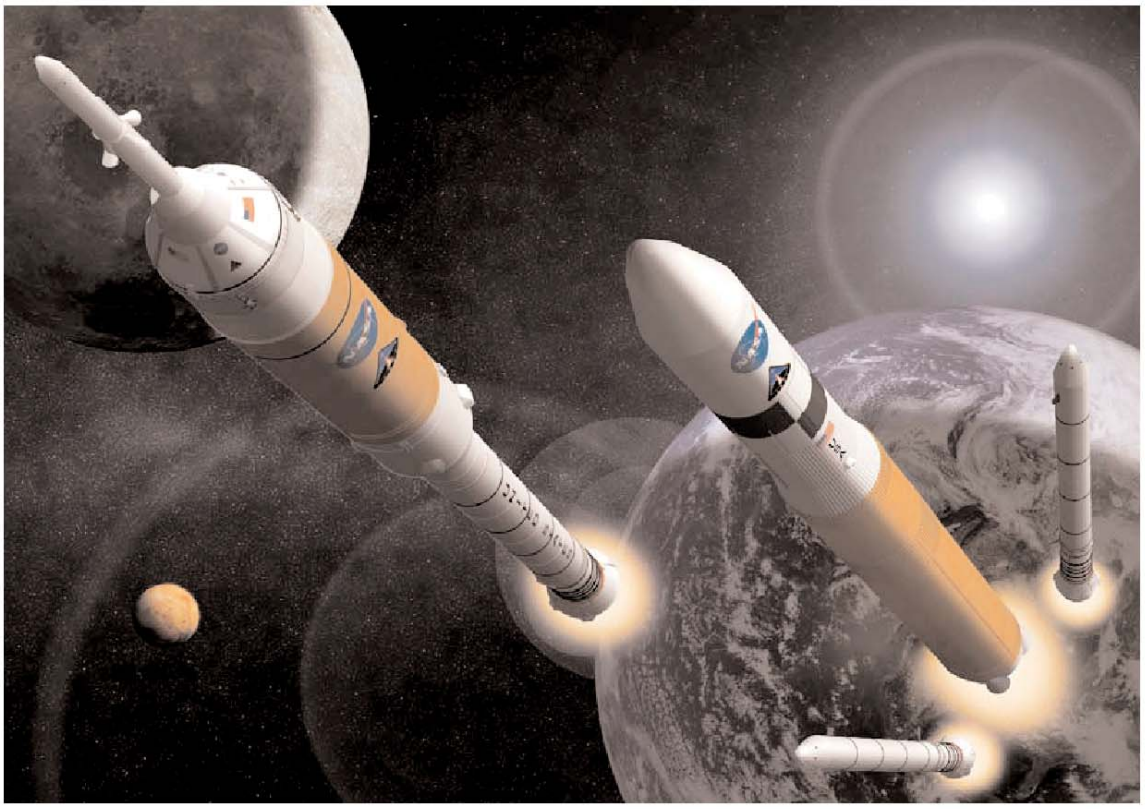
STENNIS SPACE CENTER'S ROLE IN THE FUTURE OF SPACE EXPLORATION



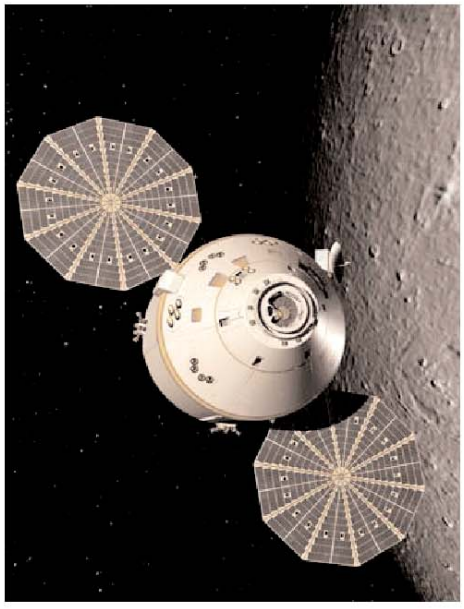
An artist's rendition illustrates the Ares I crew launch vehicle (left) and Ares V cargo launch vehicle.

