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# Spaceport News

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

# 2012 reshaped vision for space

*By Rebecca Regan*
*Spaceport News*

In 2012, Kennedy Space Center celebrated its 50th year and continued transitioning from a historically government-only launch facility to an affordable and sustainable multiuser spaceport of the future.

Kennedy teams were involved in launching four missions this year: two on expendable launch vehicles and two commercial flights to the International Space Station. The center also prepared and then transported three space shuttles to their final display sites, established strategic partnerships and began the refurbishment of existing infrastructure for future uses.

The Launch Services Program (LSP) launched its first mission of the year June 13. The Nuclear Spectroscopic Telescope Array (NuSTAR) began its two-year mission aboard an Orbital Sciences' Pegasus XL rocket launched from the Kwajalein Atoll in the Marshall Islands. Now operating in a low-Earth equatorial orbit, NuSTAR is studying high-energy X-ray light to reveal black holes lurking in our Milky Way galaxy and those hidden in the hearts of faraway galaxies.

On Aug. 30, the Radiation Belt Storm Probes mission began with a thundering early morning liftoff aboard a United Launch Alliance Atlas V rocket from Cape Canaveral Air Force Station. Now called the Van Allen Probes, the two identical spacecraft loaded with scientific instruments are following each other through two extreme and dynamic regions of space that surround Earth. The pair now is providing unprecedented details about the Van Allen region, which can affect Earth's communications systems and electric power grids.

Kennedy LSP workers also marched toward three launches planned for 2013, one from Florida and two from California's Vandenberg Air Force Base.

Work to open a new frontier in space and to invest in the American commercial aerospace industry also began to pay off this year.

The Space Exploration Technologies (SpaceX) Dragon capsule became the first commercial spacecraft to berth to the International Space Station on May 25 after launching three days earlier atop a Falcon 9 rocket from Space Launch Complex 40 at Cape Canaveral Air Force Station. As the company's second demonstration mission for the Commercial Orbital Transportation Services program, the flight opened the door for regularly transporting critical cargo and research to and from the station.

A few months later, SpaceX transitioned to the Commercial Resupply Services phase, launching its first of 12 contracted resupply missions to the station. Lifting off on Oct. 7, the Dragon spacecraft embarked on a journey to deliver about 1,000 pounds of

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*CLICK ON PHOTO* *NASA*

In this time-lapse image, the lights of Orbital Sciences' L-1011 "Stargazer" streak across the night sky as the aircraft takes off from the runway at Kwajalein Atoll with the company's Pegasus rocket to launch NASA's Nuclear Spectroscopic Telescope Array on June 13.

*CLICK ON PHOTO* *NASA*

SpaceX's Falcon 9 rocket and Dragon capsule lift off Oct. 7 from Space Launch Complex 40 on Cape Canaveral Air Force Station for the first Commercial Resupply Services mission to the International Space Station.

# Contracts next step in crewed ISS missions

*By Rebecca Regan*
*Spaceport News*

NASA announced Dec. 10 the next step in its plan to launch American astronauts from U.S. soil, selecting three companies to conduct activities under contracts that will enable future certification of commercial spacecraft as safe to carry humans to the International Space Station.

Advances made by these American companies during the first contract phase, known as the certification products contracts (CPC), will begin the process of ensuring integrated crew transportation systems will meet agency safety requirements and standards to launch American astronauts to the International Space Station from the United States, ending the agency's

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## Kennedy Infrastructure Reviewed

The Ground Systems Development and Operations Program recently completed an important System Requirements Review/System Definition Review milestone in planning for future operations at Kennedy Space Center.

**See Page 4 for details . . .**



*CLICK ON PHOTOS* *NASA images*

In 2012, Kennedy Space Center employees prepared NASA's space shuttles for their display sites across the country. Discovery, left, headed to Virginia first on April 17, followed by Endeavour, center, to California on Sept. 21, and Atlantis, right, to the Kennedy Space Center Visitor Complex on Nov. 2.

From **2012**, Page 1

supplies to the orbiting laboratory. It also carried with it critical materials to support about 170 investigations, some of which stemmed from Kennedy's Engineering and Technology Directorate and the International Space Station Ground Processing and Research Directorate.

These commercial cargo flights provide a glimpse of what commercial crew services to low-Earth orbit might look like in the future. Working with seven commercial partners during the Commercial Crew Development Round 2 phase, NASA's Commercial Crew Program (CCP) continued to move promising spacecraft and launch vehicles concepts forward.

The program then signed new agreements in August with three companies for the Commercial Crew Integrated Capability initiative. Until mid-2014, CCP will work with SpaceX, Sierra Nevada Corp. (SNC) and The Boeing Company as they complete their integrated spacecraft and launch vehicle designs, test their hardware, and showcase how they would operate and manage missions from launch through orbit and landing.

CCP also awarded the first phase of contracts in certification efforts for crewed missions to the space station. The Certification Products Contracts will allow NASA and industry to iron out how systems in development could meet all of the agency's safety and performance requirements.

By investing in American-led commercial space transportation systems for low-Earth orbit missions, NASA can focus on exploring farther than ever before with its own rocket and spacecraft.

The agency's first space-bound Orion spacecraft arrived at Kennedy on June 28. It now is being processed and tested for flight in the Operations and Checkout Building high bay. The first uncrewed mission of Orion, called Exploration Flight Test-1, is targeted to launch atop a Delta IV rocket in 2014. NASA also is designing a heavy-lift rocket called the Space Launch System that will launch future Orion spacecraft and astronauts farther into space than ever before from Kennedy.

