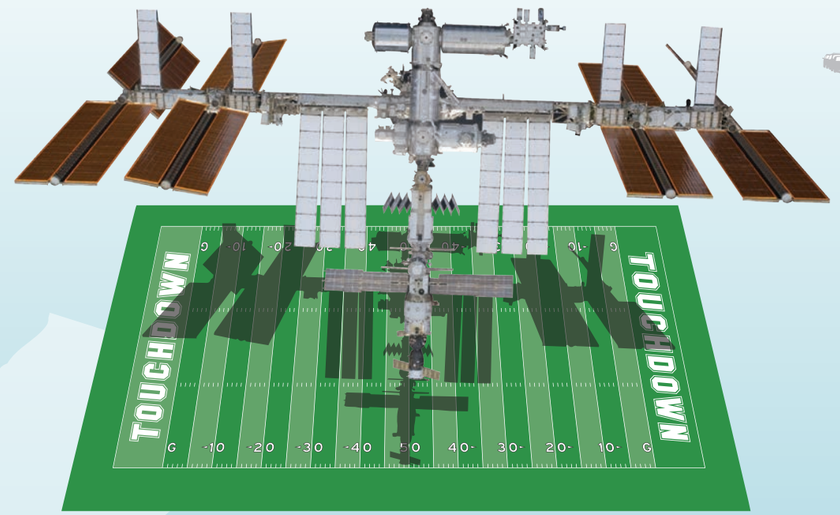
"We still have a lot to learn about human physiology in extended periods of time in microgravity, how to protect from radiation," he said. "We've been to the moon, we know how to operate in low-Earth orbit, now let's go to another planet. Our ultimate goal is to put boots on Mars and, one day, explore beyond our solar system."

NASA file/1998

Aided by television monitors, mission specialist Nancy Currie operates the controls of Endeavour's remote manipulator system arm to ease the Russian-built Zarya module onto the U.S.-built Unity connecting module in the shuttle's cargo bay Dec. 6, 1998.

Did you know...

The **ISS solar arrays** generate between **75-90 kilowatts** of electricity - enough to **power up to 40 homes**.



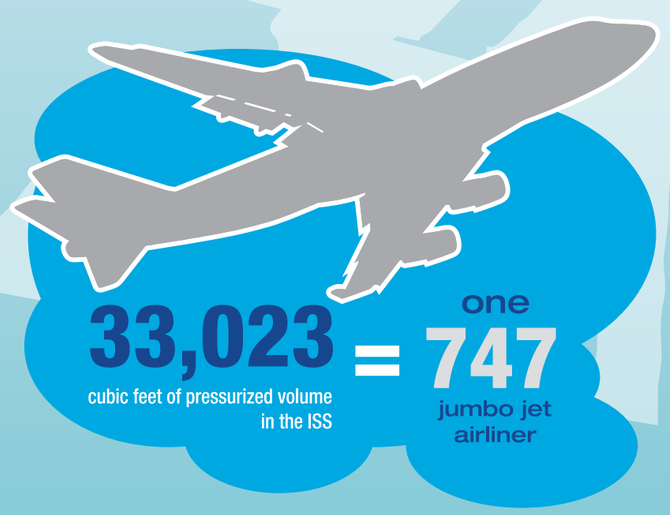
The *ISS* spans
357 feet almost the entire area of a football field

ISS mass in space

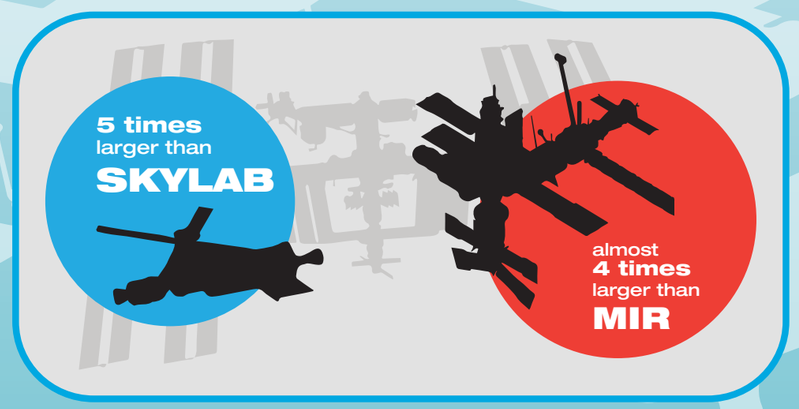
approximately **900,000** pounds

equal to **320** automobiles

ISS Program involves more than
100,000 people
500 contractor facilities
37 U.S. states
15 countries



