



KENNEDY SPACE CENTER'S
SPACEPORT
m a g a z i n e



**Newest NOAA
Weather Satellite
Launches to
Earth Orbit**

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Cover: A United Launch Alliance Atlas V rocket lifted off from Space Launch Complex 41 at Cape Canaveral Air Force Station on March 1, 2018, carrying NOAA's Geostationary Operational Environmental Satellite (GOES-S). Liftoff was at 5:02 p.m. EST. GOES-S is the second satellite in a series of next-generation weather satellites. Photo credit: NASA/Bill White

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www.nasa.gov/launchschedule.

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National Aeronautics and Space Administration



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DEBII CALDWELL

NASA Voice Systems Lead NASA-Kennedy IT

As the NASA voice systems lead, I work with customers from all programs at Kennedy to help them get the ground communications they need, such as operational intercomm (OIS), paging and radio.

I started working at Kennedy in June 1987 in Shuttle Flight Controls. I moved to Payload Ground Communications in 1994. After working in shuttle processing for a few years, I wanted to expand my knowledge and experience to other activities at the space center. I worked in ground instrumentation for a couple of years, then moved to Payload Comm. I've been in Comm ever since.

The biggest challenge is having the desire to please all of our customers, but having so much work that it's hard to get it all done. Fortunately, we've hired a few new people recently, and I think they will help a lot.

I've had so many awesome memories since I came to work with NASA. I had only been here for three days when a couple of co-workers took me into the shuttle aft compartment, and over time I had work that took me into the crew compartment, the payload bay, inside the booster forward and aft skirts, and even the shuttle wing.

There are so many amazing things that we get to take part in improving every day!



SKY WATCHING

NOAA's GOES-S will provide more accurate forecasts, weather warnings

BY BOB GRANATH

NASA launched the **Geostationary Operational Environmental Satellite-S** into orbit for NOAA -- the National Oceanic and Atmospheric Administration on March 1, 2018. Liftoff occurred at 5:02 p.m. EST atop a United Launch Alliance (ULA) Atlas V rocket from Space Launch Complex (SLC) 41 at Cape Canaveral Air Force Station in Florida.



The spacecraft, known as GOES-S, will give meteorologists an additional tool to significantly improve the detection and observation of environmental phenomena that directly affect public safety and protection of property.



At Astrotech Space Operations in Titusville, Florida, NOAA's Geostationary Operational Environmental Satellite-S (GOES-S), is rotated to a vertical position Dec. 5, 2017, after it was uncrated from its shipping container. The facility is located near NASA's Kennedy Space Center. Photo credit: NASA/Kim Shiflett

GOES-S is the second in the GOES-R Series of next-generation weather satellites that includes GOES-R (now GOES-16), -S, -T and -U. GOES-S will be renamed GOES-17 when it reaches geostationary orbit. It will reside in a geostationary position over the Pacific Ocean to provide imagery and data to improve weather forecasts for the western continental U.S., Alaska, Hawaii, and Pacific Ocean to New Zealand. Geosynchronous satellites orbit about 22,000 miles above the Earth allowing them to keep constant watch over the same location. These spacecraft play a crucial role in U.S. weather monitoring and forecasting.

The GOES-S satellite was delivered to Kennedy's Shuttle Landing Facility by a U.S. Air Force C-5 Galaxy cargo jet on Dec. 4, 2017. GOES-S was then transported to the Astrotech payload processing facility in Titusville where it was checked out and tested.

Meanwhile on Jan. 22 the ULA Atlas V booster and Centaur upper stage arrived aboard a Mariner transport ship at Port Canaveral's Army Wharf. The rocket stages then were transported to the Atlas Spaceflight Operations Center (ASOC) near SLC 41 at the Cape for inspections and checkouts.

On Jan. 24, the Centaur upper stage was transported from the ASOC to the Delta Operations Center for further processing. A week later, the Atlas V booster was moved from the ASOC to the Vertical Integration Facility at SLC 41 where it was positioned on its launcher. Soon after, the Centaur was stacked on the booster.

