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Spaceport News

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

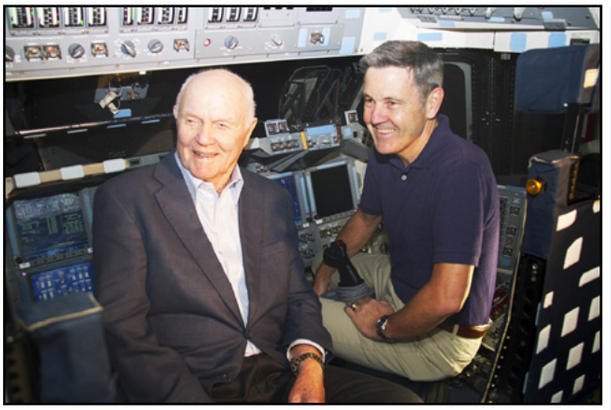
NASA, Glenn mark 50 years

By Steven Siceloff
Spaceport News

The Beatles were eight months away from releasing their first single, "Love Me Do," when John Glenn rocketed into space on Feb. 20, 1962, to become the first American to orbit Earth.

The flight set NASA on course to meet ever-more ambitious goals. Glenn's three orbits in five hours was eclipsed on the next flight and each one afterward steadily pushed Americans further out from the cradle of Earth, ultimately leading to a series of landings on the moon from 1969 to 1972.

"The whole program shifted rapidly from, 'Can we do this?' to basic research," Glenn told a packed press conference conducted among the displays and consoles that made up Cape Canaveral's Mercury control center.



NASA/Cory Huston

Mercury astronaut Sen. John Glenn and NASA Kennedy Space Center Director Bob Cabana sit in the flight deck of space shuttle Discovery in Orbiter Processing Facility-1 on Feb. 18. Both flew on Discovery in the 1990s.

Fifty years after the Mercury-Atlas 6 mission, Glenn, 90, still draws a capacity crowd. He returned to NASA's Kennedy Space Center on Feb. 17 to begin a weekend of events celebrating the milestone.

The events come a few days before the 50th anniversary, but that did not diminish the excitement of those on hand to see Glenn. Fellow Mercury astronaut Scott Carpenter, who served as CapCom during Glenn's mission before flying his own mission three months later, also made the trip to Florida to celebrate NASA's first orbital missions.

"It is a special pleasure to go back to where the times were so magical," Carpenter said.

Glenn orbited as a pivotal time in world and American history. The year he flew, 1962, would also witness the Cuban Missile Crisis, a see-who-blinks-first standoff between American and Soviet leaders that threatened nuclear war.

The American community was also substantially smaller then, with the nation's population standing at 186 million people compared with some 300 million people today. An average family made $6,000 a year, according to the U.S. Census Bureau, a little more than $4,000 per year for families living in Florida or other parts of the South.

On the other hand, things

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Proposed budget for 2013 positive

By Linda Herridge
Spaceport News

The news was positive as NASA Administrator Charles Bolden and Kennedy Space Center Director Bob Cabana shared the agency's proposed fiscal year 2013 NASA budget with the center's civil servant and contractor employees Feb. 17, during an All-Hands meeting.

Bolden presented the agency's $17.7 billion budget request. A large percentage of that amount, 45 percent, would fund Human Exploration and Operations programs, which make up the majority of programs Kennedy supports.

"We're an organization of people, not machines," Bolden said. "Our budget continues to be what we consider an aggressive portfolio for exploration."

Bolden said the 2013 budget would seem amazingly similar in many respects to the 2012 budget, under which the agency is now operating.

"It's a very stable budget," Bolden said. "We went from $18.4 billion in fiscal year 2011 to an operating estimate of $17.8 billion in fiscal year 2012."

Bolden said the three NASA priorities agreed upon by the president and Congress are the Space Launch System heavy-lift rocket and Multi-Purpose Crew Vehicle with technological development to support it; prolonged, enhanced, operation of the International Space Station, supported by viable commercial crew and cargo programs; and the James Webb Space Telescope, scheduled to launch in 2018, as the premier scientific future achievement for the nation and the world.

Bolden also added, "The thing that is most important or relevant to people on Earth is what's happening to the planet. We have a robust portfolio of Earth science missions."

Cabana gave an overview of how the proposed budget affects Kennedy Space Center.

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PM Challenges inspire employees, middle-school students

By Brittney Longley
Spaceport News

NASA employees and Central Florida middle school students took part in a two-day session in Orlando as part of the agency's Project Management (PM) Challenge.

The event was conducted in two parts, one for managers and one for students to promote science, technology, engineering and mathematics careers, an initiative called "STEM."

"Leaders are born with a backbone, they must grow a wishbone and a funny bone," said Robert Lightfoot, the Marshall Space Flight Center director who was just promoted to NASA associate administrator in Washington. A wishbone for the visionary you want to see for your team and a funny bone for a sense of humor.