33,023 cubic feet of pressurized volume in the ISS = one **747** jumbo jet airliner



The **International Space Station** has the support of **15 nations.**

Celebration marks 15 years of space station era

By Bob Granath
Spaceport News

On Dec. 10, three of the six members of the space shuttle crew that began assembly of the International Space Station held a reunion at NASA's Kennedy Space Center in Florida. Launched 15 years ago aboard the space shuttle Endeavour, the crew of STS-88 carried to orbit the first American space station element.

Kennedy's Director, Bob Cabana, who commanded STS-88, welcomed mission specialists Nancy Currie and Jerry Ross to a celebration for space center employees in the Pavilion area of the Kennedy Athletic, Recreational and Social Organization, or KARS, Park I.

"What we imagined 15 years ago is a reality today," he said. "The space station is now a world-class scientific test bed in orbit."

The STS-88 crew members participated in a panel discussion and were introduced by Josie Burnett, NASA's International Space Station Ground Processing and Research director at Kennedy. She, too, reflected on the achievements on the ISS.

"Can you believe it's been 15 years?" she said. "As many as 69 countries have flown experiments, allowing the scientific community to improve human life back here on Earth."

The Russian Space Agency's functional cargo block, named "Zarya," was launched from the Baikonur Cosmodrome in Kazakhstan on Nov. 20, 1998. Two weeks later, on Dec. 4, Endeavour lifted off from Kennedy on STS-88 with node 1, called "Unity." In addition to Cabana, Currie and Ross, the crew also included pilot Rick Sturckow, along with mission specialists Jim Newman and Sergei Krikalev, a Russian cosmonaut.

NASA/Jim Grossmann

On Dec. 10, three of the six members of the space shuttle crew that began assembly of the International Space Station held a reunion at NASA's Kennedy Space Center. Kennedy's Director, Bob Cabana, right, who commanded STS-88, hosted the employee celebration at KARS Park 1. From the left are Nancy Currie, Jerry Ross and Cabana.

The STS-88 shuttle flight was highlighted by connecting Unity to Zarya, three spacewalks to attach electrical and data connectors, and activation of systems inside the two modules.

After 12 days in space, the STS-88 crew returned to Kennedy, landing Dec. 15, 1998.

Over the past 15 years, space station assembly has resulted in the largest spacecraft ever built, providing a global platform of unprecedented research in the microgravity environment of low-Earth orbit.

Burnett praised those at Kennedy who helped make the orbiting laboratory possible.

"I want to thank all of you who were a part of making the International Space Station a success story," she said.

Currie echoed that sentiment encouraging everyone to take the opportunity to watch the space station pass overhead.

"Take your family outside and point to the night sky and say, 'I had a part of that,'" she said. "You guys have at least as big if not a bigger role than any crew member in building that space station and you should be proud of it."

Ross noted that the ongoing research now is helping pave the way for future endeavors in space exploration.

"There is a crew of six up there working 365 days a year doing tremendous science," he said. "We're going to continue to do that, pushing back the frontiers of knowledge. We're going to be learning what we need to know to go beyond low-Earth orbit and go on to Mars."

Cabana explained that the space station and the team that made it possible gives him a positive view going forward.

"You guys are the most amazing team anywhere," he said. "I know we are going to be successful. We are going to develop a vehicle that will eventually take us to Mars. We are going to have a commercial capability. We are going to continue to provide outstanding launch services for our NASA science mission. We are going to be successful because of you."

NASA

The STS-88 crew poses on Endeavour's middeck on Dec. 14, 1998. From the left, are Jerry Ross, Jim Newman, Bob Cabana, Rick Sturckow, Nancy Currie and Sergei Krikalev. Krikalev would later be assigned as a member of the first International Space Station expedition. A banner representing the participating countries for space station is in the background.

NASA

'Space to Ground' series premieres

The "Space to Ground" web series, available every Friday, features a short wrap-up of the week's activities aboard the International Space Station that showcases the diversity of activities taking place aboard the world's only orbiting laboratory.

If you have questions or comments, tweet #spacetoground to interact with "Space to Ground." To watch the first video, click on the photo.

Did you know?