Once checkouts and processing were completed at the Astrotech facility, GOES-S was encapsulated in its payload fairing and

transported to the Cape where it was mounted on top of the rocket.

NOAA manages the GOES-R Series Program through an integrated NOAA/NASA office and oversees the acquisition of the program ground system. NASA oversees the acquisition of the **spacecraft, instruments** and **launch vehicles**. Lockheed Martin Space of Littleton, Colorado, built the spacecraft and is responsible for spacecraft development, integration and testing.



The payload fairing containing NOAA's Geostationary Operational Environmental Satellite-S (GOES-S) is lifted up by crane Feb. 16, 2018, at the United Launch Alliance Vertical Integration Facility at Space Launch Complex 41 at Cape Canaveral Air Force Station. Photo credit: NASA/Glenn Benson

Mission operations are performed by NOAA at their Satellite Operations Facility in Suitland, Maryland. Harris Corp. of Melbourne, Florida, provided the main instrument payload, the **Advanced Baseline Imager** and the ground system, which includes the antenna system for data receipt. United Launch Alliance of Centennial, Colorado, is the provider of the Atlas V launch service. **NASA's Launch Services Program** (LSP), based at Kennedy Space Center in Florida, manages the agency's efforts to commercially provide rockets for specific missions. LSP also directs the overall launch effort including overseeing development and integration of the rocket with the spacecraft.

**For more information about the
GOES-R Series Program, visit:
<http://www.goes-r.gov>.**

A United Launch Alliance Atlas V rocket lifts off from Space Launch Complex 41 at Cape Canaveral Air Force Station carrying NOAA's Geostationary Operational Environmental Satellite (GOES-S) Liftoff was at 5:02 p.m. EST on March 1, 2018. Photo credit: NASA/Kim Shiflett





Astronaut surveys launch pad for crew flights to station

NASA astronaut Eric Boe, one of four astronauts working with the agency's Commercial Crew Program, had the opportunity to check out the Crew Access Tower at Space Launch Complex 41 on Feb. 28 with a United Launch Alliance (ULA) Atlas V on the pad. Boe, along with launch operations engineers from NASA, Boeing and ULA, climbed the launch pad tower to evaluate lighting and spotlights after dark. The survey helped ensure crew members will have acceptable visibility as they prepare to launch aboard Boeing's Starliner spacecraft on the Crew Flight Test to the International Space Station, targeted for later this year.



The two-stage Falcon 9 launch vehicle lifts off from Space Launch Complex 40 at Cape Canaveral Air Force Station in Florida, carrying the Dragon resupply spacecraft to the International Space Station. Photo credit: NASA/Tony Gray, Tim Powers and Tim Terry

Dragon to deliver supplies to International Space Station

Commercial Resupply Services Mission: SpaceX CRS-14
Launch Time and Date: 4:30 p.m., Monday, April 2, 2018
Launch Off: Space Launch Complex 40 at Cape Canaveral Air Force Station in Florida

Launch Vehicle: SpaceX Falcon 9, 230 feet tall
Spacecraft: Dragon, 20 feet high, 12 feet in diameter
Payload: Dragon delivering more than 5,800 pounds of cargo and material to support science investigations aboard the International Space Station.

Return to Earth: After about one month attached to the space station, Dragon will return with results of earlier experiments, splashing down in the Pacific Ocean off the coast of Baja California.

