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Spaceport News

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

SpaceX preps for 2014 abort test

By Rebecca Regan
Spaceport News

In preparation for a summer 2014 test, NASA partner Space Exploration Technologies (SpaceX) recently laid out its plan to demonstrate the Dragon spacecraft's ability to carry astronauts to safety in the event of an in-flight emergency.

This review of the in-flight abort test plan provided an assessment of the Dragon's SuperDraco engines, the software that would issue the abort command, and the interface between the Dragon and the Falcon 9 rocket on which the spacecraft will be launched.

"It's critical to have a launch abort system in which NASA and SpaceX can have confidence," said Phil McAlister, director of Commercial Spaceflight Development at NASA Headquarters in Washington, D.C.

The in-flight abort test will take place along Florida's Space Coast. During the test, a Dragon spacecraft will launch on a standard Falcon 9 rocket and an abort command will be issued approximately 73 seconds into the flight. Dragon will be outfitted with about 270 special sensors to measure a wide variety of stresses and acceleration effects on the spacecraft. An instrumented mannequin, similar to a crash test dummy, also will be inside. The spacecraft's parachutes will deploy for a splashdown in the Atlantic, where a ship will be pre-positioned for simulated rescue operations. The test spacecraft will be returned to Port Canaveral by barge so data can be retrieved and incorporated into the system's design.

This review was the eighth milestone for SpaceX under Commercial Crew Integrated Capability (CCiCap). The company is on track to complete all 15 of its CCiCap milestones by the summer of 2014. All NASA's industry partners, including SpaceX, continue to meet their established milestones in developing commercial crew transportation capabilities.

Photo courtesy of SpaceX

SpaceX displays its launch abort test Dragon capsule in September at its headquarters in Hawthorne, Calif., in preparations for its scheduled in-flight abort test which will take place along Florida's Space Coast in Summer 2014. For more information about NASA's Commercial Crew Program and its aerospace industry partners, click on the photo.

2013 Combined Federal Campaign gets underway, Page 8

MIST takes ride on airborne Cloud Lab

By Linda Herridge
Spaceport News

A mission to study how Earth's atmosphere affects microbes has brought together researchers from Kennedy Space Center's Space Life Sciences Laboratory (SLSL) and engineers from the center's Rocket University (RU).

In September, a meteorological airship containing a "Cloud Lab" flew over Kennedy's Shuttle Landing Facility carrying components of NASA's Microorganisms in the Stratosphere (MIST) experiment.

According to principal investigator David J. Smith, a microbiologist in Kennedy's Engineering and Technology directorate, MIST has two goals. One is to collect microorganisms at high altitudes. The other is to intentionally expose microorganisms to the atmosphere to understand how they survive while aloft.

Microbes get into the atmosphere in a variety of ways. Winds are the primary mechanism for lofting debris or dust particles off the ground, plant surfaces, roads and deserts. Solar heating also causes air to rise, carrying fine particles of organic matter, dust or microorganisms.

MIST was developed at Kennedy and will be flown at even higher altitudes next year. In addition to MIST measurements, Cloud Lab scientists are conducting several other experiments as the airship flies across the U.S., exploring various aspects of the Earth's atmosphere.

Smith said the relationship between the MIST team and Rocket University has been a great collaboration. Founded at Kennedy more than two years ago, RU's goal is to provide engineers and scientists at the center with more flight system and hands-on experience and to move concepts quickly through the mission life cycle.