To position the center as a premier launch site for both government and commercial spaceflight missions, the Ground Systems Development and Operations Program is developing multipurpose ground systems and upgrading infrastructure and facilities.

This year, the program removed hundreds of miles of cables replacing it with state-of-the-art command, control and communication systems in the Vehicle Assembly Building (VAB) and at pad 39B. Workers also removed space shuttle-era work platforms from the VAB to make room for a more flexible concept and began to upgrade a legacy crawler-transporter to support the SLS.

While preparing for the future, Kennedy workers closed out a historical chapter in human spaceflight. The team methodically processed space shuttles Discovery, Endeavour and Atlantis for their new missions to educate and inspire America's next generation of explorers at display sites across the country. They also preserved unique shuttle-era hardware that NASA could call on for the future, such as the space shuttle main engines set to be repurposed for use on the SLS.

Shuttle Discovery was the first to depart Kennedy when it took off atop the agency's Shuttle Carrier Aircraft (SCA) on April 17. The ferry flight to the Washington Dulles International Airport in Virginia took about four hours. The agency's most-flown shuttle then was transported to its new home at the Smithsonian's National Air and Space Museum Steven F. Udvar-Hazy Center in Chantilly, Va.

On Sept. 21, Endeavour made a three-day cross-country trek to Los Angeles with flyovers above NASA's Michoud Assembly Facility near New Orleans, Stennis Space Center in Mississippi, several points around Houston and numerous California landmarks. The agency's youngest shuttle then was honored with a two-day, 12-mile parade as it traveled to the California Science Center.

NASA gave its final shuttle a grand sendoff as it moved Atlantis from the VAB to the Kennedy Space Center Visitor Complex on Nov. 2. Shuttle-era astronauts and members of the workforce who readied the shuttles for 30 years cheered as Atlantis made a final daylong 10-mile trip through Kennedy's Launch Complex 39, Industrial Area and Exploration Park. A fireworks display that night welcomed Atlantis to its new home, which is set to open to the public next summer.

Celebrating the many accomplishments of Kennedy and its workforce was a recurring theme throughout the year. In February, NASA commemorated the 50-year anniversary of the Mercury-Atlas 6 mission, the successful first attempt at sending an American into orbit. The center then celebrated its own anniversary in July, marking five decades of launching humans and machines into space.

In September, Kennedy hosted its first Innovation Expo to highlight employee innovations and spur collaboration for future center and agency endeavors.

Many organizations across Kennedy collaborated to host a record-turnout year for its high-energy Lunabotics Mining Competition. Thirty-eight U.S. and 17 international college and university teams spent months designing and building their versions of remote-controlled or autonomous excavators, called lunabots, before heading to Kennedy to test them out in a large sandbox filled with lunar regolith simulant.

Another lunar terrain-focused project met with success in 2012. NASA's Regolith and Environment Science and Oxygen and Lunar Volatile Extraction (RESOLVE) payload was installed on the Canadian Space Agency rover, dubbed Artemis Jr., at Kennedy. The duo and a team of center engineers then traveled to Hilo, Hawaii, where the terrain is similar to the moon's to test how their tools and equipment would drill for resources.

Partnering with commercial customers has been a key focus of the Center Planning and Development Office as Kennedy becomes less program-centric and more capability-centric.

As the United States embarks on a new era of spaceflight through government and commercial partnerships, Kennedy will continue to build off its rich history of launching humans and machines farther than imagined and remain the nation's premier launch complex for decades to come.

# Foam's future forming in space and industry

*By Linda Herridge*
*Spaceport News*

Materials designed with specialized thermal properties have been integral components of NASA's space shuttles and other launch vehicles for many years. Now, two thermal insulation systems developed by scientists at Kennedy Space Center may have application for future exploration programs, as well as the commercial world.

CLICK ON PHOTO NASA/James Fesmire

The thermal insulation system called AeroFoam was developed at the Cryogenics Testbed Laboratory.

The thermal insulation system known as layered composite insulation (LCI) and the foam-aerogel composite material, known as AeroFoam, were assigned U.S. Patent numbers in 2005 and 2010 respectively. Just recently, exclusive research licenses for these technologies were granted to Flexure LLC.

Cody Bateman, the chief executive officer of Flexure, said there are numerous applications and industry crossovers, particularly in transportation and construction, which could benefit from these technologies.

"Flexure has a strong working relationship with NASA at Kennedy and Goddard Space Flight Center," Bateman said. "Since we specialize in cryogenics engineering, we are exposed to many of the best technologies in the world and understand applications where they can best be used."

Jeff Kohler is the business manager for QinetiQ North America and supports Kennedy's Technology Transfer Office. He said an exclusive research license is a short-term license that allows a company to look at technologies and determine how they want to develop them.

"A short-term exclusive research license helps protect their investment by granting them exclusive rights to the intellectual property associated with the invention," Kohler said.

LCI was developed by senior principal investigator James Fesmire and senior principal scientist Dr. Stan Augustynowicz, co-founders of the Cryogenics Test Laboratory (CTL), with the idea for it dating back to 1998.

"The LCI system is the world record holder for the lowest thermal conductivity insulation system in a soft vacuum environment," Fesmire said. "It is made into blanket forms like multilayer insulation, but includes a third element of a high surface area material such as aerogel powder."

The AeroFoam technology, with origins back to 2002, was developed jointly by Fesmire, Trent Smith, who is now strategic communications manager for the Commercial Crew Program, lead polymer scientist Dr. Martha Williams in the Polymers Science and Technology Laboratory, lead engineer Jared Sass at Kennedy's CTL, and Dr. Eric Weiser, who was a senior materials engineer in the Research Directorate at Langley Research Center.