Payloads on Board: Visit
<https://go.nasa.gov/2lsu6rt>

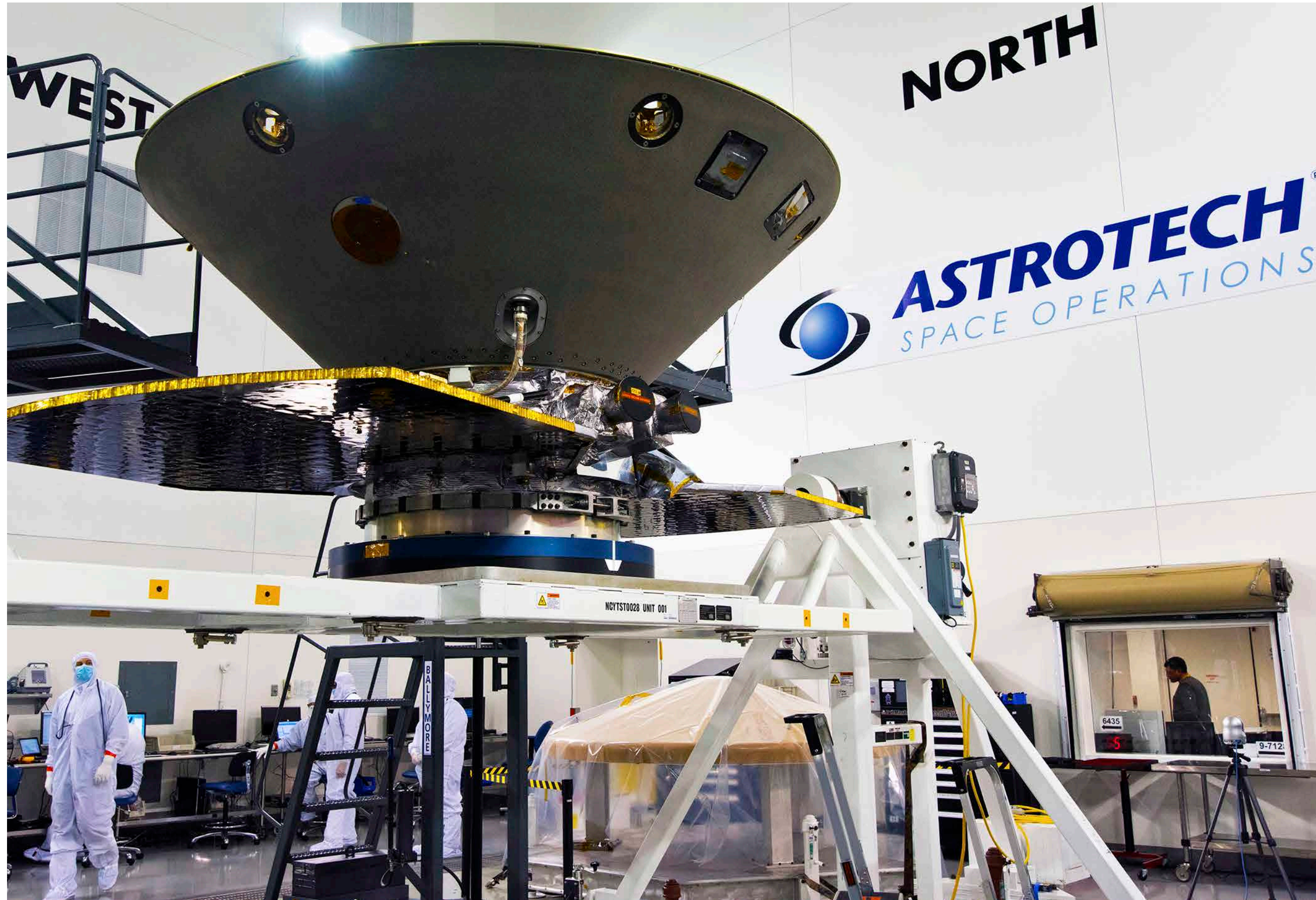
InSight spacecraft prepared for testing

Inside the Astrotech processing facility at Vandenberg Air Force Base in California, NASA's Interior Exploration using Seismic Investigations, Geodesy and Heat Transport, or InSight, spacecraft has been mounted on to a rotation fixture for testing. InSight is scheduled to launch May 5, 2018, atop a United Launch Alliance Atlas V rocket for its trip to Mars.