"Space Station Live" airs weekdays at 11 a.m. EST on NASA TV. It features live views from the International Space Station, updates on the crew's daily activities, enhanced content and interviews on space station science and features on how that science **benefits life on Earth.**

Send a Holiday Tweet to a NASA Astronaut on ISS

Send a holiday tweet to NASA astronauts Michael Hopkins (@AstroIllini) and Rick Mastracchio (@AstroRM), both of whom are living and working aboard the International Space Station throughout the holiday season.

Take a tour of ISS with Suni Williams

In her final days as commander of the International Space Station, Suni Williams recorded an extensive tour of the orbital laboratory. The tour includes scenes of each of the station's modules and research facilities. To take the tour click on the photo.

NASA file/2007

Astronaut Suni Williams works with the Lab-on-a-Chip Application Development-Portable Test System during Expedition 14 on March 31, 2007. The test system is a handheld device for rapid detection of biological and chemical substances onboard the station.

Research Achievements aboard the International Space Station

While the International Space Station is an unparalleled global engineering achievement, it now is yielding unprecedented results from scientific research that has been ongoing for more than a decade. The following is a sampling of some of the results achieved by research in the time that the space station has been permanently staffed since November 2000.

Air Purification -- A novel air scrubber developed for a space flight plant growth chamber is now in widespread use on Earth for food preservation, hospitals, homes and offices, killing 98 percent of airborne pathogens that pass through it.

Fluid Flow Models -- Capillary flow experiments on the International Space Station produced the first space-validated models describing fluid behavior, and may lead to models predicting fluid flows such as groundwater and high performance wicks used in electronics cooling.

Planetary Contamination Monitoring -- A handheld device used for rapid detection of biological and chemical substances on surfaces on the ISS has the potential to monitor the spread of Earth-derived biological material on lunar and planetary surfaces after landings.

Duchenne's Muscular Dystrophy -- Large, high quality crystals of the HQL-79 protein were grown on the space station, allowing researchers to more accurately determine its three-dimensional structure and develop a more potent form. This protein is part of a candidate treatment for inhibiting the effects of Duchenne's muscular dystrophy.

NASA

NASA astronaut Karen Nyberg works with a plant experiment in the Destiny laboratory of the International Space Station during Expedition 37 on Oct. 25, 2013.

Durability of Materials -- The study of various materials and how they withstand the harsh space environment provide a better understanding of their durability, with important applications to future spacecraft design. The Naval Research Laboratory and Boeing have used the ISS materials test bed to shorten development time for satellite hardware components by as much as 50 percent.

Cancer Treatment Delivery -- The microgravity environment on the space station led the way for better methods of micro-encapsulation on Earth, which is a process of forming micro-balloons containing various drug solutions, providing better drug delivery for several diseases including cancer and diabetes.

Ultrasound from a Distance -- Training methods developed for space flight have been used by the American College of Surgeons to teach ultrasound to surgeons, and could be adapted for diagnosis of injuries and illnesses in remote locations on Earth, including rural areas, disaster areas and the battlefield.

Vaccine Development -- Studies of Salmonella bacteria conducted on the space station have identified the controlling gene responsible for its increased virulence in microgravity, resulting in the discovery of a candidate vaccine. Salmonella is one of the most common forms of food poisoning and a major cause of childhood death worldwide.

More online

For more on benefits from the International Space Station: http://www.nasa.gov/mission_pages/station/research/index.html

Slosh: designed to improve rocket safety

By Bob Granath
Spaceport News

Since Robert Goddard's first launch of a liquid propellant rocket in 1926, experts have worked to perfect engine propulsion systems. As launch vehicles have grown in size, fuel and oxidizer tanks have become more complex resulting in unexpected changes in thrust, potentially endangering flight crews and mission success. A team of scientists and engineers at Kennedy Space Center is studying how to better understand this phenomenon and reduce its potential impacts to flight safety.

As the large Saturn V rockets were being tested for the Apollo Program in the late 1960s, up and down oscillations of the launch vehicle, called the "pogo" effect, sometimes resulted in potentially dangerous variations in engine performance.

According to Paul Schallhorn, Ph.D., chief of NASA's Environments and Launch Approval Branch of Kennedy's Launch Services Program, larger rockets now are expected to operate in more varied environments from high g loads to zero gravity.