"The foams and aerogels can be in different forms and be put together in many different ways," Fesmire said. "It is currently made in molded forms using heat-oven equipment."

Fesmire said both technologies could be tailored for a wide range of different applications, including cryogenic piping and tanks, building construction, superconducting power cables, hydrogen cars and space exploration habitats.

"The number of applications in industry is almost limitless," Bateman said.

Bateman added that there is still a significant amount of research required to commercialize these technologies. The first commercial use is scheduled for 2013, as several corporations have shown significant interest.

From **CPC**, Page 1

reliance on Russia for these transportation services.

The second phase of certification will result in a separately competed contract.

CPC contractors are The Boeing Company of Houston for $9.9 million; Sierra Nevada Corp. (SNC) of Louisville, Colo., for $10 million; and Space Exploration Technologies (SpaceX) of Hawthorne, Calif., for $9.5 million.

"These contracts represent important progress in restoring human spaceflight capabilities to the United States," said Phil McAlister, director of the Commercial Spaceflight Development Division at NASA Headquarters.

"NASA and its industry partners are committed to the goal of safely and cost-effectively launching astronauts from home within the next five years."

During the Phase 1 CPC contracts, from Jan. 22, 2013, through May 30, 2014, the companies will work with the Commercial Crew Program (CCP) to discuss and develop products to implement the agency's flight safety and performance requirements. This includes implementation across all aspects of the space system, including the spacecraft, launch vehicle, and ground and mission operations.

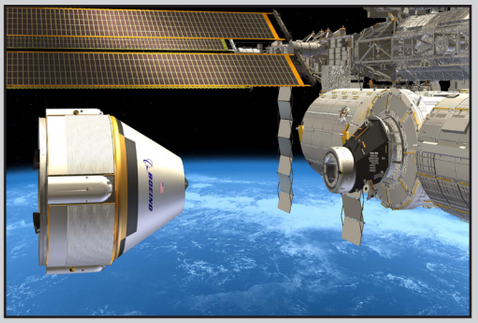
Under the contract, a certification plan will be developed to achieve safe, crewed missions to the space station. This includes data that will result in developing engineering standards, tests and analyses of the crew transportation systems design.

"I congratulate the three companies for their selection," said Ed Mango, CCP manager at Kennedy Space Center. "This is the program's first major, fixed-price contract. The effort will bring space system designs within NASA's safety and performance expectations for future flights to the International Space Station."

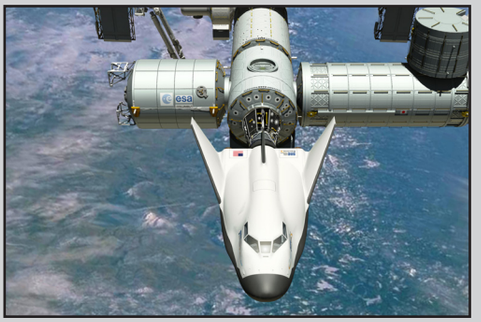
The second phase of the certification contract, expected to begin in mid-2014, will involve a full and open competition. It will include the final development, testing and verifications necessary to allow crewed demonstration flights to the space station.

**NASA's Commercial Crew Program Partners for International Space Station Mission Phase 1 Certification Efforts**

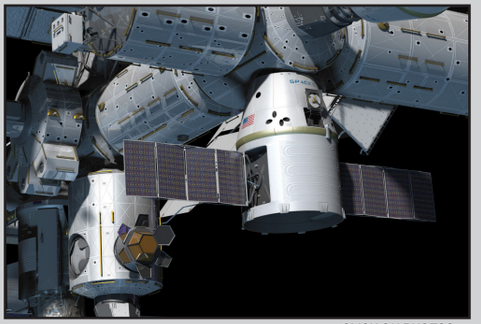
Boeing's CST-100



SNC's Dream Chaser



SpaceX's Dragon



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# Reviews establish future infrastructure needs

***By Bob Granath***
*Spaceport News*

The Ground Systems Development and Operations (GSDO) Program recently completed an important System Requirements Review/ System Definition Review (SRR/SDR) as part of planning for future operations at Kennedy Space Center. The reviews help establish the groundwork needed to launch the Orion spacecraft atop the Space Launch System (SLS) rocket beginning in 2017.

The SRR/SDR began July 11 with a kickoff meeting in which GSDO presented a summary of its program planning, requirements, architecture and operations documentation required for the milestone. The goal was to determine the center's infrastructure needs for future programs and establish work plans for the preliminary design phase.

"This GSDO team has done superb work in achieving this important milestone," said Pepper Phillips, GSDO Program manager. "This thorough review has validated that our baseline architecture is sound and aligns with the agency's exploration objectives."

GSDO is determining what systems and facilities will be required to support launching SLS with Orion atop it from Kennedy. Orion is NASA's multi-purpose crew vehicle that will provide a new capability for human exploration beyond low-Earth orbit. SLS is a powerful new rocket in development that will take astronauts farther into space than ever before.

"Our mission is to ensure we can process and launch the next generation of launch vehicles and spacecraft," said Tammy Annis, SRR/SDR lead in GSDO. "To meet this goal we need to develop the ground systems, infrastructure and operational approaches to sustain that mission."

The 37-member board reviewed reports on products such as Kennedy's future infrastructure needs, including estimates on cost, schedule and technical data.

"The teams have developed 42 products of which 16 were reviewed during the SRR/SDR process," said Greg Horvath, division chief in GSDO Program Integration.

"These reports included studies by teams that focused on program-level integration, vehicle integration and functional program requirements," he said.

The review board includes representatives from NASA Headquarters, the SLS and Orion Programs, mission operations, the astronaut office and Kennedy intuitional organizations.

