ROCKETS AND MISSILES

Music From Explorer VII

➤ EXPLORER VII, now past its first year in orbit, sounds on earth like a musical donkey.

The satellite's humming hee-haw tells an important scientific story—one easily understood by scientists working in such specialized fields as cosmic rays, micrometeorites, earth's radiation balance, aurora and ionospheric physics. But its information, when translated, may be most significant to the layman.

Dr. Verner E. Suomi of the University of Wisconsin, who designed the radiation balance experiment, said the information received about the loss of heat from the earth, as well as from the measurements of heat coming from the sun, may give better understanding of weather phenomena.

The data, collected by about 15 stations around the earth, provide for the first time on a global basis information relating to the heat balance between earth and sun that is believed responsible for our weather.

Experiments designed to gauge the effect of solar flares and other cosmic phenomena were reported by Dr. Brian O'Brien working with Dr. James Van Allen at the State University of Iowa. One experiment showed a relationship between auroras and the upper Van Allen radiation belt.

Explorer VII's scientific music may soon end. A timer was built into the satellite and set to stop its transmission approximately one year after launch, in order to release its frequency of 20 megacycles for future use.

Cosmic ray experiments were conducted with Explorer VII by Dr. Philip Schwed of the Research Institute of Advanced Studies, Baltimore, and Dr. Martin Pomerantz of the Bartol Research Foundation, near Philadelphia.

They investigated the heavy nuclei in cosmic rays to try to determine the origins of these high-energy particles.

Although such studies may not appear to have any practical benefit, Dr. Schwed told SCIENCE SERVICE the things that have had the greatest practical significance have resulted from scientific curiosity of what is little known and even less understood.

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Moon Landing in 1962

➤ WHETHER OR NOT the moon is made of green cheese, granite or meteorite-type rock will be known with scientific accuracy in 1962, Dr. A. R. Hibbs, chief, division of space sciences, Jet Propulsion Laboratory of the National Aeronautics and Space Administration, Pasadena, Calif., said. The NASA scientist spoke at the University of Maryland's Space Research and Technology Institute's third symposium.

The moon's composition will be revealed by the successful launch and landing on the moon of an instrumental space vehicle known as Ranger A, advanced model III, IV or V. The Ranger, a four-sided derrick-shaped vehicle, rests on a six-sided base. The satellite, launched by an Atlas Agena, will have been two and a half years in the planning and building when it makes its historic voyage.

It will be taking a gamma ray spectrum of the moon, checking for potassium content. "This will provide a first direct evidence of what material makes up the moon," Dr. Hibbs said. He said that Atomic Energy Commission scientists at Los Alamos, N. M., have drawn up spectra of green cheese, granite and other rocks. Most rocks contain potassium. Green cheese does not.

The Ranger will carry a 12-inch telescope for earth-gazing from the moon. It also will have instruments to measure the temperature of solar gas as it meets earth's upper atmosphere.

The space craft will take television scanning pictures, one every 12 seconds, as it approaches the moon. These will be telemetered immediately to earth, as will the other data recorded.

If the moon has radioactive materials such as have been found in meteorites, instruments in Ranger will reveal this to earth monitors. Upon landing, the most important experiment will be that involving the seismometer carried by Ranger.

"This will tell us much about the moon, if we get any seismic signals," Dr. Hibbs said. The seismometer is built to withstand the estimated landing impact at 300 miles an hour.

After the Ranger is launched in the nose cone of the Atlas Agena rocket, the nose cone separates. The Ranger then unfolds two rectangular tapered solar panels that spread out like wings. These seek the sun and will propel the satellite forward in a revolving motion until the panels are fully exposed to the sun. A four-foot disk-shaped antenna on the Ranger is designed to respond to a 960-megacycle tone signaled from earth.

The highly sophisticated satellite is designed to respond to "requests" from earth as well as to function with mechanical intelligence of its own.

If the monitors on earth do not get a response to the signal, they can request the antenna to try again.

The Rangers will be the forerunner of instrumented satellite exploration of the planets, beginning with Venus and Mars. These may begin in 1962, with a Mariner satellite, launched by an Atlas-Centaur rocket.

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OPERATION GREEN CHEESE—How the Ranger satellite will look.

ROCKETS AND MISSILES

Three-Axis Table Eliminates Missile Risks

➤ A THREE-AXIS flight simulator is enabling engineers to fly a missile without actually launching it, and to find out if the guidance and flight control systems of the missile are working properly before these systems are put to costly, and sometimes risky, flight tests.

Engineers at Lockheed's Missile and Space Division in Sunnyvale, Calif., missile system manager for the Navy's Polaris, have combined a mechanical simulator with an analogue computer. Almost daily they take the Navy's Polaris submarine missile on many flights—without actually launching it into space.

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