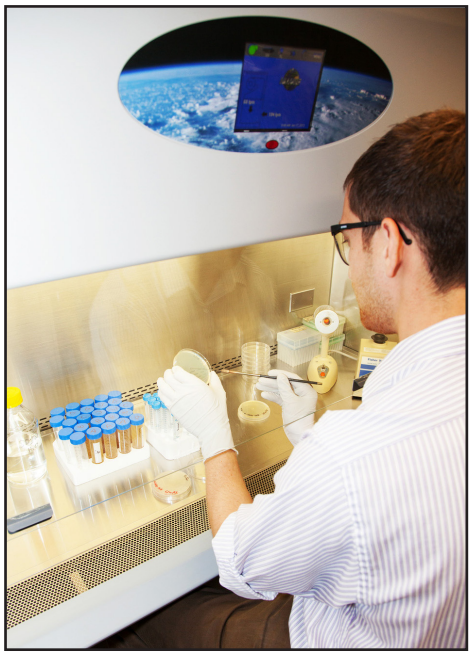
"We will piggyback on just about any opportunity we have to get into the upper atmosphere," Smith said. "RU's Near Space Program, which launches balloons into the stratosphere, will allow us to tackle a variety of engineering and scientific goals."

Andrew Schuerger, a research scientist from the University of Florida and co-investigator on MIST, is working on related research at Kennedy.

NASA/Dimitri Gerondidakis

A meteorological airship flies over Launch Complex 39 past the Vehicle Assembly Building at Kennedy Space Center on Sept. 19. A team of scientists from project "Cloud Lab" are conducting a number of experiments aboard the airship as it flies across the U.S., including NASA's Microorganisms in the Stratosphere (MIST).

"Why does NASA care about airborne microbes? From a planetary exploration standpoint, microorganisms are present on spacecraft at the time of launch," Schuerger said. "They're in very low numbers because the Planetary Protection Program within NASA spends a great deal of effort to develop protocols to keep the microbial contamination on spacecraft to very, very low levels."



NASA/Daniel Casper

Inside the Space Life Sciences Laboratory near Kennedy Space Center, Dr. David J. Smith, a microbiologist in the Surface Systems Office, prepares microbes for the Microorganisms in the Stratosphere (MIST) mission.

Schuerger's background is in microbiology, plant pathology and astrobiology. Currently, he is using a Mars Simulation Chamber to study how bacteria found on spacecraft may survive and potentially proliferate on the surface of Mars.

According to Schuerger, knowing which microbes can survive in Earth's dry and radiation-rich atmosphere may improve our understanding of which species might survive on a planet like Mars.

As NASA begins to explore outside of low-Earth orbit with humans once again, microorganisms are very beneficial in human activity, whether it's in the human body itself or whether it's in a plant-growing system that might be used to regenerate oxygen, water or food for humans.

"In that case, microbes would be very beneficial to human exploration," Schuerger said.

Adversity intrinsic to spaceflight testing

By Steven Siceloff
Spaceport News

Sierra Nevada Corporation (SNC) of Louisville, Colo., conducted a promising first flight of its developmental Dream Chaser spacecraft during a glide test Oct. 26. While failure of one of its landing wheels to deploy correctly dealt a harsh blow to the full-scale engineering model that made the flight, it is thought to be repairable. The test did not include a pilot and produced no injuries or significant damage to the runway at Edwards Air Force Base in California.

In the 110-year history of aerospace, such test flights have been critically important for advancing aviation and human spaceflight.

In 1903, the Wright Brothers had extremely limited technology to forecast how their flying machines would work, so they had to build aircraft and fly them themselves. Into the latter half of the 20th century, designers couldn't be sure how their concepts would work until a pilot was at the controls of the most sophisticated aircraft of the age. This included the X-1 experimental aircraft that broke the sound barrier and the prototype space shuttle Enterprise. Designers used remote-controlled models in the early stages of development for more radical aircraft, but it took full-size planes and risks to prove the ideas, sometimes at tragic costs.

"It isn't that you expect anything to go wrong," said Peter Merlin, historian at NASA's Dryden Flight Research Center adjacent to Edwards and home to decades of cutting-edge test flights that stretched the limits of aerospace design and engineering. "The idea is to mitigate the risks as much as possible but you have to accept some degree of risk. The only time the plane is truly safe is when it's in the hangar and you don't fly."

