September 15, 2017

Aerojet Rocketdyne Propulsion Guides Cassini on its Grand Finale at Saturn

SACRAMENTO, Calif., Sept. 15, 2017 (GLOBE NEWSWIRE) -- Aerojet Rocketdyne, Inc., a subsidiary of Aerojet Rocketdyne Holdings, Inc. (NYSE:AJRD), played a vital role in the planned plunge of NASA's Cassini spacecraft into Saturn. As the spacecraft entered the atmosphere, Aerojet Rocketdyne's onboard Reaction Control Thrusters worked to counter atmospheric torques, helping Cassini fight to keep its high-gain antenna pointed at Earth as it relayed its final data to NASA's Jet Propulsion Laboratory. These measurements of the atmosphere's composition are anticipated to be scientifically incredibly rich and valuable.

"The success of this mission is a testament to the reliability of our thrusters," said Aerojet Rocketdyne CEO and President Eileen Drake. "They traveled more than 2 billion miles through space, guided Cassini past worlds that shed light on the possibility of life beyond our planet, and served as a building block for next-generation thrusters being used on critical missions for government and commercial applications today. Congratulations to everyone on 100 percent mission success!"

"Whenever I see images come back from Cassini, I can't help but think of the role our propulsion played in making them possible, from the liquid rocket engines used to launch the spacecraft two decades ago, to the thrusters used on its final journey," said Jerry Tarnacki, senior vice president of Aerojet Rocketdyne's Space Systems Business Unit. "The robust technologies we originally incorporated into those systems can be traced directly to the successful propulsion systems we design for missions today. That speaks volumes about the dependability of our products."

Aerojet Rocketdyne provided propulsion for all aspects of the Cassini mission, which began its 2.2 billion-mile journey to Saturn in October 1997. The company provided the LR87 rocket engine that helped power the first stage of the Titan IV launch vehicle. Additionally, two RL10 rocket engines powered the vehicle's Centaur upper stage, which also included 12 monopropellant engines to help control the spacecraft. Aboard the spacecraft, the company's R-4D 100-lbf bipropellant engine slowed the spacecraft for capture by Saturn's gravity and has been used for major trajectory changes throughout the mission, including setting up the Grand Finale. Aerojet Rocketdyne also provided 16 MR-103H 0.2 lbf monopropellant hydrazine engines for use throughout the mission and during the Saturn Orbit Insertion in 2004 and these are the little thrusters that commanded the spacecraft during the final plunge.

The R-4D derives its heritage from the Apollo program. The most recent variant, the High Performance Apogee Thruster (HiPAT™) rocket engine, is the world's premier apogee insertion engine for geosynchronous spacecraft. The MR-103H derives its heritage from the Voyager missions (40 years on orbit and still operational) and its most recent variation provides attitude control for a variety of Low-Earth Orbit, Medium-Earth Orbit, geosynchronous and interplanetary spacecraft including New Horizons. In late 2016, the Cassini spacecraft began its second to last set of orbits called the ring-grazing orbits. Following a gravity assist from Saturn's moon, Titan, the R-4D main engine was fired to fine-tune the trajectory, during which Cassini passed just outside of Saturn's main rings 20 times. It was the 183rd and last planned firing of the main engine, and all remaining maneuvers were completed using Aerojet Rocketdyne's MR-103H thrusters.

On April 22, 2017, a final close flyby of Titan reshaped Cassini's flight path to begin the mission's Grand Finale phase, leaping over the rings and making the first of 22 plunges through the 1,500-mile-wide gap between Saturn and its innermost ring. The thrusters guided Cassini through this previously unexplored region, enabling the spacecraft to obtain samples of Saturn's atmosphere and particles from the main rings, as well as the closest-ever views of Saturn's clouds and inner rings.

On Aug. 14, 2017, Cassini began a set of ultra-close passes through Saturn's upper atmosphere with its final five orbits around the planet. The spacecraft's point of closest approach to Saturn during these passes was between about 1,010 and 1,060 miles (1,630 and 1,710 kilometers) above Saturn's cloud tops. Because of the density of the atmosphere this close to Saturn, the spacecraft used the MR-103H thrusters to maintain stability under conditions similar to those encountered during many of Cassini's close flybys of Saturn's moon, Titan, which has its own dense atmosphere.

Today, the mission ended with a final dive into Saturn's atmosphere, ending a remarkable story of exploration.

The spacecraft has made startling discoveries throughout the Saturnian system, including liquid methane seas on its largest moon, Titan, and a liquid water ocean beneath the frozen outer layer of its moon, Enceladus. Data from Cassini has revealed that these two moons contain environments that may be suitable for life—which is why NASA chose to end the mission with a deliberate dive into the planet. After a seven-year journey from Earth, Cassini spent another 13 years in orbit around Saturn, following a flight plan that was carefully designed to spend all the fuel used to adjust its course. According to

NASA, to avoid the possibility that the spacecraft might someday collide with Titan and Enceladus, the space agency chose to safely dispose of the spacecraft in Saturn's atmosphere, thus preserving the moons for future missions to explore their habitability and potential life.

This is not the first time Aerojet Rocketdyne has helped NASA end an orbiting mission with deliberate descent into a planet. The company's propulsion has facilitated the end of NASA's Magellan, Lunar Prospector, and Mercury MESSENGER missions, among others. Aerojet Rocketdyne built the thrusters for Cassini's propulsion module, which was designed and built by Lockheed Martin.

Aerojet Rocketdyne is an innovative company delivering solutions that create value for its customers in the aerospace and defense markets. The company is a world-recognized aerospace and defense leader that provides propulsion and energetics to the space, missile defense and strategic systems, tactical systems and armaments areas, in support of domestic and international markets. Additional information about Aerojet Rocketdyne can be obtained by visiting our websites at www.Rocket.com and www.AerojetRocketdyne.com.

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