NASA

The SPHERES-Slosh experiment will be carried to the International Space Station aboard a Cygnus spacecraft like this one launched atop an Antares rocket Sept. 18, 2013. The Orbital 1 Commercial Resupply Services flight is scheduled to lift off Dec. 18 from the Mid-Atlantic Regional Spaceport at the Wallops Flight Facility in Virginia.

"The issues we see now go well beyond the pogo effect," he said. "Upper stages are now firing multiple times and operating in microgravity after reaching space. We need to have a better understanding of how propellants 'slosh' around in their tanks so we can compensate for changes in a rocket's performance."

A better understanding of fluid slosh could not only decrease this uncertainty, but increase efficiency, reduce costs and allow additional payloads to be launched.

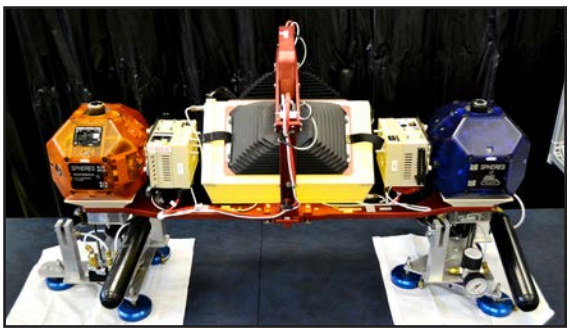
Schallhorn is serving as principal investigator for research to gain more reliable data on the slosh anomaly. To further understand liquid propellant slosh, engineers with NASA have teamed up with researchers at the Florida Institute of Technology and the Massachusetts Institute of Technology.

The Slosh Project is funded by NASA Space Technology Mission Directorate's Game Changing Development (GCD) program. GCD is designed to investigate innovative ideas and approaches that have the potential to revolutionize future space missions and provide solutions to significant national needs.

"I believe the results from this experiment can help rocket launch companies design better tanks and control systems which will make a significant impact," said Stephen Gaddis, director of the Game Changing Development Program.

A key element of the team's studies will be an experiment involving the Synchronized Position Hold, Engage, Reorient, Experimental Satellites, or SPHERES, which already is operational on the space station. The Slosh experiment will be carried to the space station aboard a Cygnus spacecraft scheduled to lift off from NASA's Wallops Flight Facility in Virginia in December 2013.

The hardware for the Slosh experiment was developed by students at Florida Tech. Once aboard the space station, astronaut crew members will assemble the package. The SPHERES will be attached at opposite ends of a metal frame. In the center of the frame is a clear plastic 18-inch by eight-inch pill-shaped tank that is partially filled with water.



Photos courtesy of Florida Institute of Technology/Dr. Daniel Kirk

The SPHERES robots will be attached to a metal frame at opposite ends. In the center of the frame is a clear plastic 18-inch by eight-inch pill-shaped tank that is partially filled with green-colored water. A pair of high-resolution cameras will record the movement of the liquid inside the tank as the experiment is pushed around by the SPHERES robots. Several inertial measurement units will accurately record the position of the experiment as it moves within the space station.

The SPHERES are bowling-ball-sized robots that use small carbon dioxide gas thrusters to maneuver as they free-float inside the space station. They operate on a set of well-defined instructions for various maneuvers.

"Modern computer models try to predict how liquid moves inside a propellant tank," said NASA's Brandon Marsell, co-principal investigator on the Slosh Project. "Now that rockets are bigger and going farther, we need more precise data. Most of the models we have were validated under 1 g conditions on Earth. None have been validated in the surface tension-dominated microgravity environment of space."

Scientists have had success accurately validating how propellants perform on the ground. However, in the absence of gravity, the physics changes drastically and liquids behave differently.

NASA's Jacob Roth, also a co-principal investigator on Slosh, explains that the reactions of fluids will be photographed by a pair of high-resolution cameras that will record the movement of the liquid inside the tank as the experiment is pushed around by the SPHERES robots.

"The free-floating experiment will perform typical upper-stage vehicle maneuvers within the station," he said. "The liquid will be photographed and measured with the data transmitted back to Earth for use in validating current computational fluid dynamics models."

The data will be used to check computer simulations currently predicting rocket performance, ultimately leading to launch vehicles and spacecraft that are more reliable, cost effective and safer.