InSight was developed and built by Lockheed-Martin Space Systems in Denver, Colorado, and arrived at Vandenberg on Feb. 28 aboard a U.S. Air Force C-17 aircraft. The spacecraft then was transported to the Astrotech facility at the West Coast launch site.

This mission will be the first to look deep beneath the Martian surface, studying the planet's interior by measuring its heat output and listening for marsquakes. It will use the seismic waves generated by marsquakes to develop a map of the Red Planet's deep interior. The resulting insight into Mars' formation will provide a better understanding of how other rocky planets, including Earth, were created.

Photo credit: USAF 30th Space Wing/Alex Valdez





NASA wants ideas from university teams for future human space missions

Teams at U.S. colleges and universities have an opportunity to potentially help NASA with innovative design ideas to meet the challenges of space exploration. The 2019 eXploration Systems and Habitation (X-Hab) Academic Innovation Challenge supports NASA's efforts to develop technologies and capabilities that will enable future human missions throughout our solar system.

NASA, in collaboration with the National Space Grant Foundation, will offer competitively selected awards of \$15,000 to \$50,000 for innovative studies and to enhance the human exploration of space.

This year's X-Hab Challenge addresses eight topic areas, some of which relate to NASA's new [Lunar Orbital Platform-Gateway](#). Entries are due April 27, 2018.

The X-Hab Challenge provides real-world, hands-on design, research and development opportunities for students interested in aerospace careers, while strengthening NASA's efforts to optimize technology investments, foster innovation and facilitate technology infusion. The products and technologies developed for the 2018 X-Hab Challenge will be further refined for next-generation exploration systems, and could eventually provide the basis for future demonstrations and missions.

Find out more at <https://go.nasa.gov/2oiL8j7>.

Last of the big swing arm umbilicals installed on mobile launcher

BY LINDA HERRIDGE



The Interim Cryogenic Propulsion Stage Umbilical (ICPSU) is lifted high up for installation on the mobile launcher (ML) on March 16, 2018, at NASA's Kennedy Space Center. Photo credit: NASA/Ben Smegelsky

One of the last of several large connection lines, called umbilicals, was installed on the mobile launcher at NASA's **Kennedy Space Center**. The umbilical was lifted by crane and attached high on the tower of the mobile launcher at about the 240-foot level, bringing the steel structure one step closer to supporting processing and launch of NASA's **Orion** spacecraft and **Space Launch System (SLS)** rocket. The launcher is designed to support the assembly, testing, check out and servicing of the rocket, as well as transfer it to the pad and provide the platform from which it will launch.

"The installation of this umbilical marks another big milestone for the mobile launcher team, the Exploration Ground Systems Program, and moves us one step closer to rolling to Launch Pad 39B and the Vehicle Assembly Building for testing," said Sam Talluto, mobile launcher deputy project manager."

This particular umbilical will supply propellants, environmental control systems, pneumatics and electrical connections to the **interim cryogenic propulsion stage (ICPS)** of the SLS rocket and will swing away before launch. The umbilical also will provide hazardous gas leak detection while the rocket is on the pad. The ICPS is **located** between the core stage of the rocket and the Orion capsule, and will provide propulsion for Orion while in space and give the spacecraft the big push needed to fly beyond the Moon.

To install the umbilical, construction workers with JP Donovan prepared the rigging lines and attached the umbilical to a large crane. The ICPS umbilical was slowly lifted up and bolted to the mobile launcher. The entire process took about four hours.

With the umbilical in place, workers will install additional equipment on the tower, as well as electrical wiring, environmental control system tubing, hydraulics and other commodities will be routed to the umbilical arm before testing. Tests of the swing arm also will be performed as part of the verification and validation process.