> *"The idea is to mitigate the risks as much as possible, but you have to accept some degree of risk. The only time the plane is truly safe is when it's in the hangar and you don't fly."*
> Peter Merlin,
> Historian, NASA's Dryden Flight Research Center

In recent decades, computers, math models and ever-more-sophisticated wind tunnel testing alleviated many levels of testing, but the real world remains the ultimate proving ground.

"Getting a vehicle ready to fly is sort of a three-step process," said Roger Launius, associate director for Collections and Curatorial Affairs for the National Air and Space Museum. "There's theoretical work that needs to be done. There's design and review that's mostly done by computers and people operating equipment and then there's the process of actually testing hardware. Ultimately, there's a full-size vehicle that has to be tested in real conditions, and if you don't do all those steps, you're probably not going to be able to fly a vehicle successfully."

In the Oct. 26 test, SNC simulated the final phase of the spacecraft returning from orbit to land on a runway. Steered by its software instead of an onboard or remote pilot, the Dream Chaser adjusted its glide slope from 50 degrees to about 29 degrees a few seconds after it was released from a helicopter. The Dream Chaser leveled out further as it neared the runway.

Dream Chaser lifted its nose up and an automatic command to deploy its landing gear went out, though only two of the three mechanisms emerged from the fuselage. The third, the left side's gear, stayed retracted.

The spacecraft touched down on the concrete and then tried to compensate for the stuck landing gear by keeping itself level as long as it could before gravity forced it on its side and the aircraft skidded off the runway.

"What we saw, which made us pretty pleased, was the vehicle's command and control system kept the vehicle from lowering itself to the runway on that side as energy dissipated," said Mark Sirangelo, vice president and head of Sierra Nevada Corporation's Space Systems. "That was pretty special and pretty advanced and we had no idea how to test that and now we do."

Sirangelo said Sierra Nevada Corporation is taking the same long-view after Dream Chaser's free-flight testing.

"This won't set us back. We may even accelerate," Sirangelo said. "The landing issue is certainly one we wouldn't have liked to have had, but we got terrific data on this lifting body. It was rock solid and we are surprised how well it performed. Clearly, it's a good design for this type of activity. With the flight data, we might bring it back earlier, and in some strange way, we may accelerate development."

NASA Archives

NASA's North American X-15 lands at Edwards Air Force Base in California during one of NASA's flight testing programs in the early 1960s.

Carpenter's travels: ocean floor to low-Earth orbit

NASA file/1962

Scott Carpenter is assisted into his pressure suit in the crew quarters of Hangar S at Cape Canaveral Air Force Station before the morning of the flight of Mercury Atlas 7, May 24, 1962.

NASA file/1959

NASA's original seven astronauts inspect a Mercury model April 30, 1959. From left are Gus Grissom, Alan Shepard, Scott Carpenter, Walter Schirra, Deke Slayton, John Glenn and Gordon Cooper.

By Bob Granath
Spaceport News

As the second American to orbit the Earth and one of the "Original 7" Mercury astronauts, Scott Carpenter is one of the icons of NASA's early efforts to explore the new frontier of space.

Carpenter died Oct. 11 at the age of 88 from complications following a recent stroke. He had been living in Vail, Colo.

"The world mourns the passing of Scott Carpenter," said NASA Administrator Charles Bolden. "As one of the original Mercury 7 astronauts, he was in the first vanguard of our space program -- the pioneers who set the tone for our nation's pioneering efforts beyond Earth and accomplished so much for our nation."

A frequent visitor to Florida's Space Coast, Carpenter was a charter member of the U.S. Astronaut Hall of Fame. Recent trips to Kennedy Space Center included the February 2012 celebration of the first American orbital spaceflights.

"It is a special pleasure to go back to where the times were so magical," Carpenter said during activities at Kennedy's visitor complex.