The challenge's organizers focused the sessions around the event's theme, "Evolve and Excel." Managers of all levels showcased examples of the agency's determination and the strength to embrace change and move forward as a premier space agency.

NASA/Jim Grossmann

A Project Management (PM) Challenge Feb. 22-23 at the Caribe Royal Hotel and Convention Center in Orlando, aimed to teach NASA workers and contractors the basics of managing projects.

The lessons come as NASA stands at a crossroad after retiring the space shuttles and readying a network of commercial spacecraft builders, moving ahead with plans to build and launch a new heavy-lift rocket and completion of two flagship missions, the Curiosity rover now on its way to Mars and the Hubble Space Telescope successor, the James Webb Space Telescope.

Employees from each of NASA's field centers and NASA Headquarters in Washington took part in discussion panels, case studies, and presentations. Speakers included Mark Langley, president and chief executive officer of the Project Management Institute, and Dr. Patrick Simpkins, director of Kennedy's Engineering and Technology Directorate.

Choosing among sessions ranging from words of wisdom to risk, safety and mission assurance, participants could focus on areas of their particular interest.

"I learned a lot about leadership, management, and NASA in the past two days," said Kennedy student employee DeAntae Cooper.

Four Orlando-area middle schools -- Lockhart, Southwest, Meadowbrook, and Meadow Woods -- participated in the students' PM Challenge.

Speakers included Heather Paul, a mechanical engineer from Johnson Space Center in Houston, and Ledlyne Heriscar, an electrical engineer from Kennedy. Hands-on activities were included to excite the students in learning more about STEM careers.

"I didn't know what it was I wanted to do, but this makes me want to learn more about math and science," said a seventh-grade student from Meadowbrook Middle School.

The students were exposed to different fields and learned about what some of the jobs at NASA entail.

"We chose really inspirational speakers, people who could not only inspire the kids but could interact with them and keep them engaged," Kennedy's Program Education Specialist Priscilla Moore said.

During the PM Challenge, many leaders were rewarded for their hard work and dedication to the agency.

NASA presented its Quality and Safety Achievement Recognition, or QASAR, award for 2011 during the PM Challenge. Recipients from Kennedy were Humberto "Bert" T. Garrido, Joseph B. Hamilton and Francis "Frank" Merceret.

NASA's QASAR award recognizes individual government and contractor employees who have demonstrated exemplary performance in contributing to the quality or safety of products, services, processes, or management programs and activities.

NASA/Jim Grossmann

A Project Management (PM) Challenge Feb. 22-23 at the Caribe Royal Hotel and Convention Center in Orlando, for middle school students promoted the importance of pursuing careers in Science, Technology, Engineering and Mathematics (STEM).

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didn't cost as much as they do now. A gallon of gas ran 31 cents in 1962, and a house cost less than $19,000. The whole federal budget totaled $106 billion and the Dow Jones Industrials, the stock market, stood at slightly more than 700 points.

Kennedy Space Center didn't even exist yet – its 144,000 acres was still more citrus groves than launch site.

Glenn climbed inside the Mercury capsule he had named Friendship 7 at Complex 14 at Cape Canaveral Air Force Station on Florida's Atlantic coast. The launch team worked inside a blockhouse near the launch pad.

"It was not a solo effort," Carpenter said. "It took thousands of people to get him safely up there and back."

At that point, two American astronauts made short trips into space, but did not reach orbit. They flew on the Redstone, a rocket that was extremely reliable, but not strong enough to send a person into orbit.

That was the job of the Atlas, a missile whose strength was without question, but whose reliability left something to be desired.

"The very first time we saw a missile launch, it went up and blew up at 27,000 feet and that wasn't a confidence builder," Glenn recalled, laughing at the memory. They followed the Atlas development and when it was ready, Glenn said the astronauts didn't have a qualm about getting on it. "You became the best-trained person you could be and that's what we did."

Glenn also dealt with a heat shield indicator that showed it might have come loose during the flight.

The heat shield remained in place and Glenn splashed down safely in the Atlantic Ocean and picked up by the destroyer USS Noa.

Although the Soviets had already put two of their own cosmonauts in orbit by the time Glenn was catapulted into orbit, the American was treated on his return with the pomp and circumstance normally reserved for royalty. His tiny spacecraft has been displayed at the Smithsonian.

The flight also changed Glenn's course. A record-setting test pilot before he became one of America's original astronauts, Glenn left NASA soon after the Mercury mission and entered the political world. He would serve in the United State Senate from his home state of Ohio and make a run for the White House.

While it seemed for decades that Glenn's space experience was limited to those three orbits in 1962, the astronaut was enlisted to fly again in 1998, this time aboard space shuttle Discovery. While the Mercury capsule was snug with just one person inside, the shuttle was comfortable with seven people inside. Glenn, then 77, conducted numerous experiments to see how his body had changed since his first mission.

