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Lunar Prospector Spacecraft Construction Complete

From: NASANews@hq.nasa.gov
Date: Wed, 12 Mar 1997 11:25:13 -0500 (EST)
Fwd Date: Wed, 12 Mar 1997 23:21:33 -0500
Subject: Lunar Prospector Spacecraft Construction Complete

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(Phone: 202/358-1547) March 12, 1997

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RELEASE: 97-38

LUNAR PROSPECTOR SPACECRAFT CONSTRUCTION COMPLETE

Construction and assembly of NASA's Lunar Prospector spacecraft, designed to obtain the first complete compositional and gravity maps of the Moon, has been completed in preparation for its scheduled September 1997 launch.

Functional and environmental spacecraft tests will be conducted over the next several months, according to project manager Tom Dougherty of Lockheed Martin Missiles & Space, Sunnyvale, CA. Once this activity is successfully completed, current plans call for the spacecraft to be shipped to Spaceport Florida in late August for launch on September 24, 1997.

"We're delighted with progress to date," said Scott Hubbard, NASA Lunar Prospector mission manager at Ames Research Center, Mountain View, CA. "Lockheed Martin and its construction team put a detailed program into place and executed it well within the established schedule and with tight cost control."

The total cost of the mission to NASA, including launch, mission operations and data analysis, is \$63 million.

Why is NASA going back to the Moon? Despite a high level of scientific and public interest, particularly during the Apollo era, major gaps remain in scientific knowledge about Earth's nearest planetary neighbor, according to project scientists. Over 75 percent of the lunar surface is not mapped in detail, and important questions about the Moon's history, composition and internal processes remain unanswered.

During its planned one-year polar orbiting mission, Lunar Prospector will map the Moon's surface composition, gravity and magnetic fields, and try to detect volatile release activity. This information should provide insights into the origin and evolution of the Moon. Lunar Prospector also should directly determine the existence or absence of water ice in the Moon's polar regions, which has been suggested by analysis of indirect, radar-based data from the Clementine mission.

As the first peer-reviewed, competitively selected mission in NASA's "faster, better, cheaper" Discovery Program series, Lunar

Prospector is an embodiment of the Agency's new way of doing business. With an emphasis on minimized risk, lowered costs, and rapid turnaround time, and its prime focus on delivery of science data, Lunar Prospector will help usher in a new era of Solar System exploration missions.

"Lunar Prospector is serving as a pathfinder in many different ways," said Hubbard. The mission has "already made history in terms of management style, technical approach, cost management and focused science. Technical insight rather than detailed programmatic oversight was used to ensure innovation and maximum return on investment. The Ames program office paid close attention to the progress of the project and its schedule, cost and science return, but provided no detailed specifications. The Principal Investigator was given the flexibility to implement the best available approach," he said.

The Lunar Prospector spacecraft is a small, spin-stabilized vehicle with a fully fueled mass of 660 pounds. It is 4.5 feet high and 4 feet in diameter, with three 8-foot booms or masts. Solar cells mounted on its outer surface will provide more than 200 watts of power.

Five scientific instruments are mounted on the booms to isolate them from the main structure and electronics. A neutron spectrometer will have the capability to locate as little as one cup of water in about a cubic yard of lunar soil (regolith). The discovery of water ice in the lunar polar regions would mean that water, necessary for life support and a potential source of both oxygen and hydrogen to produce rocket propellant, could be available for use by future lunar explorers.

A gamma-ray spectrometer will provide global maps of the elemental composition of the surface layer of the Moon. Improved knowledge of the concentrations of such elements as uranium, thorium, potassium, iron, titanium, oxygen, silicon, aluminum, magnesium and calcium will aid in understanding the composition and evolution of the lunar crust.

An alpha particle experiment will provide information on the level of tectonic and volcanic lunar out-gassing activity. It will map the locations and frequency of radon gas release events on the Moon, a body thought to be tectonically and volcanically dead until Apollo provided evidence that it may still have some limited activity.

A magnetometer and electron reflectometer will map local lunar magnetic fields, known to be weak compared to the global magnetic field of the Earth. This will help determine the origin of such fields and may provide information on the size and composition of the lunar core.

The Doppler gravity experiment will provide the first global gravity map of the Moon, essential for planning follow-on robotic and human exploration missions. It also will provide data on density differences in the crust, internal densities and the nature of the core.

When Lunar Prospector is launched, it will take five days to reach the Moon, making two midcourse maneuvers, deploying booms, and collecting calibration data via its science instruments en route. Once the spacecraft reaches the Moon, it will be put into a circular, 118-minute, 62-mile altitude, polar-mapping orbit to begin its mission.

If fuel is available at the end of the one-year nominal mission, lunar mapping may be extended at altitudes as low as 6.2 miles over areas of special interest. After the fuel needed for orbital maintenance is depleted, the spacecraft will eventually impact on the lunar surface.

Further information on Lunar Prospector, including still imagery, is available on the Internet at the following URL:

http://pyroeis.arc.nasa.gov/lunar_prospector/home.html

The Lunar Prospector mission is being implemented for NASA by Lockheed Martin, Sunnyvale, CA, with important contributions from Los Alamos National Laboratory, the University of California-Berkeley Space Science Laboratory, the Goddard Space Flight Center, Greenbelt, MD, and the Jet Propulsion Laboratory,

Pasadena, CA.

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