Exploration Ground Systems is overseeing installation of the **launch umbilicals and launch accessories** on the mobile launcher to prepare for the first integrated test flight of Orion atop the SLS on **Exploration Mission-1**. A pair of tail service mast umbilicals are slated for installation later this year and will be the last of the twenty umbilicals and launch accessories to be installed on the mobile launcher. With this test flight, NASA is preparing for missions to send astronauts to deep space destinations, including the Moon, Mars and beyond.



Construction workers with JP Donovan install the Interim Cryogenic Propulsion Stage Umbilical (ICPSU) to the tower of the mobile launcher at about the 240-foot-level on March 16, 2018. The last of the large umbilicals to be installed on the tower, the ICPSU will provide super-cooled hydrogen and liquid oxygen to the Space Launch System rocket's interim cryogenic propulsion stage, or upper stage, at T-0 for Exploration Mission-1. Photo credit: NASA/Ben Smegelsky



A heavy-lift crane and rigging lines are used to lift the Interim Cryogenic Propulsion Stage Umbilical high up for installation on the tower of the mobile launcher on March 16, 2018, at NASA's Kennedy Space Center. Photo credit: NASA/Ben Smegelsky

ASTRONAUTS LAST STOP

Orion Crew Access Arm installed on mobile launcher

BY BOB GRANATH

As astronauts prepare for trips to destinations beyond low-Earth orbit, their last steps before boarding an Orion spacecraft will be across a crew access arm on the mobile launcher at NASA's Kennedy Space Center in Florida.

The agency reached an important milestone Feb. 26, 2018, on the path to **Exploration Mission-1** with the installation of the crew access arm at about the 274-foot level on the mobile launcher tower.

The **Exploration Ground Systems** team at Kennedy has been overseeing installation of umbilicals and other launch accessories on the 380-foot-tall mobile launcher in preparation for stacking the first launch of the **Space Launch System** rocket, called the SLS, with an Orion spacecraft. The SLS will be the largest launch vehicle in the world, designed for missions beyond low-Earth orbit carrying crew and cargo to the Moon or beyond. The initial configuration for what SLS can carry past low-Earth orbit and on to the Moon is more than 26 metric tons, with a final configuration of at least 45 metric tons.

The crew access arm installation marks the completion of 17 of the 20 major launch accessories and umbilicals that provide access, power, communication, coolant, fuel and other services to the launch vehicle and spacecraft. A pair of Tail Service Mast Umbilicals are slated for installation in the spring/summer timeframe.