Before his own trip into space, Carpenter served as backup for astronaut John Glenn's flight. As the capsule communicator in Cape Canaveral Air Force Station's Launch Pad 14 blockhouse, Carpenter wished his close friend a safe mission.

"Godspeed, John Glenn," he said seconds before liftoff.

In a statement following Carpenter's passing, the last remaining member of the Mercury 7 responded similarly.

"Godspeed, Scott Carpenter, a great friend," said Glenn. "You are missed."

Carpenter was born in Boulder, Colo., May 1, 1925. He earned a bachelor's degree in aeronautical engineering from the University of Colorado in 1949.

After being commissioned as an officer in the U.S. Navy, Carpenter was designated a naval aviator in April 1951. During the Korean War, he flew missions in the area of the Yellow Sea, the Formosa Straits and South China Sea. He later attended the Navy Test Pilot School at Patuxent River, Md., and in 1954, was assigned to the Electronics Test Division of the Naval Air Test Center.

Carpenter was selected as one of the Mercury astronauts in April 1959. Along with his six colleagues, he underwent intensive training for what then was unknown -- whether or not humans could survive in space.

Following two suborbital Mercury flights and Glenn's mission to orbit the Earth three times, Carpenter was assigned to Mercury Atlas-7 (MA-7), also slated for three circuits of the globe. Launched May 24, 1962, Carpenter described the initial seconds of being in space five minutes and 24 seconds after liftoff.

"The best cues to the end of powered flight were weightlessness and absolute silence," he said. "(Weightlessness) was very pleasant, a great freedom and I adapted to it quickly."

In addition to continued tests of the Mercury spacecraft, Carpenter conducted a number of scientific experiments during his four-hour, 54-minute flight. He studied how liquids behave in weightlessness, conducted observations of the airglow layer of the atmosphere, and photographed terrestrial features.

Carpenter gave a vivid description of his observations of the Earth.

"The sunrises and sunsets were the most beautiful and spectacular events of the flight," he said. "Unlike those on Earth, the sunrises and sunsets in orbit were the same. The sharply defined bands of color at the horizon were brilliant."

Another discovery of the flight of Aurora 7 was resolution of the mystery of Glenn's "fireflies." During America's first orbital flight, Glenn reported small particles that looked like lightning bugs, appearing to be luminous, surrounding his spacecraft

"A number of times during the flight, I observed the particles reported by John Glenn," Carpenter said. "They appeared to be like snowflakes. I believed that they reflected sunlight and were not truly luminous."

As Carpenter reached for an instrument at dawn on the third orbit, he inadvertently hit the wall of the capsule and a cloud of particles flew by the window. The "fireflies" turned out to be particles of ice and frost.

While most systems had worked well during the flight of Aurora 7, the pitch horizon scanner malfunctioned at retrofire. Additionally, firing of the capsule's retrorockets was delayed.

"Although retro sequence came on time, the initiation of retrofire was slightly late," Carpenter said. "After receiving a countdown to retrofire from the California (tracking station) capcom, I waited two seconds and then punched the manual retrofire button. About one second after that, I felt the first retrorocket fire."

Aurora 7 splashed down about 250 miles downrange of the targeted location. A recovery aircraft spotted Carpenter in a raft next to the capsule 30 minutes later. A Navy helicopter soon picked up the astronaut for a trip to the aircraft carrier USS Intrepid.

"Overall, I believe the MA-7 flight can be considered another successful step on the road to the development of a useful and reliable manned spacecraft system," Carpenter said after the flight.

Speaking during Kennedy ceremonies celebrating the 50th anniversary of his and Glenn's orbital flights, Carpenter emphasized that the entire Project Mercury team at NASA centers and contractors around the nation made the program successful.

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

In addition to being one of America's first space explorers, Carpenter also held the distinction of being an aquanaut, having participated in the U.S. Navy's Man-in the-Sea Project. During the summer of 1965, he took a leave of absence from NASA to participate in the SEALAB II program off the coast of La Jolla, Calif.