GSDO teams specialize in multiple areas of development and operations at the center. The current focus is on establishing program requirements, architectures and operations planning.

The Vehicle Integration and Launch team researches the equipment, management and operations required to safely attach a spacecraft to a rocket, move the launch vehicle to the pad and successfully send it into space.

The Offline Processing and Integration Team is developing ways to process the Orion spacecraft, rocket stages and the launch abort system before they are assembled into one vehicle.

Another group is modernizing the Command, Control, Communications and Range Systems involved in launching astronauts into space. In addition to bringing computers, tracking systems and other networks up to date, the team is creating systems that can manage several different kinds of spacecraft and rockets.

Unlike previous work focusing on a single kind of launch vehicle, such as the Saturn V rocket or space shuttle, engineers and managers in GSDO are preparing infrastructure to support several different kinds of spacecraft and rockets that are in development.

"Our focus on this review is the ground infrastructure of Orion and SLS," Horvath said. "However, we are continuing to evaluate strategic investment opportunities that will enable us to best align the unique capabilities of the Kennedy Space Center with commercial space pursuits as those plans mature."

Horvath explained that it is important for the GSDO, SLS and Orion Programs to work closely together so that they all get to the planned first launch in 2017.

"We're focusing on building ground systems with interfaces to flight vehicles," he said. "Orion's systems are reasonably mature, with hardware already here at Kennedy. The SLS design is less mature at this stage, so we have to continue discussions with the people in Flight Systems as we design the integration facilities and mobile launcher umbilical connecting points between ground systems and the rocket."

Tim Honeycutt, the Technical Management branch chief in GSDO Program Integration, says that he is pleased with progress so far.

"We've determined what the issues are and we're developing a good strategy to mitigate them," he said. "It positions us well as we move forward."

The next step, the Preliminary Design Review, begins in November 2013.

"That review will allow us to evaluate preliminary designs of new systems here at Kennedy and better establish where we need to make prudent modifications to existing systems," Honeycutt said.

*CLICK ON PHOTO* *NASA/Kim Shiflett*

The mobile launcher stands at Kennedy Space Center's Launch Pad 39B during structural and functional engineering tests Nov. 28. The mobile launcher is being modified to support the Space Launch System. The Ground Systems Development and Operations Program recently completed an important System Requirements Review/ System Definition Review and plan for future infrastructure needs.

# Scenes Around Kennedy Space Center

CLICK ON PHOTO NASA/Charisse Nahser

A special fixture that enables precise prelaunch processing stands in place around an Orion spacecraft inside the high bay of the Operations and Checkout Building on Dec. 6. This Orion capsule is being prepared for a flight test in 2014 on a mission that will not carry any astronauts.

NASA/Dan Casper

Kennedy Space Center workers involved with the Grass Valley 440 Video Switcher in the Launch Control Center, Room 1P2, simultaneously turn off the switcher for the last time Nov. 30 after 33 years of operations. The switcher was used to support the Space Shuttle Program's processing activities, launches and landings. The 192 input by 512 output analog video switcher encompassed 22 equipment racks, each 10 feet tall, which was big for its time, both in capacity and physical size.

CLICK ON PHOTO NASA

NASA astronaut Scott Kelly participates in a NASA/Roscosmos press conference Dec. 5 at Johnson Space Center, previewing his upcoming yearlong International Space Station expedition with Russian cosmonaut Mikhail Kornienko (not pictured). At Kelly's right is Johnson Space Center Public Affairs moderator Josh Byerly.

CLICK ON PHOTO NASA/Charisse Nahser

Workers inside the Space Station Processing Facility position the orbital replacement unit for the International Space Station's main bus switching unit Dec. 4 as they prepare to pack the unit in a shipping container. The unit will be shipped to Japan at the beginning of 2013 for the HTV-4 launch, which currently is scheduled for later in the year.