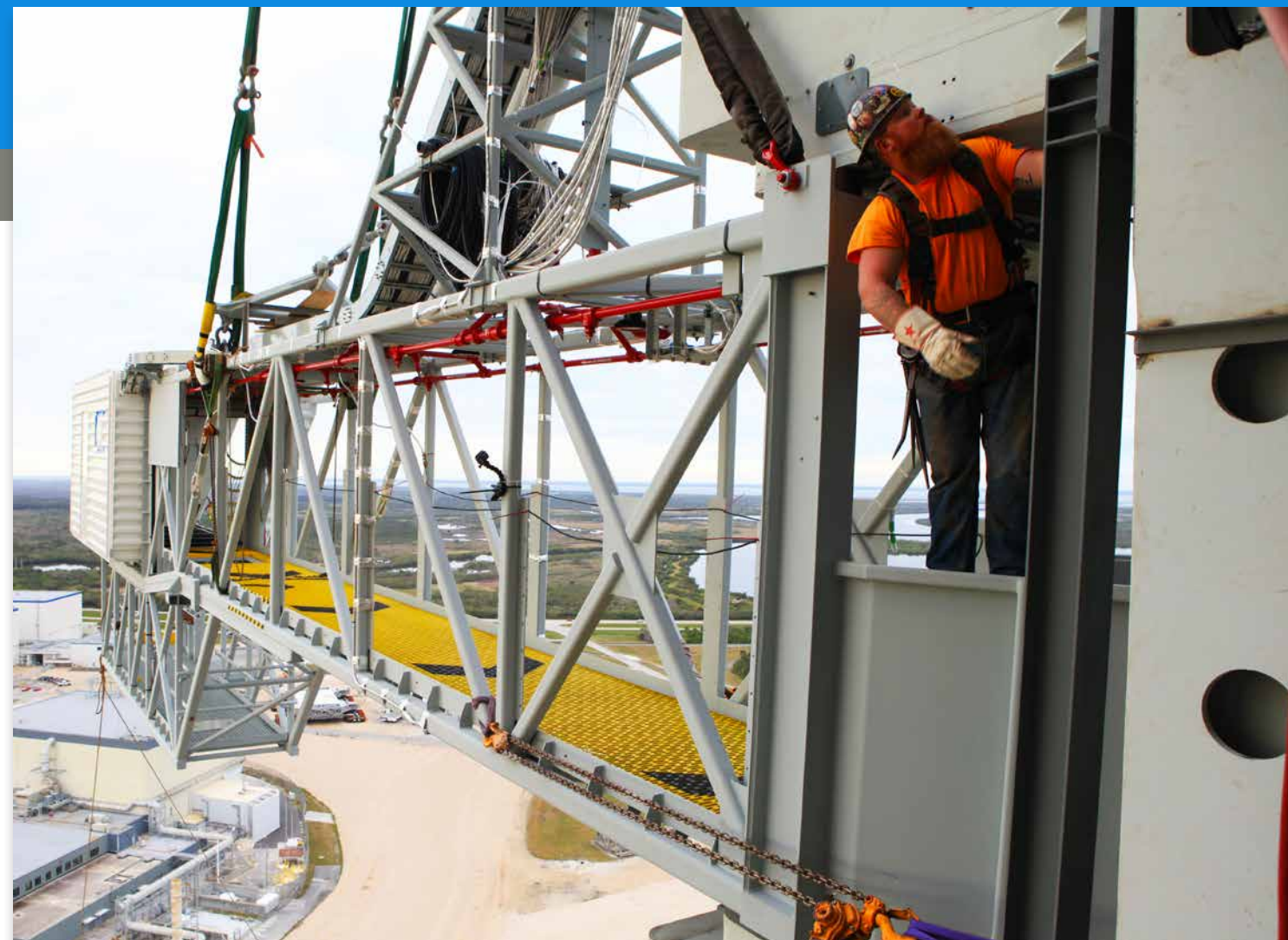
The crew access arm is made up of two major components — the truss assembly and the environmental enclosure, known as “white room.” It is given that name not only because it is painted white, but also because it is kept clean to avoid contaminants entering the spacecraft prior to flight. The crew access arm is designed to rotate from its retracted position and line up with Orion's crew hatch. The arm will provide entry and emergency egress for astronauts and technicians into and out of the Orion spacecraft.

Although there will be no crew on the first flight, the crew access arm provides a bridge to Orion for personnel and equipment entering the spacecraft and allows the ground crew access for processing and prelaunch integrated testing while in the **Vehicle Assembly Building** (VAB) and at **Launch Pad 39B**.

After technicians check out the crew access arm and complete the



A crane positions the Orion crew access arm so it can be attached to the mobile launcher (ML). The arm will be installed at about the 274-foot level on the 380-foot-tall ML tower. Photo credit: NASA/Bill White



Viewed from the 274-foot level of the mobile launcher, a technician begins installation of the Orion crew access arm (CAA) to the tower. The CAA will support the Space launch System rocket at NASA's Kennedy Space Center. Photo credit: NASA/Bill White

many other ground support equipment installations, the crawler-transporter will move the mobile launcher out to Launch Pad 39B for a fit-check and then inside the VAB for validation and verification tests.

The mobile launcher's massive steel tower is engineered to withstand the loads of the umbilicals that will connect to the SLS rocket, as well as to endure the natural forces such as wind, temperature and vibration. Similar to skyscrapers and other large structures, engineers designed the mobile launcher to withstand the movements associated with predicted loads and compensate for anticipated forces. As each piece of hardware is installed, teams precisely measure the structure to ensure the required alignment of the swing arms and umbilicals with the vehicle interface are within the design tolerances.