Emergency egress vehicles arrive at KSC

By Linda Herridge
Spaceport News

With crewed launches on NASA's Space Launch System (SLS) and Orion spacecraft fast approaching, the Ground Systems Development and Operations (GSDO) Program at Kennedy Space Center led the effort to select an emergency egress vehicle that future astronauts could quickly use to leave the Launch Complex 39 area in case of an emergency. The first of four refurbished Mine-Resistant Ambush-Protected (MRAP) vehicles was shipped from the U.S. Army Red River Depot in Texarkana, Texas, and arrived at the center Dec. 5.

NASA/Jim Grossmann

The first of four new emergency egress vehicles, called Mine-Resistant Ambush-Protected, or MRAP, vehicles arrived at Kennedy Space Center on Dec. 5, from the U.S. Army Red River Depot in Texarkana, Texas. Astronauts will be able to use the MRAP to quickly leave the Launch Complex 39 area in case of an emergency.

During crewed launches, the MRAP will be stationed by the slidewire termination area at the pad. In case of an emergency, the crew will ride a slidewire to the ground and immediately board the vehicle for safe egress from the pad. The existing bunkers around the pads would be used only if evacuation was not possible.

All four vehicles were transferred from the army at no cost to NASA. As each one arrives, they will be processed in and then transported to the Rotation, Processing and Surge Facility near the Vehicle Assembly Building for temporary storage. The vehicles will undergo some modifications to meet NASA's emergency egress requirements.

Danny Zeno, a GSDO operations integration engineer, led a two-year study of several emergency egress concepts with a team of people from NASA centers and programs. The team selected the slidewire system and the army's MRAP Caiman, a military vehicle that was used for operations in Iraq and Afghanistan.

The study team included representatives from Kennedy, Johnson Space Center's Flight Crew Office, NASA Headquarters, Marshall Space Flight Center, NASA Protective Services, Engineering, Safety and Mission Assurance, Ground Processing, SLS, Orion, and several contractor organizations.

"This is definitely an upgrade from the space shuttle-era M-113 tank design," said Zeno. "Working across agencies helped us to select the most versatile vehicle possible for NASA's purpose."

The MRAPs have increased operability, field of vision and capacity, and can travel at speeds up to 65 mph. They are driven like other common vehicles with a normal front view, except the windows are four inches thick. Inside, the closed and sealed environment contains fold-down chairs for up to eight passengers.

The 40,000-pound, heavy-duty vehicles will provide protection against chemicals and projectiles that could be carried through the air during a catastrophic event at the pad.

"We're in line with NASA's philosophy of saving money and acquiring a multiuse vehicle that also could be used by our Commercial Crew Program partners," said Tom Hoffmann, a GSDO operations integration engineer and member of the study team.

Currently, two URS Federal Services workers on the Institutional Services Contract have been trained to operate the MRAP. Zeno said there are plans to set up training scenarios for the SLS Program similar to those that were used to teach operators to handle the M-113.

NASA/Kim Shiflett

Crew members of space shuttle Discovery's STS-133 mission go for a ride in an M-113 armored personnel carrier during the Terminal Countdown Demonstration Test at Kennedy Space Center Oct. 13, 2010. The M-113 was available for emergency egress during NASA's Space Shuttle Program.

NASA, Industry Discuss Launching Astronauts

By Steven Siceloff
Spaceport News

NASA/Greg Lee

NASA's Commercial Crew Program plans to safely launch astronauts using commercially developed space transportation capabilities by the end of 2017.

The first U.S. companies to launch people into space from American soil may have been in the room Wednesday when NASA officials discussed an upcoming opportunity that culminates with operational missions carrying astronauts to the International Space Station.

A pre-proposal conference by NASA's Commercial Crew Program (CCP) at Kennedy Space Center occurred about two weeks after CCP asked for proposals from aerospace companies that would lead to crewed missions to the station in 2017 or earlier.

Proposals from commercial companies will result in award of one or more contracts for the development and certification of a Commercial Crew Transportation Capability (CCtCap). CCtCap is the second phase of a two-phase certification plan for commercially built and operated integrated crew transportation systems. One or more contracts may be awarded following an open competition; however, all companies interested in submitting proposals must be at a level consistent with the first phase of certification efforts during the Certification Products Contract (CPC). Through its certification efforts, NASA ensures that a commercial transportation system has met NASA's safety and performance requirements.

