

NASA surpasses test facility record with J-2X powerpack test

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During a record-breaking test on June 8, 2012, engineers throttled the J-2X powerpack up and down several times to explore numerous operating points required for the fuel and oxidizer turbopumps. The results of this test will be useful for determining performance and hardware life for the J-2X engine turbopumps. The J-2X engine will power the upper stage of the evolved NASA's Space Launch System, an advanced heavy-lift rocket that will provide for human exploration beyond Earth's orbit. The test was conducted at NASA's John C. Stennis Space Center in south Mississippi. Pratt & Whitney Rocketdyne is developing the J-2X engine for NASA's Marshall Space Flight Center in Huntsville, Ala. Credit: NASA/SSC

(Phys.org) -- NASA's Stennis Space Center near Bay St. Louis, Miss., broke its own record Friday when it conducted a test on the new J-2X powerpack. The test lasted for 1,150 seconds, surpassing the previous record by more than a full minute.

For NASA, the test marked a milestone step in development of a next-generation rocket [engine](#) to carry humans deeper into space than ever before. For Stennis, the 19-minute, 10-second test represented the longest duration firing ever conducted in the center's A Test Complex.

"This is the longest and the most complex J-2X test profile to date," said Mike Kynard, NASA's [Space Launch](#) System liquid engines element manager. "By combining as many test objectives as we can, we aim to get the most out of every opportunity and work as affordably and efficiently as possible while maintaining a reasonable level of risk."

The powerpack is a system of components on the top portion of the J-2X engine, including the gas generator, oxygen and fuel turbopumps, and related ducts and valves. As designed, the powerpack system feeds the thrust chamber system, which produces engine thrust. By removing the thrust chamber assembly, including the main [combustion chamber](#), main injector and nozzle, engineers can push more easily the turbomachinery components over a wide range of conditions to demonstrate durability and safety margins.

"Setting a new record for the longest duration test on one of our stands in the A complex is a testament to the longevity and versatility of our testing facilities," said Randy Galloway, engineering and test director at Stennis. "These stands, originally built in the 1960s to test the stages for the [Apollo Program](#), then used for the [Space Shuttle Program](#), now are being used to test for the next generation vehicle that will take us farther

than we have ever gone."

This record-breaking test explored numerous operating points required for the fuel and oxidizer turbopumps. The results of this test will be useful for determining performance and hardware life for the J-2X engine turbopumps. The test also allowed operators to calibrate flow meters on the stand, which measure the amount of liquid hydrogen and liquid oxygen delivered to the powerpack.

Before the powerpack test, the longest firing in Stennis' A Test Complex occurred in August 1989, with a 1,075-second test of a space shuttle main engine. The B Test Complex still claims the record for test duration at more than 2,000 seconds.

The J-2X engine is the first human-rated liquid oxygen and liquid hydrogen rocket engine to be developed in four decades. It will power the upper stage of NASA's evolved Space [Launch System](#), an advanced heavy-lift rocket that will provide an entirely new national capability for human exploration beyond Earth's orbit.

Pratt & Whitney Rocketdyne is developing the J-2X engine for NASA's Marshall [Space](#) Flight Center in Huntsville, Ala.

The June 8 test is part of a second series of firings on the powerpack. NASA engineers performed an initial [test](#) of an Apollo-era powerpack at Stennis in 2008.

Provided by JPL/NASA

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