A crane lifts the Orion crew access arm so it can be attached to the mobile launcher at NASA's Kennedy Space Center. The crew access arm is designed to rotate from its retracted position and line up with Orion's crew hatch. The arm will provide entry and emergency egress for astronauts and technicians into and out of the Orion spacecraft. Photo credit: NASA/Bill White



Solar panels opened on NASA's TESS satellite

Technicians dressed in clean room suits check the solar panels on NASA's Transiting Exoplanet Survey Satellite (TESS) on Feb. 22, 2018, inside the Payload Hazardous Servicing Facility (PHSF) at the agency's Kennedy Space Center in Florida. Inside the PHSF, the satellite is being processed and prepared for its flight.

TESS is scheduled to launch April 16, 2018, atop a SpaceX Falcon 9 rocket from Space Launch Complex 40 at Cape Canaveral Air Force Station. The satellite is the next step in NASA's search for planets outside our solar system, known as exoplanets.

TESS is a NASA Astrophysics Explorer mission led and operated by MIT in Cambridge, Massachusetts, and managed by NASA's Goddard Space Flight Center in Greenbelt, Maryland. Dr. George Ricker of MIT's Kavli Institute for Astrophysics and Space Research serves as principal investigator for the mission.

Additional partners include Orbital ATK, NASA's Ames Research Center, the Harvard-Smithsonian Center for Astrophysics and the Space Telescope Science Institute. More than a dozen universities, research institutes and observatories worldwide are participants in the mission. NASA's [Launch Services Program](#) is responsible for launch management. Photo credit: NASA/Leif Heimbold



Colonel Kevin L. Williams, commander of the 45th Mission Support Group at Patrick Air Force Base and Cape Canaveral Air Force Station in Florida, was the keynote speaker during the Black History Month event Feb. 28, 2018, at Kennedy Space Center. Photo credit: NASA/Tony Gray

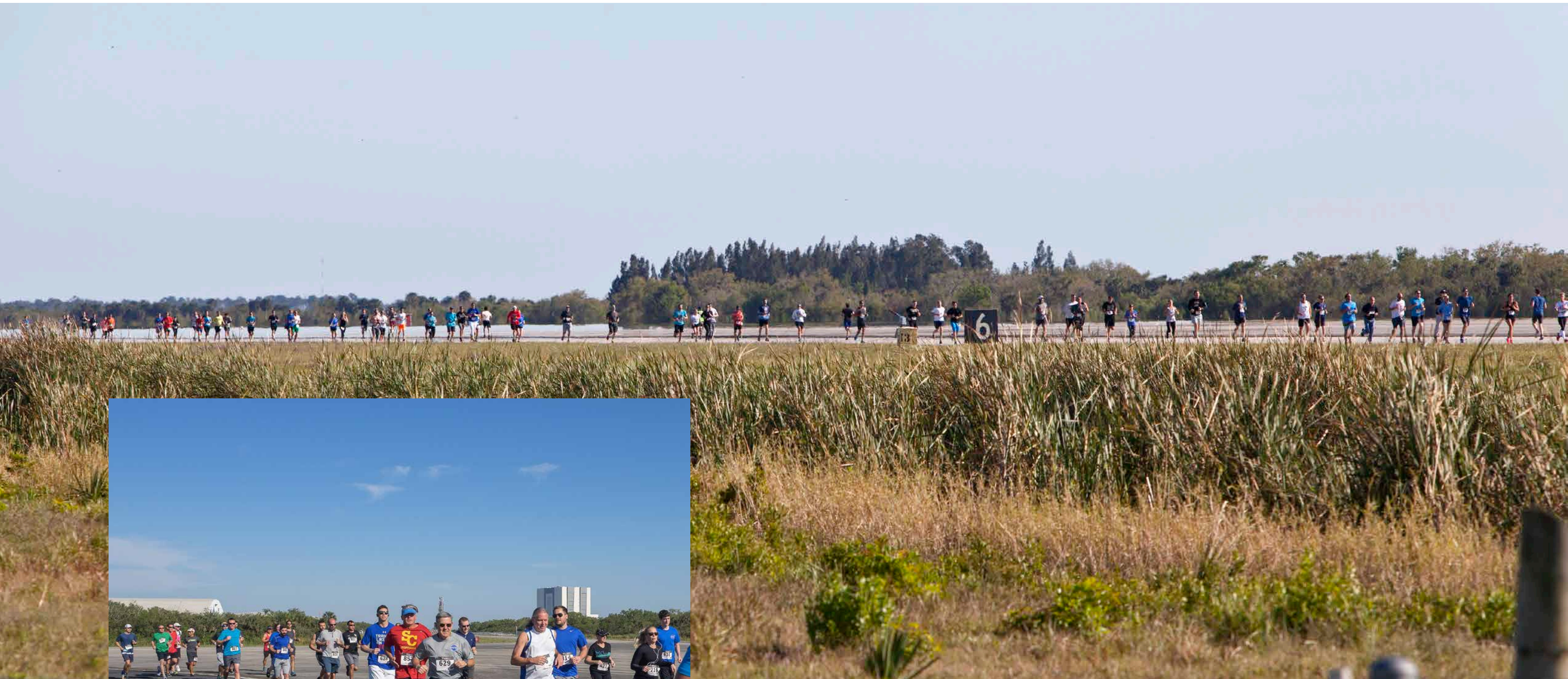
Read the full feature at <https://go.nasa.gov/2IUHTY9>.