Now retired from space and politics, Glenn said the challenge of spaceflight continues to press today's designers and engineers to keep making strides.

"These things depend on people," Glenn said. "Nothing's going to happen unless you have people to do it."

Commercial Crew Program introduces CCiCap

By Rebecca Regan
Spaceport News

NASA anticipates a bright culmination to the developmental phase of its Commercial Crew Program as it prepares to award funding to the makers of spacecraft and launch vehicles. The awards are expected to lead to activities aerospace engineers dream about, such as drop tests, engine test fires, demonstration flights and pad abort tests.

On Feb. 7, the agency issued an Announcement for Proposals (AFP) for companies to submit their plans for the Commercial Crew Integrated Capability (CCiCap) initiative by March 23. During CCiCap, the program plans to award multiple Space Act Agreements, between $300 million and $500 million each, in the summer of 2012 toward the development of fully integrated commercial crew transportation systems.

CLICK ON PHOTO NASA/Kim Shiflett

Ed Mango, program manager for NASA's Commercial Crew Program (CCP), talks to industry partners and stakeholders during a preproposal conference at the Courtyard Marriott in Cocoa Beach, Fla., on Feb. 14. At left, are Cheryl McPhillips, the NASA Participant Evaluation Panel PEP chair for the Commercial Crew Program CCP, and Lee Pagel, the NASA PEP deputy. For more information, click on the photo.

"We want to advance multiple integrated crew transportation systems with the path of getting to an orbital demo flight by the middle of the decade," said Ed Mango, CCP program manager.

A fully integrated system would include a spacecraft and launch vehicle, as well as blueprints for mission control and ground operations.

The announcement asked for proposals to include a base period of about 21 months, running from award through May 2014. Optional milestones beyond the base period also should be outlined leading to and culminating in a crewed orbital demonstration flight.

The goal of CCiCap is to continue to foster the development of a U.S. transportation system that can safely, affordably and routinely fly to low Earth orbit for commercial and government markets.

"Being a part of this program and this agency right now should give you chills," Mango said, "because this is the program that is going to take American astronauts back to space."

NASA spinoffs assist NBA players in making slam dunk

By Frank Ochoa-Gonzales
Spaceport News

NASA technologies will play a starring role this weekend when some of the best basketball players in the world take to the court in the NBA All-Star game in Orlando.

Race car drivers at the Daytona 500, not far from Orlando, also will capitalize on innovations made with the help of the space agency in various forms. The same goes for the dozens of professional baseball teams that take Spring Training throughout Florida.

A lot of attention will be on the NBA All-Star game, though, since it is played in the area about once every 10 years. NASA's Kennedy Space Center is taking advantage of the rare opportunity by taking part in the NBA All-Star Jam Session at the Orange County Convention Center.

“I enjoy going to an event such as this because it allows NASA to provide the connection with people to understand how NASA contributes to their day-to-day lives,” said Andres Adorno, a NASA Public Affairs specialist. “It’s exciting to catch people’s reaction when NASA is at an event like this. It’s great to see NASA click with them.”

NASA has incubated many of the technologies used on the basketball court and to watch the action on television.

In addition to sharing spinoffs, NASA also is educating people about how physics and science play major roles in sports.

Shock Absorbing Athletic Shoes

A modified form of woven-fiber fabric used as cushioning in space boots now is used in an advanced athletic shoe to assist basketball players do their best to defy gravity. Not only does this fatigue-reducing shoe actually absorb energy, but it also redistributes that energy back into the athlete with every step, measurably increasing overall athletic efficiency.

Did you know?

Shirley Lin, the mother of the New York Knicks’ Jeremy Lin, worked for McDonnell Douglas at Kennedy Space Center in the late ’80s and early ’90s.

Three of the biggest all-stars -- LeBron James, Kobe Bryant and Kevin Durant -- will wear Nike shoes designed after NASA spacesuits. The shoes feature a "mission patch" designed for each basketball player.

But what would an NBA story be these days without mentioning Jeremy Lin, the point guard of the New York Knicks? Lin, whose mother, Shirley worked for McDonnell Douglas at Kennedy in the late ’80s and early ’90s, will make an appearance during the dunk contest in which Jeremy Lin will assist teammate Iman Shumpert.

Heart Rate Monitors

New heart-monitoring technology created to track the health of astronauts on deep-space missions was modified by a company for use in physical fitness equipment. An infrared heartbeat transmitter worn under clothing uses the heart rate to act as an exercise intensity control. Those who benefit from the ability to accurately read their heart rate and work-intensity levels include cardiac rehabilitation patients, orthopedically impaired patients, and elite athletes training to reach the ultimate physical condition.

Physical Rehabilitation

A cardiovascular conditioner developed for astronauts in space led to the development of a physical therapy and athletic development machine used by football teams, sports clinics and medical rehabilitation centers.

