GEOPHYSICS

Detect Infrasonic Waves

➤ A NEW WAY of detecting and recording tornadoes and earthquakes by their sound waves has been developed at the National Bureau of Standards.

These sound waves have about the same intensity as speech. However, they are too low in frequency to be heard and are called infrasonic waves, the Acoustical Society of America meeting was told in Washington, D. C.

There are many sources of infrasonic waves, but only a few have been identified so far. To record the waves, four microphones were set up near Washington, producing frequency-modulated voltages from the sound pressures received. These voltages were then transmitted by telephone wires to a central location where they were demodulated, amplified and recorded as ink traces on paper.

CALIBRATION OF INFRASONIC MICROPHONE—by D. M. Caldwell.

When a sound wave of enough magnitude is present, similar traces are produced on each of the four paper records from the four microphones. The direction from which the wave is coming as well as its speed are obtained by comparing the different times it hits the four microphones.

The infrasonic waves from the earthquake in Montana on Aug. 18, 1959, were measured with this microphone system when they hit Washington. Severe tornadoes produce infrasonic waves at Washington even when they are more than 1,000 miles away. Infrasonic waves are also generated during geomagnetic storms caused by disturbances in the earth's magnetic field.

The sound studies at the Bureau of Standards were begun by the late Dr. Peter Chrzanowski and are being continued by the sound section staff. Contributing to this research have been Drs. Richard K. Cook, J. M. Young, H. L. Marrett, Gary Greene and K. T. Lemmon.

The Bureau is planning to install a sound-recording unit similar to that in Washington near Boulder, Colo.

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GEOPHYSICS

Geomagnetic Field Hazard

➤ THE DIRECT INFLUENCE of the earth's magnetic field on space travel is negligible, but indirectly the geomagnetic field is responsible for the greatest hazard of manned space flight, the dangerous Van Allen belts of radiation, Dr. Walter Dieminger, professor of astronomy at the University of Goettingen, Hanover, Germany, told SCIENCE SERVICE.

The visiting German scientist reported on magnetic fields at the symposium on Medical and Biological Aspects of the Energies of Space arranged by the Southwest Research Institute at the School of Aviation Medicine, Brooks Air Force Base, San Antonio, Tex.

The trapping of the high energy particles by the geomagnetic field in the Van Allen belts causes a danger area to man in space because of radiation.

"The screening effect of the magnetic field affords a natural protection from this radiation," Dr. Dieminger said.

Weight considerations would make it impossible to effectively screen a space ship and its human occupant from prolonged exposure to the Van Allen belts. The high energy radiation there far exceeds any that can be duplicated on earth.

The 12-foot concrete walls used to screen the radiation produced by some nuclear reactors could hardly be used in a space vehicle, Dr. Dieminger said.

He suggested that one solution lies in swift transit through these danger areas so that man would be exposed to the radiation for a minimum of time. However, he would receive some exposure even if the transit time was a matter of hours.

Theoretically, if man could make his leap into space from the polar areas of the earth, he could avoid the dangerous Van Allen belt exposures.

This is because above these regions "nature has provided a way of escape by 'funnels' of low radiation intensity above the geomagnetic poles," Dr. Dieminger said. However, physical problems of launchings in these remote areas are at present too great to overcome.

If man can be protected while he goes through the relatively shallow but dangerous Van Allen regions of outer space, he probably can safely navigate in the depth of the cosmic ocean of outer space. There is, however, the possibility, pointed out by Dr. Dieminger, that even these relatively safe areas may contain waves or clouds of magnetically trapped solar gas. If a space ship should plunge through these, the effect on the occupant would be lethal.

So far, however, there is no direct knowledge that such danger spots exist. Space vehicles, as probes, are an excellent means of investigating directly the magnetic fields in space and provide an estimate of the more harmful indirect effects, insofar as man in space is concerned, Dr. Dieminger said.

"The magnetic field of the earth has been used for navigation for more than 4,000 years, and up to now nobody knows its origin. Carefully designed experiments not too far in the future will provide this important scientific information," he predicted. This in turn could bring knowledge that would enable better planning for long-range space flights.

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