Lockheed Martin's Radiators Destined For Installation On International Space Station

PRNewswire
DALLAS

Lockheed Martin Missiles and Fire Control - Dallas' Photovoltaic Radiators (PVR) are scheduled to be launched on the Space Shuttle Endeavor on November 30 as part of the next International Space Station assembly mission.

Under clear conditions, the deployed radiators will be one of the most visible parts of the International Space Station (ISS), easily seen from the ground with the naked eye. The three PVRs were designed and manufactured at the Lockheed Martin Missiles and Fire Control plant in Grand Prairie, Texas.

The PVRs are designed to get rid of excess heat produced by the solar cell batteries, which provide electrical power for the ISS and the early habitation modules. The PVRs work like the radiator in a car, with liquid ammonia used as the coolant. Excess heat is taken from the batteries and a heat exchanger, and moved to the PVR panels. The ammonia enters the PVR panels on one side and is distributed to small diameter tubes across each of seven flat panels. As the fluid flows through each panel, heat is radiated into space, cooling the fluid.

Initially, two of the three PVRs will be used to help cool the habitation module and remove excess heat from early science experiments on the ISS. These two units will eventually be moved to their final locations on solar array segments as the ISS is expanded. The third PVR is located on the solar power module and will be used entirely to reject the excess heat from the solar cell batteries. The fourth and final PVR is scheduled for launch in April 2003.

"In the environment of space, although it is very cold, heat can be a major problem," said Dave Williams, director - Space Programs for Lockheed Martin Missiles and Fire Control - Dallas. "Without these radiators, the equipment would likely overheat in short order, and the Space Station capabilities would be significantly diminished."

Their large size made testing of the PVRs especially challenging to engineers at Lockheed Martin Missiles and Fire Control - Dallas. To verify the PVR deployment mechanism in the extreme environments of space, tests in the world's largest thermal vacuum chamber were performed. NASA's Plum Brook facility in Sandusky, Ohio, provided the facilities to test the Radiators' mechanism across the -120 to +120 degrees Fahrenheit temperature range and hard vacuum conditions expected on orbit. The PVR panels are designed to tolerate ammonia freezing when the surroundings are very cold.

In addition to the PVRs, Lockheed Martin Missiles and Fire Control - Dallas has fabricated six Heat Rejection System (HRS) radiators which will cool science equipment and the habitation modules. These HRS radiators are scheduled for launch and installation on the ISS at a later date. Together, the PV and HRS radiators will have a deployed area of approximately 6,500 square feet and weigh approximately 10 tons. These large, mostly brilliant white radiator panels will contribute significantly to the Venus-like brightness of the completed ISS, which will be visible to over 95 percent of Earth's population.

The ISS radiators continue a long heritage of space-related activities for Missiles and Fire Control - Dallas that date back to the beginning of the U.S. space program in the late 1950s. Except for Gemini and Skylab, most heat rejection radiators for manned space flight were developed under the Space Programs directorate within what is now Lockheed Martin Missiles and Fire Control - Dallas. For the Space Shuttle program, the company invented and produced the reinforced carbon-carbon nose cap, chin panel and wing leading edges, as well as the Space Shuttle radiators.

Located in Dallas, Tex.; Orlando, Fla.; and Sunnyvale, Calif., Lockheed Martin Missiles and Fire Control develops, manufactures and supports advanced combat, missile, rocket and space systems. The company is organized in seven program/mission areas: Strike Weapons, Air Defense, Anti-Armor, Naval Munitions, Fire Control and Sensors, Fire Support and Product Development.

Headquartered in Bethesda, Maryland, Lockheed Martinis a global enterprise principally engaged in the research, design, development, manufacture and integration of advanced-technology systems, products and services. The Corporation's core businesses are systems integration, space, aeronautics, and technology services.

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