Kathy Lueders, acting program manager of CCP, noted NASA's hope that CCtCap will allow commercial industry to provide the agency with the most innovative solutions to a safe, cost-effective and reliable transportation capability. She also emphasized the need for the spacecraft to be able to serve as a lifeboat for the station, something that no other American spacecraft has done since the Skylab program in the early 1970s when an Apollo spacecraft remained docked to the station for less than three months. A station lifeboat needs to stay in space for many months at a time.

The conference took place within a month of the successful conclusion of NASA's groundbreaking Commercial Orbital Transportation Services (COTS) effort to facilitate the development of privately operated cargo spacecraft that can ferry cargo to low-Earth orbit, including the station.

COTS saw two American companies, Space Exploration Technologies of Hawthorne, Calif., better known as SpaceX, and Orbital Sciences of Dulles, Va., design, build and launch a pair of new spacecraft on rockets that also were newly designed.

Demonstration and resupply missions began in 2012 and continued into 2013. NASA already has signed Commercial Resupply Services contracts with the companies to deliver more cargo and critical science experiments to the station.

The space agency also has used the COTS model to facilitate U.S. companies' development of their own human-rated commercial spacecraft.

"We want to keep the underlying philosophy of a partnership," said Phil McAlister, NASA's director of Commercial Spaceflight Development.

CCtCap will include at least one flight test to verify the commercial spacecraft can dock to the station and its systems perform as expected. At the successful conclusion of NASA's certification activities under CCtCap, commercial companies will be awarded a minimum of two and a maximum of six post-certification missions to provide NASA with commercial crew transportation services to meet its station crew rotation requirements.

The contract further emphasizes NASA's partnership with the Federal Aviation Administration (FAA) for commercial human spaceflight. Commercial launch and re-entry activities for post-certification missions will be licensed by the FAA under CCtCap.

Pam Underwood in the FAA's Office of Commercial Transportation said the agency worked closely with NASA and its partners in licensing all the commercial cargo missions under COTS to ensure public safety. The FAA has a similar partnership with CCP to achieve safe crew transportation missions under CCtCap. This partnership was formalized in a Memorandum of Understanding between the agencies for the achievement of mutual goals in human space transportation dated June 2012.

"This partnership seeks to avoid conflicting requirements, multiple sets of standards, and to advance both public and crew safety," Underwood said. "Collaboration and partnership between our agencies will further provide a stable framework for the U.S. space launch industry."

There has been no shortage of companies looking to work with NASA during this development and certification phase for crewed missions, including aerospace giants and several start-ups.

NASA engineers continue to work closely with several commercial companies as they refine their certification plans and test new equipment in increasingly realistic scenarios to develop safe human spaceflight transportation capabilities.

Blue Origin test-fires new rocket engine

By Steven Siceloff
Spaceport News

NASA commercial crew partner Blue Origin of Kent, Wash., announced it has tested a new, hydrogen- and oxygen-fueled engine designed to lift the company's crewed Space Vehicle on future missions out of Earth's atmosphere. Blue Origin is one of the American companies developing next generation rockets and spacecraft capable of carrying humans to low-Earth orbit.

Blue Origin conducted the test of its BE-3 rocket engine on a stand at the company's West Texas facility near Van Horn on Nov. 20. The engine fired for 2 1/2 minutes, then paused for several minutes before re-igniting for a minute in a pattern that simulated a suborbital mission.

NASA's Commercial Crew Program (CCP) has been working with the company on several aspects of the engine's development. The program supported testing of the BE-3 under the agency's Commercial Crew Development Round 2 initiative and continues to offer technical support. NASA and Blue Origin also are partnered in review and tests of the company's Space Vehicle design.

"Blue Origin has made steady progress since the start of our partnership under the first Commercial Crew Development round," said Phil McAlister, NASA's director of Commercial Spaceflight Development. "We're thrilled to see another successful BE-3 engine test fire."

During the test, the engine demonstrated a full mission duty cycle, mimicking the flight of the company's suborbital New Shepard vehicle by thrusting at 110,000 pounds in a 145-second boost phase, shutting down to simulate coast through apogee. The engine then restarted and throttled down to 25,000 pounds thrust to simulate controlled vertical landing.

Blue Origin's Orbital Launch Vehicle will use the BE-3 engine to propel the company's Space Vehicle into orbit. Unlike other boosters that burn once and then fall away to never be used again, the Reusable Booster System is designed to send a crew into space and then make a soft landing on Earth before being refurbished for another mission. The Space Vehicle is envisioned to carry people into orbit and could potentially carry astronauts to the International Space Station.

