

# 'HRF' To Spell Science On Space Station

PRNewswire  
HOUSTON

The first scientific research payload rack for the Space Station's new Destiny Laboratory will be headed for space aboard the Space Shuttle Discovery on STS-102. The rack, called the Human Research Facility (HRF), contains instruments and experiments that will allow astronauts to conduct important experiments investigating how space affects the human body. This research will help to assure safe and productive human spaceflight and will provide data for applying space technologies to the solution of scientific and medical problems on Earth.

NASA assigned responsibility for developing the HRF to engineers and scientists from Lockheed Martin Space Operations' Science, Engineering Analysis and Test (SEAT) operation in Houston. The Lockheed Martin team worked with researchers from five nations to produce a complementary set of experiments to study the physiological and psychological effects of long-duration spaceflight on humans. They also tested and certified the equipment for spaceflight; integrated the experiments on the HRF rack and trained the astronaut crew on how to conduct the experiments.

"With the arrival of the HRF, science aboard the space station can begin in earnest," said Ken Reightler, vice president, SEAT operations. "HRF is a trailblazer, in a way, for the world class research in biology, chemistry, physics, ecology and medicine that will be conducted on the International Space Station in the years ahead. Like the space station, the Human Research Facility is also a model of international cooperation, with researchers from five different countries collaborating on the effort. We are extremely proud of our role in helping to make this all possible."

The HRF consists of two equipment racks designed to provide electrical power, command and data handling, cooling air and water, pressurized gases, and vacuums to the instruments and experiments they carry into space.

The first rack is being launched on STS-102 and the second is scheduled for launch in 2002. The racks will ride to space inside the Leonardo Multi-Purpose Logistics Module, which was built by the Italian Space Agency (ASI), to carry equipment, experiments and supplies to and from the station aboard the space shuttle.

The HRF rack to be launched on STS-102 contains a computer workstation and laptop computer for crew members to command and test the experiment equipment, collect and store experiment data, and send this data to and from scientists on Earth. It also includes the equipment needed to support a number of important experiments.

Three of the experiments will investigate different aspects of the effects of radiation on astronauts. The Bonner Ball Neutron Detector, developed by the National Aeronautics/Space Development Agency of Japan (NASDA), will measure neutron radiation onboard the space station. A package of dosimeters, provided by the German and European space agencies, will document the nature and distribution of the radiation measured by the neutron detector. And, the Phantom Torso experiment, developed by NASA, will calculate the levels of radiation on various human organs.

Another experiment, designed by a University of California researcher, will measure the bone loss and recovery experienced by astronauts making spaceflights on the International Space Station. A Canadian Space Agency experiment will study the effects of altered gravity on spinal cord excitability. And, a NASA behavioral study will investigate how interpersonal factors may affect performance of the crew.

The rack also holds equipment to provide the medical and research community with standardized, systematic collection of data to use in assuring the health of the crew. This includes a mass spectrometer, the Gas Analyzer System for Metabolic Analysis Physiology (GASMAP), and an ultrasound imaging system. Both are designed to support a variety of future human research investigations.

Lockheed Martin Space Operations, a business unit of Lockheed Martin Technology Services headquartered in Cherry Hill, New Jersey, is a high-technology company with about 4,000 engineers, scientists and support personnel. Services include data collection, telemetry, and communication operations support for NASA; software and hardware engineering for the Space Shuttle and International Space Station; mission operations and planning systems design, development, and integration; and human life sciences research.

SOURCE: Lockheed Martin Space Operations

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