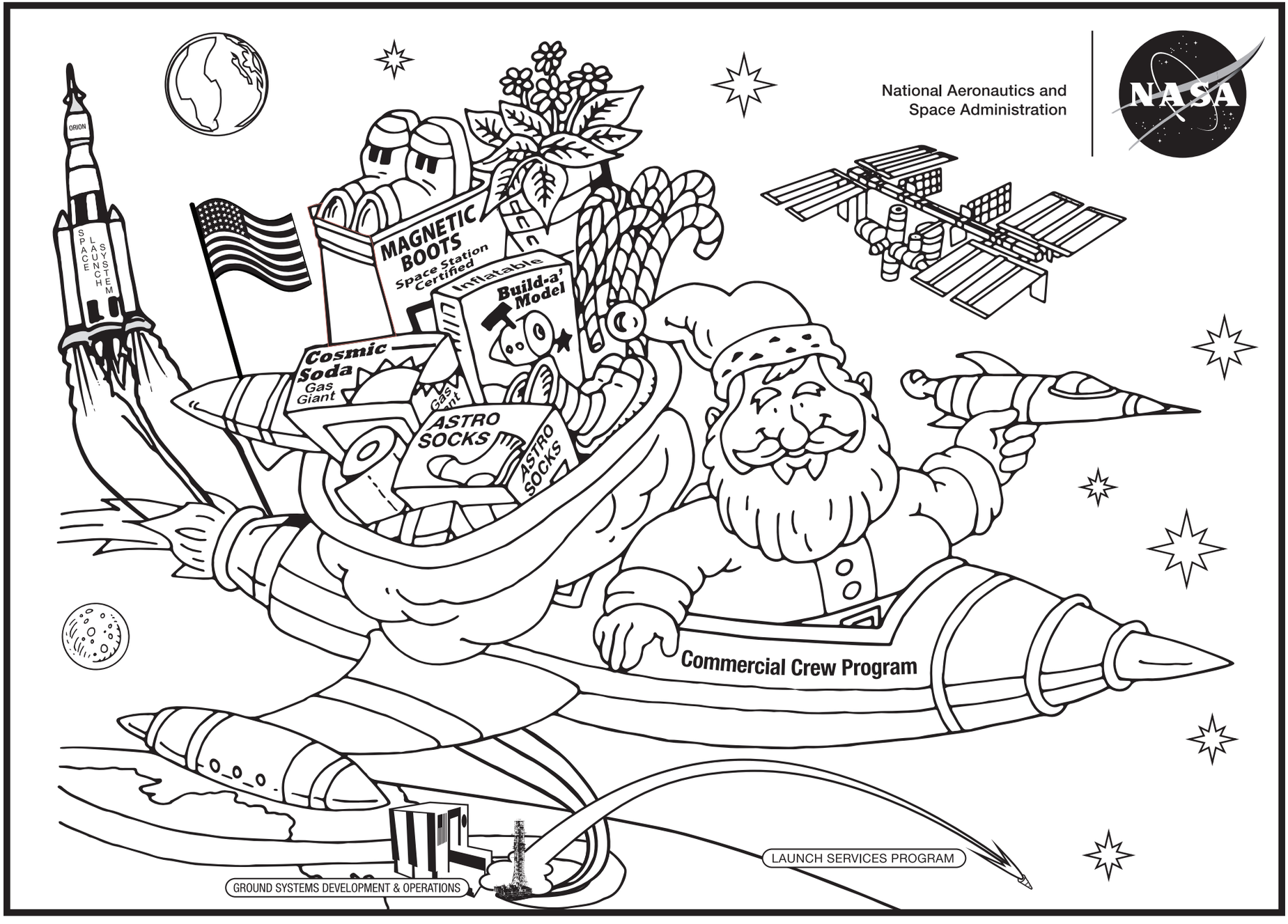

Reader-submitted photo

The Kennedy Space Center Running Club took part in the 17th Annual Reindeer Run on Dec. 1 at Cherie Down Park in Cape Canaveral. From left are Troy Cochran, Nathan Wood, Daisy Mueller, Laura Midulla, Shaun Daly, Catherine Daly, Rubiela Vinje and Timothy Bass. The club, which became official in July under the NASA Exchange, set up a booth and handed out outreach items, including decals, newsletters and information related to innovation at NASA. The club was created to encourage walking, jogging and running, with a focus on maintaining a healthy lifestyle.

# 2012 KSC Holiday Coffees






# NASA's Spaceflight Endeavors



SP-2012-12-266-KSC

# Co-op program changes its 'path, ways'

***By Brittney Longley***
*Spaceport News*

Highly regarded as a businessman and motivational speaker, Nido Qubein also is known for his quote, "Change brings opportunity."

Change is bringing more opportunities not only to students, but to veterans as well, as the program formerly known as the Cooperative Education (Co-op) Program transitions into the Pathways Intern Employment Program.

The transition officially began May 11 after an executive order was issued. While there are significat differences between the two programs, both give students opportunities to work with the federal government as they reach for the stars.

The Pathways program contains three components: the Intern Employment Program, the Recent Graduate Program, and the Presidential Management Fellows Program.

Students who previously were referred to as co-ops now are known under the new program as Pathways interns.

"The name change is a cultural change for NASA and those are always difficult with any company," said Josephine Pereira, Pathways program and recruitment manager.

Another big change is that veterans receive absolute preference, whereas they previously were given priority consideration.

The Center Recruitment and Pathways Program Office at Kennedy Space Center rolled out the new program by informing current students of the changes and creating a Pathways Roadshow.

The office also made presentations during directorate staff meetings to ensure that all directorate leaders were aware of the changes, hiring options and how the changes would affect current students.

*CLICK ON PHOTO* *NASA*

Emmanuel Magala, an intern with Spaceport Command Control Systems, pours super-cooled liquid into a vacuum-insulated sealed pipe for testing in the Cryogenic Testing Facility at Kennedy Space Center in 2010.

Human Resources reached out to almost every directorate throughout a two-month timespan, providing a chance to answer questions that any hiring authority might have.

"Overall, the program is still giving students the opportunity to enhance their education pursuits and broaden their understanding of the work being conducted at NASA," Pereira said.

# Interns showcase experiences

***By Brittney Longley***
*Spaceport News*

From processing purchase orders to working on plant habitats, six permanent Pathways interns showcased the lessons they learned outside of the classroom at the 2012 fall Pathways student showcase at the Kennedy Learning Institute on Dec. 5.

The showcase was designed for students to highlight their accomplishments and inform other students of the role they play at Kennedy Space Center. Under the Pathways Intern Employment Program, any intern who began working at Kennedy after Jan. 1, 2012, must present a project to their peers and program coordinators in order to become eligible for full-time employment. Mentors, supervisors and directors also may attend.

Anthony Bharrat, an intern with the Flight Computers, Data and Software Branch of the Engineer and Technology Directorate had the opportunity to share his experience of working the Plant Habitat project. Bharrat developed software that will put data into the required format for proper communication between the Plant Habitat and the International Space Station.

"I learn something new every day at Kennedy. The people are always so nice and everyone is willing to help," Bharrat said.

"The showcase is a really good way to allow students to understand what is going on around the center," said Josephine Pereira, Pathways program and recruitment manager. "We often get so encompassed in our work, and this showcase allows us to see what role we all play in Kennedy's future."