Kennedy Space Center workers and guests mingled during the center's Black History Month event Feb. 28, 2018. The special presentation was hosted by the center's Black Employee Strategy Team. Photo credit: NASA/Tony Gray



Kennedy Space Center's Black Employee Strategy Team celebrated Black History Month in February with several events for the center's workforce, including a special presentation Feb. 28, 2018. Aaron Jenkins, an IT specialist, presented a short overview of the event theme, "African-Americans in Times of War." Photo credit: NASA/Tony Gray



Led by Kennedy Space Center Director Bob Cabana, spaceport employees took part in an annual tradition March 13: the KSC Walk Run. It's NASA's version of the community fun run, but the Shuttle Landing Facility is a one-of-a-kind race course. Runners chose a distance – 10K, 5K or two miles – then took off down the runway alongside their colleagues in the spirit of friendly competition. Open only to badged spaceport employees and their guests, the KSC Walk Run was part of the spaceport's Safety and Health Days, a week-long event dedicated to fostering a culture of safety and wellness both at work and at home. Photo credits: NASA/Ben Smegelsky (large photo) and NASA/Fred Benavidez (inset)



45th Anniversary of First Probe to Saturn

Launched 45 years ago, Pioneer 11 became the first spacecraft to explore Saturn. Inside the AO Building at Cape Kennedy (now Cape Canaveral) Air Force Station, the Pioneer 11 spacecraft is seen on March 16, 1973, during installation of its protective payload fairing. The 571-pound space probe was 9.5-feet long and included a 9-foot diameter antenna. The spacecraft lifted off April 6, 1973, atop an Atlas Centaur rocket.

Along with sister ship, Pioneer 10, they were the earliest spacecraft to venture through the treacherous asteroid belt beyond Mars. Pioneer 11's nearly two-year mission took it on a fly-by of Jupiter on Dec. 3, 1974, then used the giant planet's gravity to propel it on to Saturn.

Pioneer 11 completed the 1.5 billion mile trip with the closest approach to Saturn on Sept. 1, 1979, passing within 13,000 miles of the ringed planet. While taking the first close-up photographs of Saturn, Pioneer 11's instruments located two previously undiscovered moons, an additional ring and charted the planet's magnetic field. Photo credit: NASA

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