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Launch of Phoenix



The Phoenix lander bound for the northern plains of Mars is launched atop a Delta 2 rocket from Cape Canaveral.

- [Full coverage](#)

Phoenix to the pad



The Phoenix lander bound for Mars is hauled to Cape Canaveral's pad 17A on July 23 for installation atop the Delta 2 rocket that will propel the craft on its cruise from Earth to Mars.

- [Part 1](#) | [Part 2](#)

Dawn waits for date



The Dawn spacecraft is returned to a processing facility to await a new launch date. The mission was delayed from July to September, prompting the craft's removal from the Delta rocket at pad 17B.

- [Part 1](#) | [Part 2](#)

Spacewalk highlights



This highlights movie from the July 23 station spacewalk shows the jettisoning of a support platform and a refrigerator-size tank.

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Expedition 16 crew

New engine valves installed on Atlas and Delta rockets

BY STEPHEN CLARK
SPACEFLIGHT NOW

Posted: August 16, 2007

A team of U.S. government and contractor investigators is nearing the end of a two-month inquiry into a fuel leak that left two top secret spy satellites in the wrong orbit during a June launch of the Atlas 5 rocket.

The liquid hydrogen leak was traced to a valve that failed to close during a long coast phase between burns of the Centaur upper stage's RL10 engine. The RL10 conducted two burns during the [June 15 launch](#) to place a classified payload into orbit for the National Reconnaissance Office, the government agency that operates the nation's spy satellite fleet.

The open valve allowed the supercold liquid hydrogen to slowly leak from the Centaur stage, and the second burn of the RL10 was cut short four seconds early when the rocket ran out of fuel.

The engine, which burns a mix of liquid hydrogen and liquid oxygen, is built by Pratt and Whitney Rocketdyne, Inc. The RL10 is used on the upper stages of both the Atlas and Delta rocket fleets.

An investigation board was convened after the launch to look into the cause of the upper stage anomaly. The team was comprised of officials from the U.S. Air Force, NRO, and United Launch Alliance, the joint company formed last year by Boeing Co. and Lockheed Martin Corp.

Engineers were able to replicate the leak condition during tests at ground facilities, according to a statement from the Air Force's Space and Missile Systems Center.

"The team is well on its way to implementing corrective actions on the Atlas 5 and Delta 4 vehicles currently being processed for flight," the Air Force said in the statement.

Technicians installed a new valve design into two RL10 engines being readied for launch in the next two months. An Atlas 5 rocket is scheduled for a September mission and a Delta 4-Heavy booster is set for launch in October.

According the Air Force, engineers are confident the new valves will be able to hold up in the cold temperatures the engine experiences in extended coast phases between firings. The Centaur flew for an hour between its first and second burns during the botched June launch.



Members of the upcoming space station Expedition 16 crew, led by commander Peggy Whitson, hold a pre-flight news briefing.

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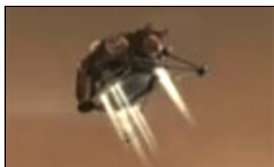
Mars lander preview



A preview of NASA's Phoenix Mars lander mission and the science objectives to dig into the arctic plains of the Red Planet are presented here.

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Phoenix animation



Project officials narrate animation of Phoenix's launch from Earth, arrival at Mars, touchdown using landing rockets and the craft's robot arm and science gear in action.

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NRO officials do not reveal orbital parameters for spy satellites, but amateur hobbyists that track spacecraft can produce accurate orbit estimates by observing satellites over time.

The two craft launched in June, believed to be part of the Naval Ocean Surveillance System designed to locate enemy ships, were left in an orbit stretching from a low point of about 523 miles to a high point of approximately 737 miles, according to data from a group of observers around the world.

The orbital fixes were "derived from numerous observations by a dozen observers in Europe and North America," said Ted Molczan, a veteran satellite observer based in Canada.

Based on observations of previous NOSS launches, the orbit reached by the Centaur during the June launch was about 100 miles too low at perigee and about 12 miles lower than expected at apogee, according to Molczan.

Molczan said both satellites began a series of coordinated maneuvers in July to gradually raise their orbits.

The spacecraft had raised the low points of their orbits by 40 miles by Aug. 11, but maneuvers have stopped this week, Molczan said.

"The main effect to this point has been to raise the perigee, as would be expected," he said.

The satellites still must further increase their altitude and refine their orbital inclination by a few one-hundredths of a degree, according to the observers' data. If maneuvers continue at the same rate, the craft should reach the altitude of their planned initial insertion orbit by October.

NOSS satellites typically must conduct additional orbital maneuvers to achieve the proper separation between the formation-flying craft. Such maneuvers usually take several weeks, Molczan said.

The next Atlas 5 flight was postponed by one month as the review board investigated the cause of the June launch's orbit shortfall. On July 10, workers hoisted the rocket's first stage into the Vertical Integration Facility at Cape Canaveral's Complex 41.

The Air Force's first Wideband Global SATCOM satellite will be the payload for the Atlas 5's upcoming launch. The next-generation military communications bird was shipped to Florida last month to begin final preparations for launch.

The Atlas 5 rocket is set for blastoff Sept. 13 at 8:16 p.m. EDT, about 45 minutes after sunset along the Space Coast. The Centaur upper stage will deploy the WGS F1 satellite in a geostationary transfer orbit using two burns of the RL10 engine.

The long-awaited second launch of the Delta 4-Heavy rocket is now scheduled for the early morning hours of Oct. 4. The launch will be the first operational mission for the heavy-lifting booster, which first flew in [December 2004](#) on a demonstration flight for the Air Force.

Using three burns of the RL10 engine spread over nearly six hours, the Delta 4-Heavy upper stage will deliver the 23rd and final Defense Support Program satellite into a circular geostationary orbit. The marathon mission will include extended coast periods like those on the stricken June launch.

Since 1970, DSP spacecraft have hovered above Earth to warn the U.S. military of missile launches around the world.

"These revised launch dates were chosen to provide sufficient time to complete the planned corrective actions on both Atlas and Delta vehicles," the Space and Missile Systems Center said in a release.