*CLICK ON PHOTO* *NASA/Charisse Nahser*

Pathways intern Anthony Bharrat, studying at the University of Central Florida, talks about working on the Plant Habitat project Dec. 5 at the Kennedy Learning Institute.

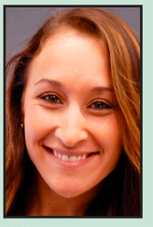
**Danielle Walker**

*"It has been an exciting adventure learning the processes of NASA, and being able to relate the on-the-job experience with my course work."*

**Steven Gilmore**

*"Having the opportunity to contribute to the future of Kennedy, and ultimately American space exploration, has been a once-in-a-lifetime experience."*

**Ashley Keegan**

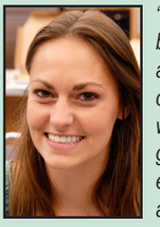


*"I'm thankful to have had the opportunity to support the Procurement Directorate's Engineering and Projects Office. I learned something new and different every day."*

**Jake Hochstadt**

*"I've been able to see how NASA is embracing new technologies. My experience at Kennedy and short time at NASA Headquarters was eye-opening."*

**Ashley Williams**



*"This has been an amazing opportunity where I have gained vital experience and knowledge that will allow me to further my career."*

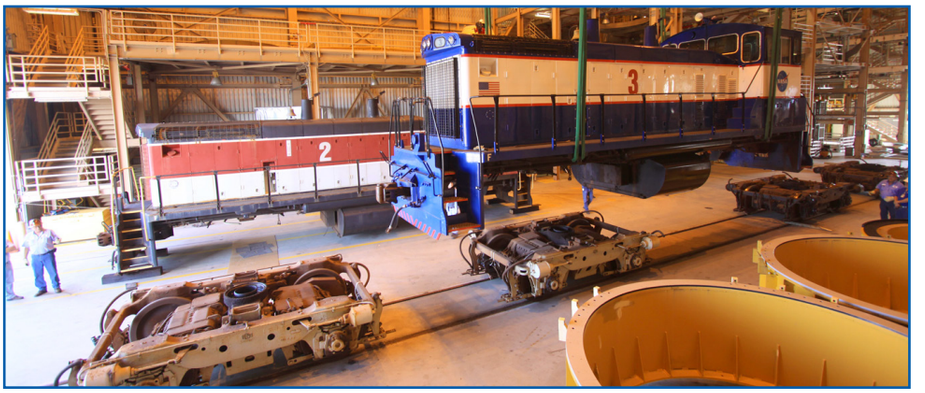
# Shuttle-era facility conducive to NASA locomotives

*By Anna Heiney*
*Spaceport News*

One of the NASA Railroad locomotives recently received a major upgrade, made possible by on-site resources already available inside a Space Shuttle Program-era facility at Kennedy Space Center.

The Rotation, Processing and Surge Facility (RPSF) on the north side of the center's Launch Complex 39 area was built in 1984 to handle the massive solid rocket motor segments that arrived by rail. It is now being used to service those locomotives.

"This facility has never lifted or done anything other than shuttle segments and shuttle parts," said Kevin Panik, manager of the RPSF. "This is a really historic time for us at (Kennedy), that we're able to now show the capabilities that we have here."



NASA/Jim Grossmann

An overhead crane lifts NASA locomotive No. 3 off its trucks inside the Rotation, Processing and Surge Facility at Kennedy Space Center on Nov. 27 for positioning atop the trucks previously used by locomotive No. 2.

Kennedy owns three EMD SW-1500 locomotives, workhorses that have more than pulled their weight hauling solid rocket motor segments in and out of the launch complex. Years ago, the NASA Railroad team carefully restored locomotive No. 3, which currently handles much of the rail work now that the shuttle era is over. But locomotive No. 2 had the better set of wheel and axle assemblies, or trucks. So managers decided to swap trucks between those two locomotives.

"We want to use the best equipment and the most environmentally friendly equipment that we can on the locomotives that we're going to be actually using," explained NASA Railroad manager John Thiers.

"These wheels and trucks (to be moved to locomotive No. 3) are almost brand new," said Mike Stephens, the railroad lead for contractor Yang Enterprises. "We rebuilt them here years ago . . . we didn't want to let them go when we'll need them."

Each locomotive weighs about 159,000 pounds, not including the trucks that add another 89,000 pounds to the 248,000-pound total.

"We were interested in the cost savings," said Rommel Rubio, launch vehicle offline elements operation manager in Kennedy's Ground Systems Development and Operations Program (GSDO). "The cranes are already there; we only had to pay for the people."

The entire operation was done in less than one work shift Nov. 27, and the locomotives returned to the NASA Railroad Yard that same day.

"They were all for it because it would show other uses for that building, and it worked out great for us," Stephens said. "Now locomotive No. 3 is in it for the long haul. It's good for 25 years at the blink of an eye."

# Brevard Space Week inspires future explorers

*By Bob Granath*
*Spaceport News*

Words over the entrance to the Exploration Space exhibit at the Kennedy Space Center Visitor Complex declare, "Explorers Wanted." Between Nov. 26 and Dec. 7, thousands of future astronauts, scientists and engineers walked through those doors during Brevard County Space Week. This year, 5,300 sixth-graders in Brevard County were bused to Kennedy's visitor complex for an educational program designed to encourage interest in science, technology, engineering and mathematics (STEM) careers.

"Over a period of nine days, we had all the sixth-graders throughout the county come in for science demonstrations and hands-on activities," said Kerri Lubeski, senior educator and coordinator of Brevard Space Week for Delaware North Companies Parks and Resorts. "This is the tenth year we've done this, and the reaction from the students has always been enthusiastic."

