ASTRONOMY

# Propose Trapping Meteors

**A meteor trap designed for use in a man-made satellite could provide scientists with important information on the structural damage meteors might cause vehicles in space.**

➤ A SATELLITE with a built-in meteor trap to detect the tiny particles of meteoric matter in space has been designed.

Dr. Gerald S. Hawkins of Boston University said a satellite meteor-catching system would help in assessing the structural damage that might be caused to man-made vehicles in space. In a special report to the Smithsonian Institution Astrophysical Observatory, Cambridge, Mass., where he is a consultant, Dr. Hawkins said the information gathered by a meteor-trapping satellite would also extend the frontiers of meteor astronomy.

The tiny meteor particles cannot now be detected from the earth's surface. Dr. Hawkins estimates his rotating trap would detect about one meteor per day if the collecting area of the microphone were about one and a half square inches. Microphones in satellites have already proved successful for measuring the impact of small meteoric bodies in space.

Dr. Hawkins' method consists of using two rotating cylinders, the outer one with one slit, the inner with two slits. The combination spins about its axis so that only meteors with the correct speed can pass through the system and hit the microphone, which is on the inside edge of the outer cylinder.

To measure speeds of the order of 30,000 feet per second, the cylinder should have a diameter of about three feet and spin at the rate of 5,000 revolutions per minute. The detection rate could be increased by lengthening the slits or by placing two or more slit systems and microphones in one satellite, Dr. Hawkins has calculated.

If the satellite were given an initial spin, then slowed down during a period of several months, the velocity distribution of the meteors could be obtained from the rate of microphone impacts if the spin rate is measured. Distribution of directions could be measured by a microphone set at the base of a tube that is directed along the axis of spin.

Knowing the velocity, Dr. Hawkins reported, the mass of individual meteors would be estimated from the size of the impulse transmitted to the microphone and telemetered to the ground.

One successful meteor trap satellite would thus give a good knowledge of the distribution of mass, velocity and the orbits of meteoric bodies that are at present below the limits of detection from the earth's surface.

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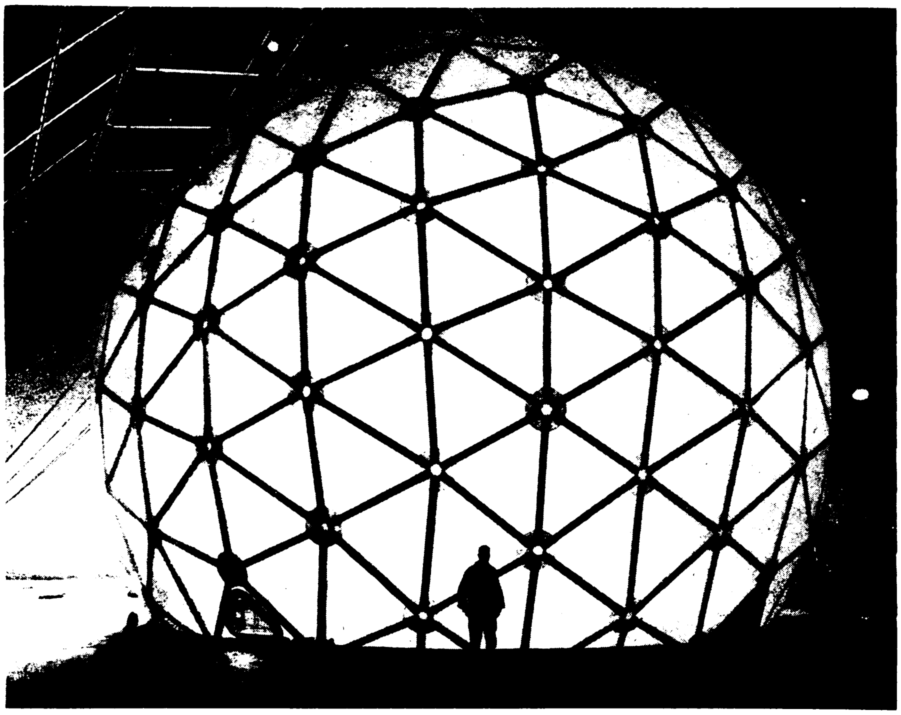

*SEVEN-STORY RADOME—A glass fiber radome seven stories high, believed to be the world's largest, has been produced at Goodyear Aircraft Corporation, Akron, Ohio. The huge laminated plastic structure is made up of hundreds of panels bolted together in a few basic panel groups. It can be erected or disassembled by six men in approximately 80 hours. Made of resin reinforced with glass cloth, the plastic panel is fire retardant and weather resistant; it will withstand 150-mile-an-hour winds.*

ASTROPHYSICS

## Satellites Show Earth's Atmospheric Changes

➤ OBSERVATIONS OF earth satellites have shown the sun's radiation bombarding the earth's outer atmosphere changes the density of the very rarefied air at altitudes from 120 to 2,500 miles.

Dr. L. G. Jacchia of the Smithsonian Institution Astrophysical Observatory, Cambridge, Mass., said the variations graded from 100% at the highest altitudes to about 20% at the lowest altitudes. The atmospheric fluctuations were found by studying the changes in accelerations of both Russian and U. S. satellites as the artificial moonlets circled the earth month after month.

The relation of these changes to variations in the sun's radiation was found by studying records of solar output at radio wavelengths of 10 to 20 centimeters, or a few inches. (Standard broadcasts use wavelengths of many miles.)

The very short wavelengths, which can be detected at the earth's surface, proved a virtually perfect index of the variations in the sun's "hard" radiation absorbed high in the atmosphere. The solar radiations causing the atmospheric density changes are probably X-ray, ultraviolet and corpuscular in nature, Dr. Jacchia said.

The first suggestion that changes in the orbital acceleration of man-made earth satellites were due to variations of atmospheric structure resulting from solar bombardment were made by Drs. Jacchia and R. E. Briggs, also of the Smithsonian Observatory. Dr. W. Priester of Bonn, Germany, spotted the correlation between the 20 centimeter wavelength records and the satellites' acceleration curves.

Dr. Jacchia said there is a "bare suggestion" of a two-day lag in the changes in the earth's atmospheric density when compared with the solar radiation records. He indicated this lag, if confirmed, could be due to a slow readjustment of the atmosphere after heating by absorbed solar radiation.

Dr. Jacchia found that the accelerations of Satellites 1958 beta 2 and 1958 delta 1 (Vanguard I and Sputnik III) varied in unison. He also found good evidence that 1958 alpha, 1958 gamma and 1958 epsilon (Explorer I, Explorer III and Explorer IV) did likewise.

Dr. Priester's correlation was between Dr. Jacchia's acceleration curve for 1957 beta 1 (Sputnik II) and the 20-centimeter solar radiation curve between Nov. 11, 1957 and Feb. 10, 1958.

The results are reported to astronomers by Harvard College Observatory, Cambridge, Mass., clearing house for astronomical data in the Western Hemisphere.

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