NASA to Begin Testing Engine That Will Power Ares Rockets

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An original J-2 engine undergoes processing at NASA's Marshall Space Flight Center in Huntsville, Ala., in 1965. The Apollo-era engine, used to power the second stage of the Saturn V rockets to the moon, is being studied anew by NASA rocket scientists building the engines that will power the next generation of launch vehicles, the Ares I and Ares V, and carry human explorers to the moon. The Saturn V, like key hardware and components of the Ares launch vehicles, was designed, developed and tested by Marshall Center engineers. (NASA/MSFC)

In December, NASA will begin testing core components of a rocket engine from the Apollo era. Data from the tests will help NASA build the next generation engine that will power the nation's new Ares launch vehicles on voyages that will send humans to the moon.

NASA will test the engine's powerpack, a gas generator and turbopumps that perform the rocket engine's major pumping and combustion work. These components originally delivered propellants to the Apollo-era J-2 engine that fueled the second stage of the Saturn V rockets.

NASA is using these heritage parts to develop a new engine, known as the J2-X, to power the upper stages of both the Ares I crew launch vehicle and the Ares V cargo launch vehicle. Results from the tests will help engineers modify the machinery to meet the higher performance requirements of these two next-generation rockets.

"The J-2X engine will incorporate significant upgrades to meet higher thrust and efficiency requirements for Ares," said Mike Kynard, manager of the upper stage engine in the Ares Projects Office at NASA's Marshall Space Flight Center in Huntsville, Ala. "That's why we're taking a new look at these components -- to gather performance data, test their limits, and reduce risks down the road when we're building and testing the engine."

The powerpack tests will be conducted at NASA's Stennis Space Center near Bay St. Louis, Miss., where the components were installed in late September 2007.

"The final checkouts of the test article and facility are in work," said Gary Benton, test project manager of the Ares upper stage engine at Stennis. "The test team at Stennis has put a lot of effort into this project and looks forward to getting these first tests completed."

During the initial trials, engineers will run propellants through the powerpack, monitoring its ducts, valves and lines while simulating conditions as if it were attached to a rocket upper stage and main combustion chamber. Engineers will be able to preview conditions that might be present during an engine test fire.

The first test in the series will be a chill test, during which engineers will verify the tightness of seals in the fuel lines and pumps at propellant temperatures as low as minus 425 degrees Fahrenheit. Engineers also will verify accuracy of the chill procedure and determine the amount of time required to chill the pumps.

Later tests in the series will progress to include test fires at a variety of power levels and durations ranging from 12 seconds to 550 seconds. Testing is set to continue through February 2008.

The Ares rockets support NASA's goal of providing safe, reliable, affordable transportation to support sustainable, long-term exploration. The Ares I is an in-line, two-stage rocket that will transport the Orion crew vehicle to low Earth orbit. Orion will accommodate as many as six astronauts on missions to the International Space Station or as many as four crew members on lunar missions. The Ares V, a heavy-lift launch vehicle, will enable NASA to launch a variety of science and exploration payloads and key components needed to go to the moon.

The J-2X is an evolved version of two historic predecessors: the J-2 engine that propelled the Saturn IB and Saturn V rockets, and the J-2S, a simplified version of the J-2 that was developed and tested in the early 1970s.

Marshall manages the J-2X upper stage engine for NASA's Constellation Program, based at NASA's Johnson Space Center in Houston. Under a contract awarded in July 2007, Pratt and Whitney Rocketdyne Inc., of Canoga Park, Calif., will design, develop, test and evaluate the engine.

Source: NASA