The SpiraFlex system, currently on the International Space Station, is used by the crew as a countermeasure against musculoskeletal degradation caused by microgravity.

Uniforms

To protect astronauts against the bitter cold and scorching heat encountered in space, NASA worked with private industry to create temperature-adaptive materials for use in spacesuits and gloves.

The resulting phase-change material enhances the wearer’s comfort by moderating temperatures between the body and the environment, keeping things comfortable.

More than 200 brands use this technology which also is used in athletic footwear to reduce the moisture of trapped heat and sweat by absorbing excess body heat and re-releasing it when needed.

Plasma Displays

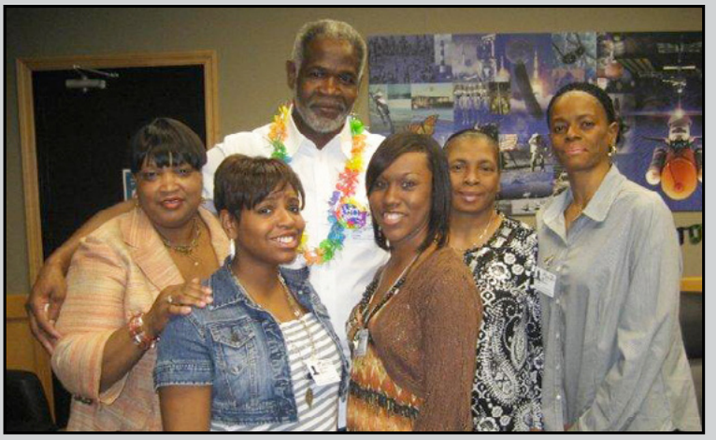
By developing the right combination of phosphate and glass, NASA quickly provided a solution for adequate transparency in the small, gas-filled glass spheres needed to build the new larger and curved-format displays.

Scenes Around Kennedy Space Center

RETIREMENT CEREMONIES

Reader-submitted photo

Jim Ball, left, celebrates his retirement from NASA with Hugh Harris (NASA retiree and Ball's first supervisor at NASA) and George Diller (current NASA Public Affairs officer) Feb. 2 at Dixie Crossroads Seafood Restaurant in Titusville. Ball, who retired after more than 28 years of federal service, received the "Silver Snoopy" Award and NASA's Exceptional Achievement Medal twice.



Reader-submitted photo

David Banks, surrounded by co-workers, family and friends, celebrates his retirement on Jan. 27 after 40 years of federal service at Kennedy Space Center. Banks worked for the Center Operations Logistics and Services Branch. During his tenure, he was the supply and equipment management officer (SEMO).

CLICK ON PHOTO *NASA/Jim Grossmann*

Preparations are under way to sandblast and paint the 290-foot-high water tower at Kennedy Space Center's Launch Pad 39B on Feb. 8. Scaffolding surrounds the tower and a special covering has been placed around the tank. The water towers at Launch Complex 39, which includes pad A and B, are part of the sound suppression system. Water stored in the 300,000-gallon tank used during space shuttle launches would be released just prior to main engine ignition and flow by gravity to special mobile launcher platform (MLP) outlets. Nine seconds after shuttle liftoff, the peak flow rate was 900,000 gallons per minute and helped to protect the orbiter and payloads from being damaged by acoustical energy reflected from the MLP during liftoff. For more on the Sound Suppression Water System, click on the photo.

NASA/Kim Shiflett

NASCAR racer Jason Leffler with Kyle Busch Motorsports (KBM) drives his instrument-laden vehicle down the three-mile-long Shuttle Landing Facility runway at Kennedy Space Center on Feb. 8. The operation is part of KBM's program to test aerodynamic and real-world capabilities on one of the flattest surfaces in the world. Racing teams have been using the runway for testing since 2008. KBM signed a Space Act Agreement with NASA to use the facility's runway.

CLICK ON PHOTO *NASA/Jim Grossmann*

A test version of NASA's Orion spacecraft completed a cross-country journey at Kennedy Space Center on Feb. 8, after giving residents in three states the chance to see a full-scale mockup of the craft that will take humans into deep space. The capsule is being stored in Kennedy's Multi-Payload Processing Facility. The test vehicle was used by ground crews in advance of the launch abort system flight test that took place in New Mexico in 2010. For more on the Orion Multi-Purpose Crew Vehicle, click on the photo.

Workers remove Apollo-era engines from crawler at VAB

By Linda Herridge
Spaceport News

For more than 30 years, NASA's two Apollo-era crawler-transporters carried six space shuttles (Atlantis, Challenger, Columbia, Discovery, Endeavour and Enterprise) atop mobile launcher platforms from the Vehicle Assembly Building (VAB) to Launch Complex 39 at Kennedy Space Center.