As part of the 45-day experiment, Carpenter spent 30 days living and working on the ocean floor. During that time, he spoke directly with astronauts Gordon Cooper and Charles Conrad during the eight-day Gemini 5 mission in August 1965.

Carpenter returned to NASA as executive assistant to the director of the Manned Spacecraft Center (now Johnson Space Center) and was active in underwater crew training for spacewalks and the design of the Apollo lunar module.

In 1967, Carpenter returned to the Navy's Deep Submergence Systems Project as director of Aquanaut Operations during the SEALAB III experiment. After retirement from the Navy two years later, Carpenter founded and was chief executive officer of Sea Sciences Inc., a corporation active in developing programs aimed at enhanced utilization of ocean resources and improved health of Earth.
In pursuit of these and other objectives, he worked closely with the French oceanographer Jacques Cousteau.

NASA file/1962

"Liftoff was unmistakable," said Scott Carpenter, who was boosted to space May 24, 1962, atop an Atlas rocket for his three orbits of the Earth.

NASA/Kim Shiflett

Lifelong friends Scott Carpenter, left, and John Glenn pose at the Kennedy Space Center Visitor Complex in front of a Mercury spacecraft used in an unpiloted flight test. They were on hand to participate in celebrations of the 50th anniversary of their orbital flights. Glenn was the first American to orbit the Earth on Feb. 20, 1962. Carpenter followed on May 24, 1962.

Scenes Around Kennedy Space Center

NASA

The 2013 Combined Federal Campaign will run from Oct. 28 to Nov. 22. This year's CFC cabinet members are, back row from left, Patrick Smith, Bonni McClure, Laurie Brown, Patty Hepburn, Steven Gilmore, Bobbi Gnan, Bob Cabana, Ian Kappes, Shamika Hamilton, Leslie Kelley, Kimberly Cross, Ralph Fritsche, Kari Heminger-Sperna, and Chris Hummel. Front row, from left are, Jennifer Stahre, Amanda Griffin, Tracey Drake, Rose Dougherty, Michele Richtmeyer, and Courtney Cannon.

NASA/Kim Shiflett

Technicians install a new roller bearing on crawler-transporter 2 (CT 2) inside Kennedy's Vehicle Assembly Building Sept. 10. For more than a year, NASA's CT 2 has been undergoing a major tuneup. The work has included addition of upgraded components, including the redesigned and upgraded roller bearings. Under the oversight of Kennedy's Ground Systems Development and Operations Program office, the modifications are designed to ensure CT 2's ability to transport greater loads anticipated with the agency's new Space Launch System. The launch vehicle is designed to take astronauts beyond low-Earth orbit for the first time since the early 1970s.

NASA

Carol Craig, founder, president, CEO, and CFO of Craig Technologies, accepts the Kathleen P. Sridhar Small Business Executive of the Year Award Sept. 25 in Springfield, Va., from Kennedy Space Center Deputy Director Janet Petro, left, and National Defense Industrial Association President and CEO Larry Farrell Jr., USAF (Ret). The award is named in honor of Dr. Kathleen P. Sridhar, who was a small business CEO of uncommon ability and accomplishment.

NASA Employees of the Year: 2013

NASA/Tony Gray

Employees of the Year for 2013 are, from left, Jennifer E. Van Den Driessche, Ground Processing; Dung H. Trang, Center Operations; Rogelio Curiel, Procurement; Patrick J. Maloney, Engineering and Technology; Matthew A. Bzura, Human Resources; John E. Newport; Safety and Mission Assurance; Nicole L. Dawkins, Engineering and Technology; Bryan G. Onate, ISS and Spacecraft Processing; and Dana M. Hutcherson, Commercial Crew Program. Not pictured are Bradley W. Smith, Chief Council; Sheryl D. Koller, Education and External Relations; Michael P. Porta, Chief Financial Officer Office; Stephen K. Cox, Ground Systems Development and Operations; Nancy L. Bray, Public Affairs; and Laura A. Ulrich, Launch Services Program.

