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PIONEER V SCIENTIFIC EXPERIMENTS

Pioneer V is a sophisticated and fully integrated space laboratory, spearheading one of the most ambitious and potentially rewarding scientific efforts of Western rocketry.

Assembled under the supervision of Dr. Charles P. Sonett, Director of the Space Physics Section, Research and Development Division, Space Technology Laboratories, Inc., Pioneer V's complex payload experiments were created to collect a wide variety of scientific knowledge on the space environment between the orbits of the earth and Venus.

The space laboratory reports its findings via radio to the waiting scientists back on earth. The planetoid is the third in a series of advanced payloads created for NASA's Able space probe series by STL. Preceding it were the Explorer VI "paddlewheel" satellite and Atlas-Able IV payload.

Experiments being conducted by Pioneer V will send back previously unknown data about the fundamental nature of the solar system and space itself. Such information is necessary to manned space flight, according to Dr. Sonett.

A number of long-standing scientific theories about the solar system will be finally confirmed or disproved by the new facts radioed back from the space-traveling planetoid.

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Three major kinds of experiments are being conducted: magnetic field, radiation and radio propagation. Information gathered will be fundamental in advancing radio propagation, solar physics, and cosmology. Included in the payload are experiments developed by the Air Force Cambridge Research Center, and the Universities of Chicago and Minnesota.

Units in the space laboratory will map the magnetic fields between the earth and the orbit of Venus, the first such experiments to be made in deep, interplanetary space. The vast magnetic fields of space profoundly influence weather and radio transmission, and will be a major consideration in future space projects.

Collecting data on the magnetic field perpendicular to the spin axis of Pioneer V is a half-pound search-coil magnetometer. Developed by Darrell Judge and Malcolm McLeod of STL, the three tiny packages of the search-coil can detect and classify a number of magnetic field characteristics.

An aspect indicator designed by Stuart Baker and George Takahachi of STL will help fix the direction of the magnetic fields encountered by referencing the sun for payload location and position.

Combined information from the magnetic field units will constitute a rough survey of earth Venusian and solar magnetic belts.

Radiation experiments in the laboratory planetoid will give a picture of the intensity and extent of the radiation belts first discovered by Explorer satellites. Pioneer V will send back data on radiation more distant than any previously examined.

A unit called a proportional counter "telescope" developed at the University of Chicago's Fermi Institute by Professor John Simpson, will measure cosmic rays. Capable of distinguishing very high energy radiation in the presence of induced secondary particles, the unit will explore the high-energy radiation trapped in the earth's magnetic field, and also will monitor varying-energy solar rays.

An ionization chamber and Geiger-Muller tube developed by Professor John Winckler at the University of Minnesota is a double radiation experiment. With an unprecedented opportunity for direct solar observation, the twin unit will determine the mean specific ionization of radiation from the sun and other sources and the effects of such radiation on the contents of space.

Together, the radiation devices will furnish a mass of data on the location and nature of the radiation that is a basic element of "empty" space.

A unit named a micrometeorite momentum spectrometer will tally the number and nature of tiny space-traveling micrometeorites striking the planetoid. Developed by Maurice Dubin, now of NASA, and Herbert Cohen of the Air Force Cambridge Research Center, the device uses a sensitive diaphragm and microphone in the planetoid's side to sense the impact of the small meteorites.

Voltage measurements will be made to determine the operation of the payload solar cell battery system.

In addition to the instrumented experiments to be carried out a measurement of the astronomical unit will be made. The astronomical unit is the fundamental unit of length for the location of objects in space and defined as the mean distance from the earth to the sun. Results of existing methods for measuring the AU are inconsistent; measurement by a different means will prove quite valuable. The method planned for AU measurement by the Thor-Able IV launch requires that the position and velocity of the space vehicle be accurately determined at two widely separated times in its trajectory. These will be determined by the ground tracking stations. Preliminary information indicates that the accuracy of this method of Astronomical Unit measurement may be sufficient to aid in discriminating between the measurements made by other methods.

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