After traveling 2,190 miles, crawler-transporter 2 (CT-2), which weighs about six million pounds, will receive two new diesel engines and generators so it can be used to carry NASA's Space Launch System heavy-lift rocket, currently under design, and new Orion spacecraft to the launch pad.

Mary Hanna, the project manager for the crawler-transporters in NASA's Ground Systems Development and Operations Program, is overseeing the upgrade efforts.

"The crawler has to be ready for the new future programs," Hanna said. "It's the only way to get launch vehicles out to the pads, and we're taking time now to do the upgrades so that we're ready."

On Feb. 15, in high bay 2 inside the VAB, NASA engineers and United Space Alliance engineers and technicians prepared the obsolete diesel engines, generators and associated parts for removal. The old engines, which were built in 1964 and installed as original equipment, ran the AC electrical system.

Work began to remove the massive engines in late January when the crawler was moved from the crawler yard into the VAB. About 20 technicians and engineers coordinated efforts to remove the old engines and generators using the VAB's 325-ton overhead crane to lift them out.

The new 1,500 kilowatt power diesel engines, built by Cummins Engines in Minnesota, arrived at Kennedy in mid-December and are being stored in the crawler maintenance yard.

"The new engines are more powerful but they have a smaller footprint," Hanna said.

After the engines are in place, Hanna said, there is a lot of work required to connect the electrical, plumbing and mechanical lines, and installation will be completed by mid-June.

The removed engines are being drained, cleaned and readied for transport by flatbed truck to Ransom Road where they will be resold or recycled.

CLICK ON PHOTO *NASA/Kim Shiflett*

A crane is used to lift an Apollo era diesel engine away from crawler-transporter 2 (CT-2) just outside of the Vehicle Assembly Building at Kennedy Space Center on Feb. 15. New engines will be installed later this month. Work is in progress in high bay 2 to upgrade CT-2 so that it can carry NASA's Space Launch System heavy-lift rocket, which is under design, and new Orion spacecraft to the launch pad. The crawler-transporters were used to carry the mobile launcher platform and space shuttle to Launch Complex 39 for space shuttle launches for 30 years. For more on the Space Launch System, click on the photo.

Hanna said CT-2 also is undergoing other upgrades and modifications, including 16 new, higher capacity jacking cylinders; new roller bushings and roller shafts; upgraded electrical power system components; power, control and instrumentation cable replacement; and driver cab controls.

Other upgrades include new electrical control systems and programmable logic controller modernization, new instrumentation systems, a new belt pin lubrication system, new hydraulic valves and hydraulic tubing replacement.

Structural shear web augmentation and corrosion control are ongoing tasks, as well.

When all of the modifications have been completed, the crawler will be ready to carry NASA's heavy-lift rocket and other future space program vehicles to Launch Complex 39 for their turn to make space program history.

NASA

Two new 1,500 kilowatt power diesel engines and generators arrived at Kennedy Space Center from Cummins Engines in Baton Rouge, La., last December. Engineers and technicians will begin work to install them in crawler-transporter 2 in high bay 2 of the Vehicle Assembly Building in March.

From **BUDGET**, Page 1

The fiscal year 2013 request for Kennedy is just over $2 billion and includes exploration, space operations, science, space technology, education and more.

"This budget takes all the hard work the center went through in the last couple years and puts in place our future path and now we're executing that path," Cabana said. "For Kennedy to actually get an increase of $323 million over last year is huge. It says that we're on the right path."

Cabana said that human exploration programs increased for fiscal year 2013. Among them, NASA's Commercial Crew Program increases from $406 million to $830 million, of which Kennedy's portion increases $367 million to 790 million and Kennedy's funding from Exploration Ground Systems increases from $305 million in fiscal year 2012 to $405 million in fiscal year 2013.

While NASA's Launch Services Program remains essentially the same as last year, Cabana explained that the budget for Space Operations at Kennedy will decrease from $308 million this fiscal year to $217 million in the next fiscal year. Science decreases from $299 million to $160 million because the center is not scheduled to launch as many science missions in the next fiscal year compared to this fiscal year.

Cabana said that Space Technology and Education remain even at the center, while space shuttle funding decreases from $35 million this year to $21 million for fiscal year 2013 since the shuttles are scheduled to all be delivered to their various public display sites by November 2012.

"All that we're doing is the right thing for the future," Cabana said. "This budget allows us to make that happen.

"The right thing here for Kennedy is to make sure that we support our exploration program, the big rocket and Orion, and also support commercial operations," Cabana said, "The budget overall is great news for where we're going. Now it's up to us.

"I want to make it happen. And the only way we're going to make it happen is if we continue to deliver on what we say we're going to do in a cost-efficient, quality way," Cabana said.

Launch abort system challenges rocket engineers

By Steven Siceloff
Spaceport News

While companies design and perfect spacecraft and rockets to take people into space safely, teams of NASA engineers are deciphering what needs to happen if a launch goes wrong.