NASA/Cory Huston

Center Director Bob Cabana welcomed counterintelligence agents from NASA's 10 centers to Kennedy Space Center on Sept. 17 for three days of training.

Agents refine counterintelligence skills

By Linda Herridge
Spaceport News

Terrorism threats are on the rise throughout the world and safety remains the No. 1 priority at NASA.

Protecting workers, missions, and assets at all NASA centers always has been the top priority of the NASA Office of Protective Services.

To that end, NASA counterintelligence (CI) agents from the agency's 10 centers converged on Kennedy Space Center on Sept. 17 for three days of intensive training sessions and briefings designed to improve their skills.

"NASA's high visibility and technology programs make the agency a high-priority-interest target for stealing technology," said Darrell Slone, NASA's CI program director in Washington, D.C.

Created 10 years ago, the CI program's primary focus is education and awareness.

"Whether it's a tailored briefing for the center director, a foreign travel briefing for one of our engineers traveling abroad, or a meeting to discuss technology development, our program strives to provide the workforce with the information they need to thwart possible future collection efforts by foreign entities," said Ron Storey, Kennedy's lead counterintelligence special agent.

Intelligence officers participated in briefings about cybersecurity issues, counterterrorism and counterintelligence from various CI community members, including the FBI and the Naval Criminal Investigative Service. The meeting also included updates on policies and operational issues and how to better coordinate efforts across the centers.

"Trying to prevent threats from foreign intelligence has never been greater. We are spending a lot of time on cyber issues," Slone said.

"Face-to-face meetings help to solidify relationships with our counterparts," Slone said. "It's very important and also helpful to work with other agencies. It creates a good support system."

Slone said the goal is to help prevent incidents. "We want NASA to know it has someone to turn to."

Officials: Economic opportunities pepper spaceport

By Steven Siceloff
Spaceport News

Commercial enterprises and partnerships increasingly are taking advantage of economic opportunities at Kennedy Space Center and the agency is eager to add to the tally, center officials recently told the Economic Development Commission of Florida's Space Coast during a session focused on technology transfer.

"I hope today will lead to establishing new partnerships," said Karen Thompson, chief technologist at Kennedy. "NASA really is passionate about establishing external partners. It helps us do a better job with our development."

All of NASA's field centers have technology transfer programs that focus on their different specialties. The partnerships the agency has in mind fall roughly into two areas: businesses working closely with NASA scientists or resources to develop new technology benefitting spaceflight, and enterprises that adapt an existing NASA innovation into a marketable product for uses other than spaceflight.

Kennedy's Mike Lester, Research and Technology Partnership manager, said there are plenty of examples of each working out successfully.

"We believe collaborating with Kennedy in research and technology can provide you with commercial advantages in the marketplace," Lester told the audience at a Cocoa Beach convention center near the Florida spaceport.

He noted several success stories, including a group of college students who worked with Kennedy on a class assignment to develop a hypothetical business case.

"Did the students just turn in their assignment, get their grade and walk away?" Lester asked. "No. They formed a startup company called the Juntura Group and then immediately entered into partnership with Kennedy."

With the agreement, the company had exclusive rights to sell position sensors. They refined the technology to target specific audiences and began manufacturing and selling them.

"If you're not a little jealous, you ought to be," Lester said.

As the event progressed, business specialists detailed how entrepreneurs and businesses can make their own success stories with partnerships, including using NASA grants to develop a business model and plans that apply to the agency's desired goals. The proposals are judged competitively on a number of factors.

"The heaviest weight is the technical and scientific merit," said Joni Richards, Technology Infusion manager at Kennedy. "What can really push them over the edge is the commercialization plans."

Center Director Bob Cabana said, "I think we can share information and figure out what you need to do to be part of this exciting future on the Space Coast. Even though we're a launch center, we also do a lot of technology development at KSC."