NASA'S CONSTELLATION PROGRAM: AMERICA'S PLAN TO RETURN TO THE MOON AND ON TO MARS

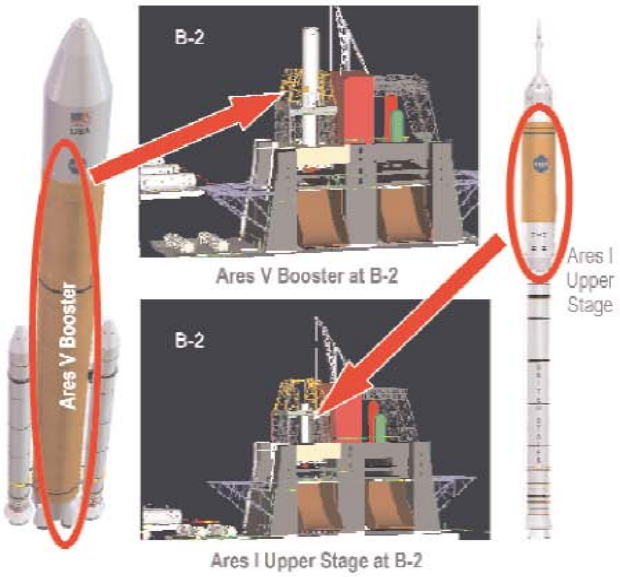
NASA is developing new spacecraft that will transport humans and cargo to establish colonies on the moon and eventual journeys to Mars. Building on the technologies of the Apollo and Space Shuttle programs, NASA's 21st century exploration system will be affordable, reliable, versatile and safe. The new spacecraft, Ares I, Ares V and Orion, will replace the space shuttle, which will retire in 2010. Stennis Space Center will be responsible for rocket propulsion testing for the upper stage of the Ares I and Ares V, and the main stage of the Ares V.

Orion

America's new generation of explorers will travel to the moon in crews of four aboard NASA's Orion crew exploration vehicle. Orion will be launched into low-Earth orbit by the Ares I crew launch vehicle, and NASA's Ares V cargo launch vehicle will be used to carry cargo into orbit.



NASA's Orion crew exploration vehicle



Development and flight-stage acceptance testing for the Ares I Upper Stage and for the Ares V Core Booster Stage will be conducted on SSC's dual-position B Stand, as shown in these concept illustrations.

Ares I – Crew Launch Vehicle

Future astronauts will ride to orbit on Ares I, which uses a single five-segment solid rocket booster, a derivative of the space shuttle's solid rocket booster, for the first stage. A liquid oxygen/liquid hydrogen J-2X engine derived from the J-2 engine used on Apollo's second stage will power the crew exploration vehicle's second stage.

Core components of the J-2X engine are installed on SSC's A-1 Test Stand for testing, which began in December 2007.

Core components of the Apollo-era engine are being tested on the A-1 Test Stand at Stennis Space Center. The A-1 Test Stand, site of the first space shuttle main engine test in 1975, held its last test for that program Sept. 29. The test stand began a new chapter in its operational history in 2006, when it was officially handed over to the Constellation Program for testing the J-2X components. Data from the tests will help NASA build the next generation J-2X engine.

The Ares I can lift more than 55,000 pounds to low Earth orbit. The new crew transportation system is 10 times safer than the space shuttle, primarily due to its in-line design and launch abort system.

Ares V – Cargo Launch Vehicle

Ares V, a heavy lift launch vehicle, will use five RS-68 liquid oxygen/liquid hydrogen engines mounted below a larger version of the space shuttle's external tank, and two five-segment solid propellant rocket boosters for the first stage. The upper stage will use the same J-2X engine as the Ares I. The Ares V can lift more than 286,000 pounds to low Earth orbit and stands approximately 360 feet tall.

Pratt & Whitney Rocketdyne's RS-68 engine (inset) will power the core stage of the Ares V. Testing for commercial applications of the RS-68 is under way at SSC's B-1 Test Stand.

This versatile system will be used to carry cargo and the components into orbit needed to go to the moon and later to Mars.