In other words, what kind of ejection system will astronauts need to survive?

"We're trying to give the crew that last option for when things go bad," said Brent Jett, deputy director of NASA's Commercial Crew Program, or CCP, and four-time space shuttle astronaut.

Keep in mind that the system needs to work at all points during ascent -- from the launch pad, where the air is thick and the spacecraft is not moving at all, to more than 100 miles above Earth, where there is no discernable air and the spacecraft and crew are speeding along at 17,500 mph, or about 5 miles a second.

Also, consider that because rockets can malfunction and even explode within a second of the first problem, the ejection system needs to be able to spot a problem and get the spacecraft out of danger before it's too late.

"Basically, you're separating from the rocket with a smaller rocket and it's a pretty extreme environment to put the crew into," said Chris Gerace, deputy chief of CCP's Systems Engineering and Requirements Office.

NASA file/2009

The Max Launch Abort System, a 33-foot-tall rocket, was launched July 10, 2009, to evaluate it for use in the Orion spacecraft program. The escape system is an example of a "pusher" escape system because the thrusters are below the spacecraft.

NASA file/2011

An Orion spacecraft built solely as a testbed is outfitted May 6, 2011, with a fully functional abort system ahead of a test launch to simulate a rapid escape from the launch pad. This system is an example of a "tractor" rocket because the engine is above the spacecraft and pulls it away from the rocket.

Setting up requirements for an abort system and designing a reliable one are no afterthought for engineers.

"This is one of the biggest emergency systems in the overall architecture of the commercial transportation system," said Don Totton, a CCP systems engineer.

"It was definitely in my top five on my list in terms of making sure we got it right," Jett said.

NASA's work in the next generation of spacecraft abort systems is significantly different from past programs. Instead of designing a specific system for a given craft, the engineers are drawing objective requirements that private companies must meet to be considered for NASA missions.

"We ask ourselves, is it necessary and is it achievable," Gerace said. "It's always important to look at what you want with those two questions in mind."

The agency also is funding some of the design work for the companies while offering its own extensive expertise under other partnerships, known as Space Act Agreements.

"To me, these guys are being very innovative," Totton said. "They've all taken such different approaches and our requirements allow that. We've given them a lot of flexibility."

The criteria range from showing that the escaping spacecraft will not run into a tumbling or exploding rocket to proving that the escape will not put the astronauts through more than 15 g of force or pressure, or 15 times the force of gravity.

The crew also has to have a chance to override an abort command, or begin one even if the flight computer doesn't sense a problem. The astronauts also will be able to take control of the spacecraft's flight after computers handle the initial separation from the rocket. That will give the flight crew the ability to navigate through the complex realm of entry. Whoever is at the controls, whether it is a person or a computer, has to position the heat shield properly in an abort and slow the craft down safely so its parachutes can be deployed or land on a runway.

"Probably the only things we get in today that does not have a human being ready to step in and take control of that system is a monorail system at the airport or an elevator," Jett said. "Everything else we get into for transportation – airplanes, trains – the human always has the ability to insert themselves into the system."

Finding the right requirements was a new challenge for NASA, engineers said.

"We're not designing a launch abort system. What we're doing is, we're saying, given the requirements and the goals that we're trying to achieve, what are the objectives that an abort system needs to achieve," Gerace said. "What we struggled with was, OK, how do we describe in objective terms what it is we're trying to do?"

Totton said the team focused on aborting safely from two failures: if the rocket's thrust is suddenly lost or the attitude vector veers off course.

"If it's sized properly for those failure modes at all points in ascent, we're going to get a very robust system," Totton said.

To meet those requirements, designers at individual companies are developing powerful rockets and computer networks that can sense trouble and then carry the whole spacecraft and crew away from the failing rocket to a safe landing. It will be up to NASA to judge whether they will work.

"The type of abort system individual companies choose will depend on a variety of engineering design factors. Ultimately, it's about what approach is most efficient to meet requirements for a safe abort for their integrated spacecraft and rocket configuration," said Wayne Ordway, CCP's associate director and manager of the Spacecraft Office at Johnson Space Center in Houston.

There have been at least three occasions when a launch abort system was or would have been triggered. The Russian Soyuz spacecraft and rocket fired their escape rocket on two occasions and successfully rescued the crew, one of which was an explosion on the launch pad. In 1986, the space shuttle Challenger broke up during ascent when a joint on one of its solid rocket boosters failed to seal, and exhaust leaked out and ruptured the external fuel tank.

The space shuttle did not use a dedicated launch abort system, but was programmed with abort modes that would allow it to return and land safely in certain scenarios.