NASA touts George Low awardees

Spaceport News Report

URS Federal Technical Services Inc., the institutional services contractor at Kennedy Space Center, is one of two companies that has received NASA's premier honor for quality and performance, the George M. Low Award.

NASA recognized URS of Germantown, Md., in the large business award category and ATA Engineering Inc. of San Diego, Calif., in the small business award category. According to the award, both companies share a commitment to teamwork, technical and managerial excellence, safety, and customer service

"NASA's industry partners are crucial in our work to reach new destinations and expand our nation's capabilities, and we're happy to recognize these two companies with the high honor of the George M. Low Award," NASA Administrator Charles Bolden said. "Their success both in space and on the ground has demonstrated excellence and innovation that will help us reach our challenging goals and keep America the leader in space exploration."

With 1,100 employees and subcontractors, URS maintains 1,250 facilities, roadways, railroad tracks and an airfield; provides utilities, indoor climate control, life support and propellant storage; conducts non-destructive evaluation; cleans, samples and calibrates components; and coordinates logistics.

Evaluators cited URS' automation initiative, which deployed tablet computers to employees to reduce their paperwork burden; its process for ensuring customer satisfaction; and the breadth of its safety program in an industrial environment with so many potential hazards.

ATA Engineering Inc. supported development of the Mars Science Laboratory and its robotic rover, Curiosity, at NASA's Jet Propulsion Laboratory in Pasadena, Calif.

NASA/Jim Grossmann

URS Program Manager Larry Ostarly, left, and URS Deputy General Manager Jim McCarthy show off the George M. Low Award their company recently won.

CFC counting on Kennedy workers

The 2013 KSC Combined Federal Campaign started Oct. 28, providing us the opportunity to help our community by participating. This year's campaign will run through Nov. 22.

The slogan, "You Can COUNT on KSC," voices our response to the requests for aid from local, national, and international charities.

This year, NASA is striving for the highest participation ever for the agency. You can make a one-time donation of any amount or select a payroll deduction to any number of charities. Talk to your organization's CFC cabinet member or, for more information, go to **http://cfc.ksc.nasa.gov**.

Did you know . . .

Giving up one coffee ($3) per week could provide 17 days of adult care to a senior suffering from Alzheimer's OR provide 15 nights of shelter for a domestic violence victim?

Giving up a sandwich ($5) per week could give counseling to six individuals experiencing domestic violence, helping put them on the path to safety OR deliver meals to three home-bound seniors?

Giving up a fast-food meal ($7) per week could provide 12 hours of coaching and supervision to individuals with disabilities, allowing them to live independently OR serve 121 meals to families and individuals struggling to make ends meet?

Giving up a pizza delivery ($10) per week could employ one person with a disability OR provide 130 nights of supportive housing, helping people to find a permanent and safe place to live?

Giving up a movie ($15) per week could serve 10 seniors with meals at a Senior Lunch site, providing nutritious food and necessary socialization OR provide more than 700 hours of teaching to children with learning disabilities, catering the teaching style to the child's learning style?

Giving up a dinner out ($20) per week could support one mentor match for at-risk kids OR assist six homeless veterans with basic supplies, such as tents and flashlights, and provide them the resources to come out of homelessness?

Looking up and ahead . . .

**** All times are Eastern***

Nov. 18
Mission: Mars Atmosphere and Volatile EvolutioN (MAVEN)
Launch Vehicle: Atlas V
Launch Site: Cape Canaveral Air Force Station
Launch Pad: Space Launch Complex 41
Launch Time: 1:28 to 3:28 p.m.
Description: MAVEN is the first mission devoted to understanding Mars' upper atmosphere. The mission's goal is to determine the role that loss of atmospheric gas to space played in changing the Martian climate through time.

To watch a NASA launch online, go to **http://www.nasa.gov/ntv**.

John F. Kennedy Space Center

Spaceport News

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