The projects included a scavenger hunt among full-scale mockups of historic launch vehicles. Students were asked to match the mission with the rocket it supported. There also was an engineering exercise allowing the students to design and build a structure, and then test how well it would hold up.

"Each team of five students was given a kit with identical plastic pieces to build a space station-like truss," said Julie Clements of the Delaware North Education Office.

Following construction, weights were added to determine the strength of each truss.

"The teams were awarded points based on how much weight their truss would support," Clements said.

CLICK ON PHOTO NASA/Tim Jacobs

Teams of five students use kits with identical plastic pieces to build a space station-like truss at the Kennedy Space Center Visitor Complex on Dec. 4. Following construction, weights were added to determine their strength, and points were awarded based on how much weight each could support.

"It's amazing how many different designs the groups come up with."

Anne-Marie Chamberlin, a sixth-grade teacher at Sable Elementary School in Melbourne, felt the special activity was worth the effort.

"It's really great to see the kids so engaged," she said. "I appreciate this opportunity for the students to learn about our space program and to experience this first-hand."

Chamberlin feels living near the Kennedy Space Center gives local students an advantage.

"We're lucky to live on the Space Coast," she said. "Kids are having fun learning away from the monotony of the regular classroom work."

Read the full story online:
http://go.nasa.gov/X6Njzf

# Students accelerate NASA technologies to market

***By Anna Heiney***
*Spaceport News*

Kennedy Space Center is getting help transferring innovative space technologies to the marketplace, thanks to a new partnership between NASA and Rollins College in Winter Park, Fla.

Under a new Space Act Agreement, a small team of MBA students and faculty advisors from the school's Center for Advanced Entrepreneurship will thoroughly analyze a patented NASA technology, then provide NASA's Technology Transfer Office at Kennedy with recommendations for potential licensees and marketing strategies, as well as insight gathered from industry experts.

"These 'second-tier technologies' are patented and they have merit, but it's hard to aggressively market them with so many technologies ahead of them in the queue," explained Jeff Kohler of QinetiQ North America, who leads a team supporting NASA's technology transfer activities at Kennedy. Through the new partnership, "NASA gets the benefit of an extra boost for some technologies we could only passively market, and the students get the experience of working with real-world technologies."

When NASA contacted the school to explore the possibility of such a partnership, the concept sounded promising to Cari Coats, executive director of Rollins' Center for Advanced Entrepreneurship at the Crummer Graduate School of Business. She believed a model the school was applying in another partnership also would work well for collaboration with Kennedy.

"NASA sources the technology and Rollins College sources the students and faculty," Coats said. "We create a path to market, determine how the technology can be commercialized, and create a business plan."

The partnership kicked off in September with a pilot project in which the Rollins team evaluated and created a commercialization plan for the inductive position sensor developed by NASA's Robert Youngquist and Stephen Simmons of Easi. The technology is a series of three small inductors that align in such a way that any slight movement by the middle inductor is detected because of the change in magnetic fields. This information can be fed electronically to a device that needs precise alignment in order to make corrections.

Although the sensor was developed to support measuring the depths of very small defects on the space shuttle orbiter windows, it could be beneficial anywhere volume is tight but high sensitivity is needed over a range of positions, including medical, optical, machining and automotive uses.

The Rollins team is comprised of professor Dr. Peter McAlindon, advisor Sergie Albino, and four student participants, all of whom brought previous technical or business experience to the project. Two of the students, Carlos Capiro and Pankaj Patil, work with major defense contractors and have engineering backgrounds. The other two, Jason Goldberg and Steven Madow, came into the project with extensive business experience, one in information technology and the other in Web development.

Throughout the project, the team followed a process established at the start of the term.

"We call our process the 'Four Ps'," McAlindon explained. "It stands for patents, partners, prospects and packaging."

The group started by researching the patent in order to determine what set the new sensor apart from existing sensors. It then reached out to industry partners.

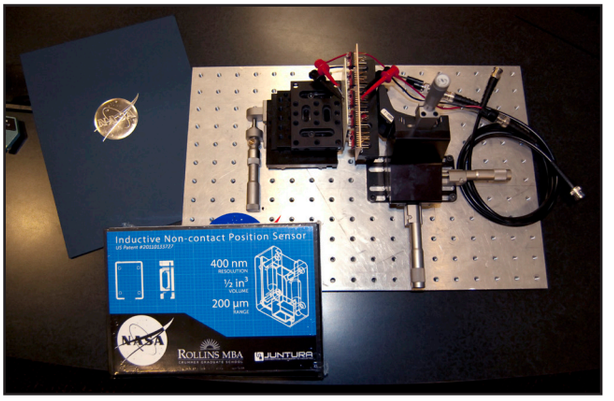
"First, we really had to understand how this technology fits with all the other technologies out there," McAlindon said. "Then we called people in the field who know all about sensors, to help us identify holes in the market and where this technology can be applied."

These subject-matter experts helped narrow a list of "prospects" -- specific markets and individuals to target for possible commercialization opportunities. Finally, the team considered packaging -- the best way to get a prototype of the technology into the hands of companies who potentially could license it.

"If you can show someone the technology, it works a lot better than sharing papers or formulas," McAlindon said. "They all want technical specifications and ask to actually see a sensor. So the students took a prototype and built a custom housing, and made it so you can attach it to whatever you're working on and see how it performs."

The Rollins MBA team presented its commercialization plan to NASA at the school's Winter Park campus Dec. 6, at the close of the fall term.

"The students more than exceeded our expectations in the development of a commercialization and marketing plan for the non-contact position sensor," Kohler said after the presentation. "They went beyond the traditional scope of a plan and developed a business model for a possible start-up company."