Each of those cases offer little to today's designers. Very few specifics are known about the Soyuz aborts, so it's hard to use them to confirm computer models, Totton said. In the

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NASA file/2009

An Apollo Launch Escape System is test-fired May 19, 1965. This escape rocket had 200,000 pounds of thrust, more than twice that of the Redstone rocket that lifted American Alan Shepard into space four years earlier.

NASA/Brittney Longley

The Black Employee Strategic Team (BEST) hosts a leadership panel in the mission briefing room of the Operations and Checkout Building at Kennedy Space Center on Feb. 15.

BEST hosts leadership panel discussion

By Brittney Longley
Spaceport News

On the day he died, President John F. Kennedy said, "Leadership and learning are indispensable to each other."

And while history has proven true the essential relationship between leadership and learning, NASA Kennedy Space Center workers had an opportunity to learn from their leaders as the Black Employee Strategic Team (BEST) hosted a leadership panel in the mission briefing room of the Operations and Checkout Building on Feb. 15.

The panel included six Kennedy managers: Hortense Blackwell Diggs, director of Education Programs; Hewitt Q. "HQ" McKinney, chief of the Launch Services Program's (LSP) Resource Management Office; Thomas Keller, Program Manager of Chenega Security and Support Solutions; Kim Carter, chief of the Information Technology Directorate's Business Office; Wanda Harding, a senior mission manager in the Flight Office of the LSP; and Tyrell Hawkins, the associate director of Management for NASA's Commercial Crew Program (CCP).

"We were seeking across a section of disciplines, programs, and backgrounds to have the most perspective shared," said Lakeesha Flowers, BEST head chair.

The goal of the event, Flowers said, was for employees to build lasting relationships with Kennedy's leadership team. It's a pretty attainable goal since many of the panelists have been working on NASA programs for at least 10 years, and, combined, they posses plenty of experience to share with employees who are trying to build or maintain a successful career with the space agency.

"You're going to be put into a lot of situations, but it's nothing to be fearful of," McKinney said. "It's showing what you can do."

McKinney added: "My grandmother told me to always go the extra mile because no one will be there with you anyway and there's no traffic in the extra mile."

Employees asked the panel members a wide range of questions, from what it takes to become a leader and how failures can help shape our successes. Many of the panelists agreed that you have to follow and learn before you can successfully lead.

The panelists shared more words of wisdom:

"Stepping out of your comfort zone is what it sometimes takes to be successful," Hawkins said.

"Be a supporter, support the team no matter what the effort is," Diggs said.

Many of the employees in attendance said they were inspired to take on a few extra miles, set achievable goals and continue to network with their leaders in order to become leaders themselves.

From **ABORT**, Page 6

case of Challenger, the space shuttle is such a different design from the designs under consideration that it wouldn't be useful to compare them.

In the past, NASA incorporated rockets on a tower above the capsule for Mercury and Apollo. The launch escape system for Apollo used a solid-fueled rocket that, at 200,000 pounds thrust, was more powerful than the Redstone that launched Alan Shepard into space. Those designs are generally known as "tractor rockets" because they pull the spacecraft away from the rocket. The rocket is jettisoned before the spacecraft reaches orbit.

Designs with the rockets below the spacecraft are known as "pushers."

Each system has advantages and disadvantages compared to the other. For example, an Apollo-style tractor rocket mounted atop the capsule can allow more mass to be taken into orbit, Totton said. A tower also ignites quickly and builds up its thrust very fast to escape danger. On the other hand, if there is not an abort, the tower is thrown away.

A pusher system, with all the weight of the spacecraft above it instead of below, can put more pressure on the computers controlling the abort during the critical first second or so when the spacecraft is getting away from the rocket.

Think of balancing a baseball bat on the palm and how many adjustments it takes to keep it balanced.

On the plus side, the engines and propellant not used in an abort can still be used by the spacecraft once it reaches orbit. SpaceX, for example, has expressed interest in using the engines at landing to make pinpoint returns to a pad on Earth after a mission.

"A pusher becomes very synergetic to the overall mission," Gerace said.

Previously, liquid-fueled pusher engines were not practical for an abort system because they didn't build up thrust quickly enough. Jett said engine technology advances have closed that gap, though.

Boeing and engine maker Pratt & Whitney Rocketdyne successfully tested the Bantam abort engine that is the basis of a pusher escape system. NASA's Orion spacecraft performed well in a test of its escape system, a traditional tractor rocket tower.

Sierra Nevada and Blue Origin also anticipate using pusher systems. NASA is working under unfunded Space Act Agreements with three companies, including United Launch Alliance, which is determining what will be necessary to make its Atlas V rocket acceptable to launch people. ATK and Excalibur Almaz also are working with NASA through unfunded agreements.

While deciding whether and how an abort would work during launch, designers also will examine the warning system in the rocket itself.

"That design process is every bit as important as the launch abort system design," Gerace said.

They want to make sure the flight computers have the right information to find out if something major is wrong, but not so much information that a perfect flight is accidentally abandoned.