"Working with NASA accelerated our BE-3 development by over a year in preparation for flight testing on our New Shepard suborbital system and ultimately on vehicles carrying humans to low-Earth orbit," said Rob Meyerson, president and program manager of Blue Origin. "The BE-3 is a versatile, low-cost hydrogen engine applicable to NASA and commercial missions."

The engine firing comes about a year after the BE-3's thrust chamber was tested at NASA's Stennis Space Center in Mississippi. Developing a new rocket engine is one of the most difficult aspects of launch vehicle design because of the dynamics involved with creating a powerful machine that can safely operate in a range of -423 degrees Fahrenheit, the temperature of liquid hydrogen, to more than 6,000 degrees Fahrenheit in the engine during a firing.

The BE-3 is the first new liquid-hydrogen rocket engine built for production since the RS-68, which was developed more than a decade ago for the Delta IV rocket family.

NASA/Lauren Harnett

Blue Origin test fires a powerful new hydrogen- and oxygen-fueled American rocket engine at the company's West Texas facility Nov. 20.

NASA/Lauren Harnett

Blue Origin test fired a powerful new hydrogen- and oxygen-fueled American rocket engine at the company's West Texas facility Nov. 20. During the test, the BE-3 engine fired at full power for more than two minutes to simulate a launch, then paused for about four minutes, mimicking a coast through space before it re-ignited for a brief final burn.

‘Skip’ Mackey remembered by colleagues

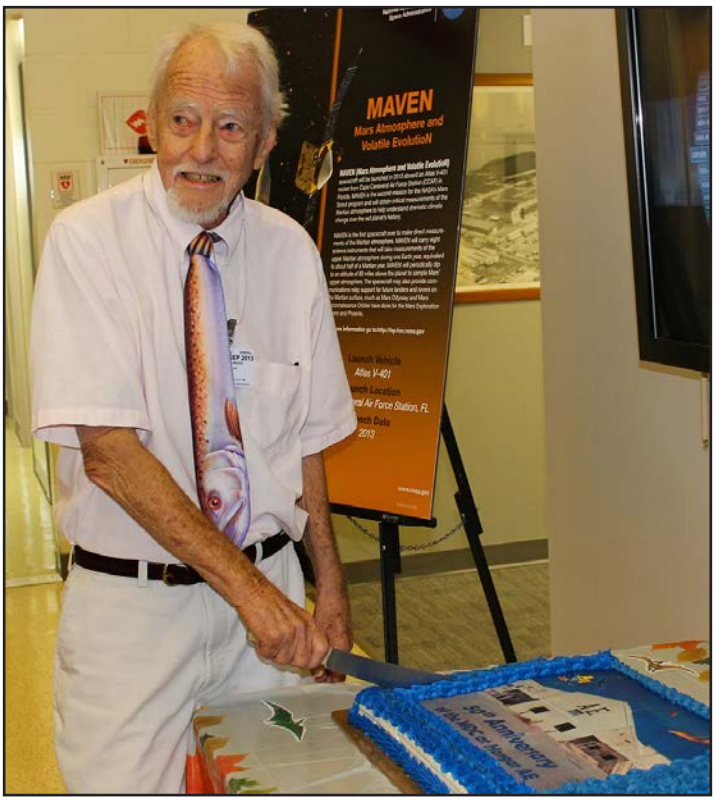
By Linda Herridge
Spaceport News

Arthur J. “Skip” Mackey Jr. was the “Voice of NASA” in the 1960s and 70s during countdown broadcasts for NASA’s rocket launches from Cape Canaveral Air Force Station in Florida. Mackey, who was branch chief for Telemetry and Communications in the agency’s Expendable Launch Vehicle Program and then the Launch Services Program (LSP) for 39 years, passed away in Fort Lauderdale on Nov. 19.

Eric Anderson, chief of the Ground Systems Integration Branch for LSP, worked with Mackey from 1993 to 1996.

“When I started at Kennedy, I originally worked for the Space Shuttle Program,” Anderson said. “During a tour of Hangar AE, I heard Skip give a talk about the rocket industry and what role communications and telemetry played in the launches.

“His passion and energy for the work and the people inspired me like no one else had before or since. When a position came up in his office, I jumped at the opportunity to work for him and I have worked in the same office ever since,” Anderson said.



