

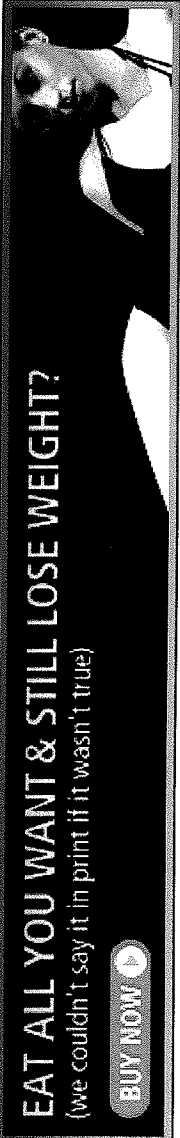
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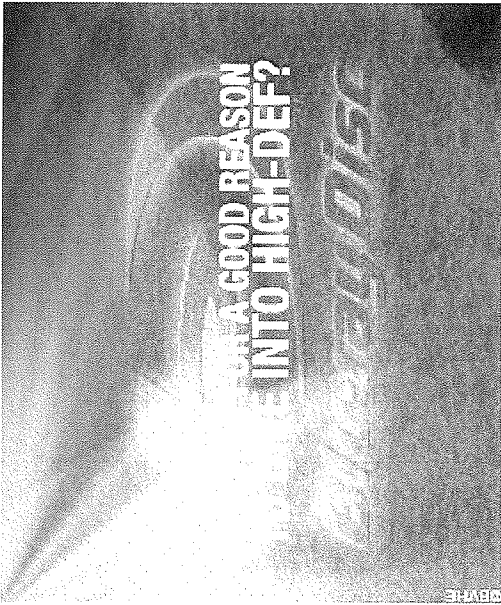
Lunar orbiter readied to take giant leap

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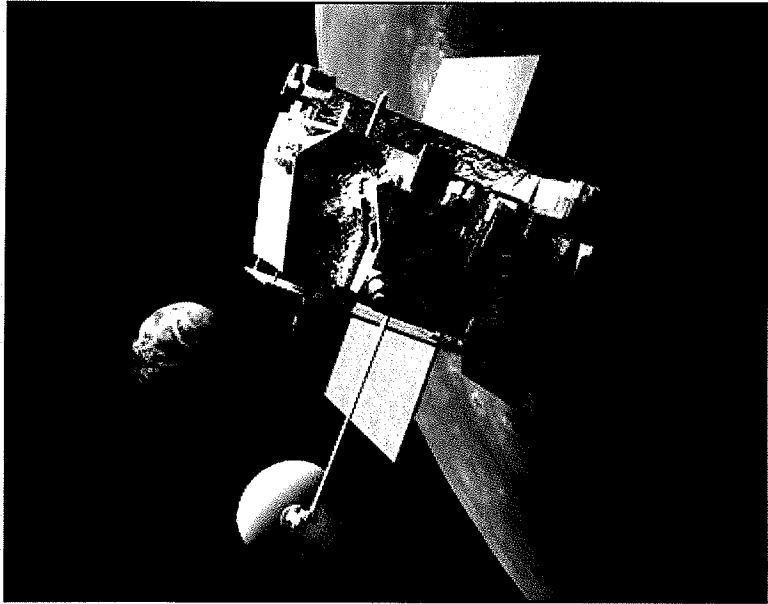
This week, the Lunar Reconnaissance Orbiter, or LRO, begins a preliminary design review — a process that is sure to reflect the financial stress and strain status of NASA's newly issued budget for fiscal year 2007.

Overarching goals

The task ahead for engineers and scientists is to keep LRO on track in order to achieve several goals: to characterize future robotic and human lunar landing sites and to identify potential lunar resources, with emphasis on applied science/engineering assessments. LRO is also to investigate the lunar radiation environment in terms of impact on humans.

LRO is the first of the Robotic Lunar Exploration Program missions. After a planned launch by late fall in 2008, LRO will take four days to make its way to the moon and then orbit that chunk of "magnificent desolation" for nominally one year.

Now being competitively sought is a co-manifested "secondary" payload on the LRO launch. One idea floating about is ejecting some type of hardware from LRO to demonstrate a "first look" at the polar regions from the moon's surface.



NASA

The Lunar Reconnaissance Orbiter, shown in this artist's conception, would be launched in 2008 to survey the lunar surface, develop better data about the moon's water ice resources and characterize the radiation environment.

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Challenging mission

The mission remains an essential "first step back to the moon for NASA and its implementation of the vision," said Jim Garvin, chief scientist at NASA's Goddard Space Flight Center in Greenbelt, Md., which is managing the mission.

LRO's topographic mapping capabilities will, in Garvin's view, "reveal for all of us a 'new moon' that we will be able to utilize on our path to human return and eventual human missions to Mars."

The NASA center is acquiring the launch system and spacecraft, as well as providing payload accommodations, mission systems engineering, assurance and management.

"LRO, in all respects, is a unique and challenging planetary mission," Jim Watzin, planetary division chief for Goddard's Flight Programs and Projects Directorate, explained to Space.com. For example, LRO will fly within 31 miles (50 kilometers) of the lunar surface for at least one year in order to conduct a comprehensive and detailed mapping mission. That's a feat that has never before been attempted, he noted.

"Low lunar orbit, at the precision mapping altitude of 50 kilometers, is substantially different from our experiences at other planets," Watzin said, underscoring the relatively stable and benign environments of Mars orbit — or Earth orbit, for that matter.

Active propulsion

Watzin said that low lunar orbit is inherently unstable, due to the asymmetry of the lunar gravitational field. LRO's orbit would oscillate and collapse to the point of collision in about two months' time if not properly maintained through active propulsive means, Watzin advised.

Furthermore, Watzin said that as LRO swings around the moon it will be exposed to dramatic temperature shifts. Another tough duty for LRO is its precision mapping mission, requiring large volumes of data that must be collected and transmitted back to Earth.

"This requires a data system with capacities similar to many low-Earth-orbiting

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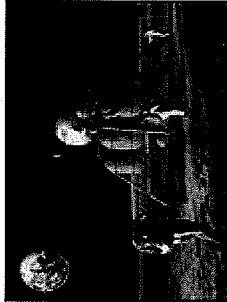
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satellites ... but exercised over a far greater distance with less power and weight than typically allotted," Watzin said. "In almost all aspects, this is a challenging mission."

CONTINUED: Probe will revisit U.S. and Soviet landing sites

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