The Apollo flight computers looked at between nine and 13 things during a launch to determine if the flight should be aborted. Space shuttle main engine computers looked at dozens of things several times a second and modern rocket computers can add more to that.

"In selecting abort triggers, we have to balance the risk between performing the abort and not aborting when we don't need to," Totton said.

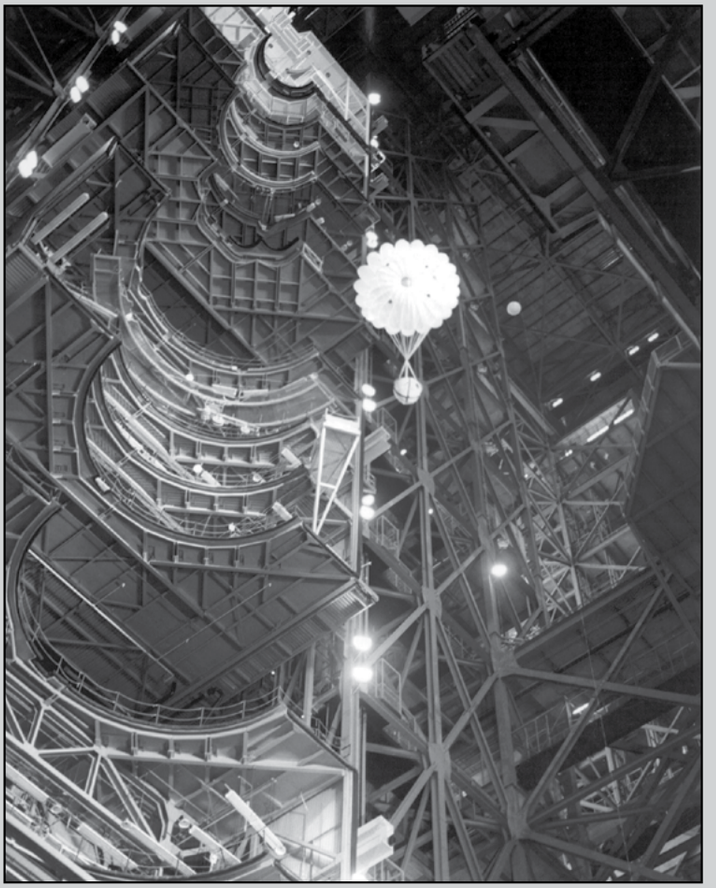
The next generation of spacecraft is not expected to venture into space with people on board until 2015 or so, but there is plenty of work for designers as they refine their launch abort strategies.

In celebration of Kennedy Space Center's 50th anniversary, enjoy these vintage photos . . .

FROM THE VAULT

NASA file/1962

This ground level view taken Jan. 8, 1962, shows the front of the E&L (Engineering and Laboratory) Building while the construction of a new sidewalk is being done.



NASA file/1975

A parachute system, designed to carry an instrument-laden probe down through the dense atmosphere of torrid, cloud-shrouded Venus, was tested in Kennedy Space Center's Vehicle Assembly Building (VAB) on June 4, 1975. The tests are in preparation for a Pioneer multi-probe mission to Venus scheduled for launch from Kennedy in 1978. Full-scale (12-foot in diameter) parachutes with simulated pressure vessels weighing up to 45 pounds were dropped from heights of up to 450 feet to the floor of the VAB where the impact was cushioned by a honeycomb cardboard impact arrestor. The VAB offered an ideal, wind-free testing facility at no additional construction cost and was used for similar tests of the parachute system for the twin Viking spacecraft.

NASA Employees of the Month: February

Employees for the month of February are, from left, Steven Bigos, ISS Ground Processing and Research Office; Rob Wolfinger, Procurement; Derrick Thomas, Office of the Chief Financial Officer; Mike Deliz, Center Operations; and Angel Lucena, Engineering and Technology. Not pictured: Ewing B. Swaney, Ground Processing; Roland Schlierf, Ground Systems Development and Operations Program; Michael D. Stirling, Engineering and Technology; Dennis Moore, Office of Safety and Mission Assurance; and Gary Beatovich, Vehicle Launch Services Program.

Looking up and ahead . . .

*** All times are Eastern**

2012

No earlier than Feb. 24	Launch/CCAFS (SLC-41): Atlas V, MUOS Launch window: 5:15 to 5:59 p.m.
No earlier than March 21	Launch/Reagan Test Site Kwajalein Atoll: Pegasus XL, NuSTAR Launch window: 11:30 a.m. to 3:30 p.m.
No earlier than late April	Launch/CCAFS (SLC-40): SpaceX Falcon 9, Dragon C2/C3 Launch window: TBD
No earlier than April 27	Launch/CCAFS (SLC-41): Atlas V, AEHF 2 Launch window: TBD

John F. Kennedy Space Center

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