NASA

Arthur J. “Skip” Mackey attended the 50th Anniversary celebration of the Hangar AE Mission Director’s Center at Cape Canaveral Air Force Station, Fla., on Sept. 24, 2013.

When NASA began to broadcast launch countdowns to the public for the first time, it was Mackey’s voice that was heard during the launch vehicle’s ascent into space. He worked on all of the uncrewed vehicle programs up to and including the Delta program, which was the last one he worked on before he retired.

Anderson’s position is the same one that Mackey held, but it was consolidated into the program in 1998 when Kennedy began to manage LSP for NASA.

Mackey had a talent for technical flight commentary for launches. Anderson said the job required the technical ability to read telemetry data from the launch vehicle and recognize what was going on and then be able to improvise the commentary from this data “on the fly.”

George Looschen, an engineering scientist with QinetiQ on the ELVIS-2 contract in Denver, Colo., started his career with NASA in 1964 at the Goddard Space Flight Center in Greenbelt, Md.

“When I arrived, Skip was already there. He ran the telemetry station and also was instrumental in building the telemetry station at Vandenberg Air Force Station in California,” Looschen said. “He also managed the contractor support for the stations.”

Looschen said Mackey was a true gentlemen and a friend. “It would be hard to put a value on his many significant contributions to the U.S. space programs,” Looschen said. “His legacy will definitely live on.”

Charlie Thompson worked for various contractors from 1985 to 2009 as a communications engineer. He recalled that a camera was first set up in the telemetry lab and followed Mackey around during his launch countdown commentary for commercial launches.

“Skip was a gentleman. He allowed people to be creative and try new ideas,” Thompson said. “Looking back, Skip held together a diverse and highly dedicated group of people with very different personalities. He realized the value of each one of his employees.”

Claire Neptune served as Mackey’s office assistant and recollects what a hard worker Mackey was. “He expected that from all of us and kept everything running smoothly,” Neptune said.

In a Florida Today feature dated Nov. 8, 1992, former NASA Expendable Launch Vehicle Program Director Robert Gray was quoted as saying, “I suspect that Skip Mackey has directly supported more space launches than anyone else in the world. It’s probably in the hundreds. And once a rocket lifts off, everyone turns on Skip’s channel because they want to know what is going on with the vehicle.”

NASA file

Skip Mackey received an Exceptional Service Medal from NASA in 1988. Mackey is seen here at one of the telemetry consoles May 19, 1989.

Scenes Around Kennedy Space Center

NASA/Charisse Nahser

The heat shield for the Orion spacecraft is offloaded from the Super Guppy aircraft at the Shuttle Landing Facility at Kennedy Space Center Dec. 5. The largest of its kind ever built, the heat shield will be installed on the Orion crew module in March 2014. Orion is scheduled to make its first unpiloted flight test, Exploration Flight Test-1 in September 2014.

NASA/Tim Jacobs

Engineers remove a protective covering from around the TDRS-L satellite inside the high bay at the Astrotech payload processing facility in Titusville Dec. 6.

NASA/Daniel Casper

Crawler-transporter 1 (CT-1) approaches the top of Launch Pad 39A after traveling along the crawlerway Dec. 3. New jacking, equalizing and leveling, or JEL, hydraulic cylinders were installed on the crawler and are undergoing a leveling and turning test as CT-1 travels along the slope.

NASA/Kim Shiflett

The first free flight test of the Project Morpheus prototype lander begins as the engine fires and the lander lifts off at the north end of the Shuttle Landing Facility at Kennedy Space Center Dec. 10. During the 54-second test, it ascended about 50 feet and hovered for about 15 seconds. It then flew forward and landed on its pad about 23 feet from the launch point.

Happy Holidays!

KSC
Holiday
Coffee

John F. Kennedy Space Center

Spaceport News

Spaceport News is an official publication of the Kennedy Space Center. Contributions are welcome and should be submitted three weeks before publication to Public Affairs, IMCS-440. Email submissions can be sent to **KSC-Spaceport-News@mail.nasa.gov.**

Managing editor . . . . . Chris Hummel
Editor . . . . . Frank Ochoa-Gonzales
Assistant editor . . . . . Linda Herridge
Copy editor . . . . . Kay Grinter

Editorial support provided by Abacus Technology Corp. Writers Group.
NASA at KSC on the Web, at **http://www.nasa.gov/kennedy**
SP-2013-11-266-KSC • NASA Kennedy Space Center Public Affairs