*CLICK ON PHOTO* *SGT/John Hampton*

An original inductive position sensor developed by NASA's Robert Youngquist and Stephen Simmons of Easi is seen behind the prototype kit developed by a team of MBA students and faculty advisors from the Rollins College Center for Advanced Entrepreneurship. The kit will be sent to potential licensees as part of a commercialization plan.

And the students' enthusiasm was reflected in the finished product.

"The presentation and professionalism shown by the students was outstanding. They were genuinely excited about the project and even offered to continue working on it into the next school semester," said Jim Nichols, NASA licensing manager.

Kennedy's Innovative Partnerships Office will use these results to pursue opportunities with industry. Typically, the agency licenses the patent to a company that develops it into a saleable product. Royalties NASA earns through these sales are used toward further technology development.

With the trial successfully completed, the non-reimbursable Space Act Agreement will be signed in time for the start of the spring term in January, with the Rollins team working on one new technology per term during two of the three terms per year. Although it's written as a three-year agreement, it could be extended if the partnership thrives.

"These students were just giddy at the opportunity," Coats said. "The idea that they could have a role in bringing to market a NASA technology -- a brand that carries significant weight -- is very exciting. We're thrilled to get them out of the classroom and provide a real-world opportunity."

*SGT/John Hampton*

NASA representatives and Rollins College MBA team members gather for a group photo Dec. 6. From left are Pete McAlindon, professor, Rollins College; Lew Parrish, QinetiQ North America; Robert Youngquist, NASA; Jim Nichols, NASA; Sergie Albino, advisor from Caveat Engineering; students Jason Goldberg, Steve Madow, Pankaj Patil and Carlos Capiro; and Jeff Kohler, QinetiQ North America.

# KSC team places third in 30th SWAT roundup

***By Steven Siceloff***
*Spaceport News*

A progression of obstacle courses simulating real-life emergency situations tested Kennedy Space Center's Emergency Response Team (ERT) during the annual SWAT Round-Up International. The Orlando-based competition, now in its 30th year, pitted special operations squads from law enforcement agencies around the world against each other in difficult races against the clock. Fifty-one teams took part in this year's event.

The Kennedy team, made up of eight competitors representing the spaceport's elite ERT, came into the weeklong competition as defending champions. After five days of events, the team finished this year's roundup in third place, about two minutes out of first place. Marion County's team won the event, with San Antonio finishing second.

"This annual training gives us a chance to test our skills against some of the best teams in the world," said Mark Borsi, chief of Security at Kennedy. "Defending a championship is something we'd really like to do, but it's not really necessary for us to feel good about ourselves and protect the center."

Several members of the team have participated in the competition numerous times, including competition team leader Charles Pedrick.

"The first year I came, we placed in the high teens," Pedrick said. "Ever since then, we kept finishing higher and higher."

The competition is set up to test a SWAT team's ability and fitness, factors the teams have to master in real life.

For instance, in Pedrick's favorite event, known as Super SWAT, the officer has to run a mile in a gas mask, stop and shoot a target about the size of an index card from 15 yards before repeating that task twice more for a total of three miles and three targets.

The roundup also offers specialized classes for the officers who come from departments all over Florida, the Midwest, Texas and California. Overseas squads take part, too, including teams from Hungary, Switzerland, Sweden and Bosnia. Several South American and Caribbean Island nations also competed.

"It builds real camaraderie among the teams," Pedrick said. "You get to reach out to the other teams, develop some training opportunities."

NASA/Jim Grossmann

The Emergency Response Team from Kennedy Space Center competes in the 30th Annual SWAT Round-Up International in Orlando on Dec. 5. The competition pitted special operations squads from law enforcement agencies around the world in races against time through obstacle courses and shooting ranges.

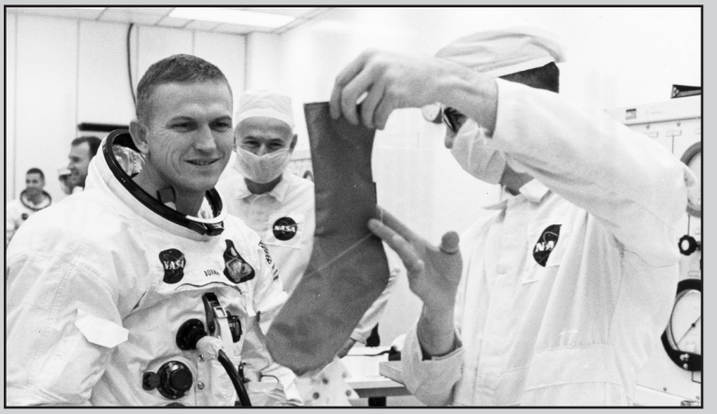
## NASA Employees of the Month: December

NASA/Rick Wetherington

Employees for the month of December are, from left, Shaun R. Marsee, Engineering Directorate; Thomas M. Elam, Center Operations; and Ana R. Stark, Launch Services Program. Not pictured are David M. Bradford, Chief Financial Office; Andrew W. Swift, Ground Processing Directorate; Michael D. Hogue, Engineering Directorate; and Douglas W. Newsome, Safety and Mission Assurance Directorate.

In celebration of Kennedy Space Center's 50th anniversary, enjoy this vintage photo . . .

## FROM THE VAULT



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NASA file/1968

During a light moment in the Astronaut Suiting Laboratory 44 years ago, a technician presents Apollo 8 Commander Frank Borman with a holiday stocking prior to his six-day lunar orbital mission with James Lovell and William Anders. The crew launched Dec. 21, 1968, from the Kennedy Space Center's Launch Pad 39A.

John F. Kennedy Space Center

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