The RS-68 is the most powerful liquid oxygen /liquid hydrogen rocket engine in existence, capable of producing 650,000 pounds of thrust at sea level. The prime contractor for the RS-68 engine is Pratt & Whitney Rocketdyne of Canoga Park, Calif. All RS-68 engines are assembled and test-fired at Stennis Space Center.

A-3 TEST STAND

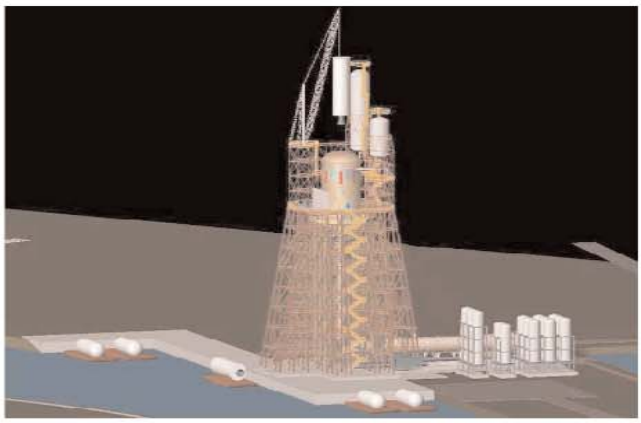
NASA announced May 8, 2007, its intention to build a new test stand at Stennis Space Center for testing the J-2X rocket engine. The A-3 Test Stand will allow engineers to test the J-2X engine's operating parameters by simulating conditions at different altitudes. To do that, the test stand will generate approximately 4,620 pounds per second of steam and use it to reduce the engine test cell pressure.

Construction began on the A-3 Test Stand in summer 2007, with the first test scheduled to be conducted in 2010. The structure is the first large test stand to be built since the south Mississippi site was established in the 1960s.

Simultaneous with A-3's construction was a series of tests conducted in Stennis' E Test Complex on a miniature version of A-3's exhaust diffuser. The tests to validate the diffuser's design will help engineers work out any issues before the full-scale version is built.

A-3 Test Stand Capabilities

- Will enable long-duration (550 seconds) J-2X testing
- Start and run pressures as low as 0.16 pounds per square inch absolute, a vacuum condition simulating the equivalent of 100,000 feet in altitude
- Will enable engine gimballing (rotating) in a 5-degree square pattern
- Will accommodate a 200-millisecond engine shutdown, and protect the engine from damage due to shutdown pressure transients
- J-2X sea-level testing and launch vehicle stage testing



Artist concept shows the design of the A-3 Test Stand for proving the J-2X engines that will carry humans back to the moon.

A-3 Test Stand Structure

- Open steel frame design
- 300 feet tall
- Structure and foundation designed for thrust levels of up to 1 million pounds
- Two-stage steam ejector system to achieve simulated altitude conditions

SUMMARY OF STENNIS SPACE CENTER'S CONSTELLATION PROGRAM RESPONSIBILITIES:

Manage and integrate all Constellation Systems rocket propulsion testing

- Lead the development, certification and acceptance testing for the upper stage engine
- Lead development testing for upper stage main propulsion test article
- Lead acceptance testing for flight upper stage assembly
- Support design, development, testing and evaluation of propellant test and delivery systems; ground engine checkout facility simulation and analysis; engine and launch facility planning
- Support flight performance systems integration, and systems engineering processes and tools
- Integrate and coordinate propulsion test activities with the rocket propulsion test management board
- Support the refinement and design of future elements

"Stennis Space Center is the last place in the country where we can test large engines or whole rocket stages. Without SSC, NASA doesn't have a place to do that."

– Michael Griffin, NASA Administrator

"SSC, Marshall and the Michoud Assembly Facility have a long, rich history of working together, (an asset that will smooth development and delivery of the Ares vehicles)."

– Steve Cook,
Exploration Launch Projects office director, Marshall Space Flight Center

"Half the cost of developing these vehicles goes toward the testing and certification services Stennis Space Center already provides to the country."

– Jeff Hanley,
NASA's Constellation Program manager

MORE INFORMATION, LINKS:

Details about Constellation Program:
http://www.nasa.gov/mission_pages/constellation/main/index.html

Information on Stennis Space Center:
htttp://www.nasa.gov/centers/stennis/home/index.html