

GEOPHYSICS

Dangers to Man in Space

A SERIOUS threat to manned space flight has been discovered: very intense radiation thrown out by the sun during its active periods.

This new radiation makes the hazards of the Van Allen radiation belts, first found by earth satellite instruments, seem pale by comparison. A high level of 10,000 times normal has been measured on one occasion.

The over-all disturbed period, when the ionizing radiation exceeds normal background, lasts from one to eight days.

When one of these solar radiation events occurs, an individual in space within the solar system might be exposed to radiation totaling as much as 1,000 roentgens an hour. Thirty minutes of such exposure would result in a dosage fatal to about half the persons so exposed, according to currently accepted tolerance rates.

During the past few years, this radiation has been observed using different methods by scientists at the State University of Iowa, the University of Minnesota and the Geophysics Institute of the University of Alaska.

At the time of a giant solar flare last May 12, the Minnesota group launched several simultaneous unmanned balloon flights. These revealed a tremendous burst of protons, or hydrogen nuclei, from the

sun, resulting in unexpectedly high amounts of this radiation at balloon altitudes in the earth's atmosphere.

Drs. E. P. Ney, J. R. Winckler and P. S. Freier of the University of Minnesota have proposed that discovery of this radiation may impose the most serious threat yet to manned space flight.

In *Naval Research Reviews* (Oct.), Malcolm D. Ross of the Office of Naval Research warns that manned space flight is not the next logical step following the recent Russian moon rocket feats.

Although shielding is an obvious solution to the problems presented by the "soft" solar radiation, he points out that the amount of material required for adequate protection will impose a "severe weight penalty and may not be a practical" solution.

"We must face facts regarding manned space flight," he reports. "Technical problems can and will be solved as they occur."

"The major new radiation discovery, however, is a recurring natural solar phenomenon, the result of a mechanism and events on the sun" not completely understood.

Since its occurrence cannot be forecast at this time, predictions of manned space flight in the near future appear "quite unrealistic," Mr. Ross concludes.

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METALLURGY

Yttrium for A-Plane

A BLUE-GRAY member of the rare earth family, yttrium, holds promise as a metal for use in an atomic-powered airplane's reactor.

K. M. Bohlander of General Electric's Aircraft Nuclear Propulsion Department, Cincinnati, Ohio, said that the only problem in machining yttrium has been a tendency of small particles to catch fire when sparking occurs at the working point.

This has been solved by flooding the work and cutting tool with an oil coolant, he said.

Scientists at the symposium, held in Chicago and sponsored by the American Society for Metals and the Atomic Energy Commission, also heard how "pinches" of yttrium when added to other metals help increase resistance to oxidation under high temperatures.

Yttrium's most extraordinary effect has been increasing oxidation resistance in iron-base metals containing chromium. A little yttrium added to stainless steel containing 25% chromium gives the metal the same oxidation resistance at 2,500 degrees Fahrenheit as it had at 2,000 degrees, it was reported. Addition of aluminum or thorium further increases oxidation resistance.

Use of yttrium as an alloying agent also improves the workability and physical properties of the metal. The iron-chromium-

yttrium alloy is "readily cold-rolled, easily welded and represents a significant development in high-temperature metallurgy," it was reported.

Other studies showed yttrium removes oxygen and nitrogen from vanadium to improve ductility. In tests, unalloyed vanadium cracked extensively when cold-pressed and cold-rolled. But after 0.5 to two percent of yttrium was added, the metal could be cold-rolled to a thin strip with only slight edge roughness.

General Electric is one of two companies working under a Federal Government contract on development of an atomic reactor for America's first nuclear-powered airplane. Although other rare-earth metals have been investigated, concentration is on yttrium because of its good structural strength and moderate ability to absorb neutrons.

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MISSILES AND ROCKETS

Suggest "Bumpers" For Space Ships

FUTURE SPACE ships should be equipped with "bumpers" to protect them from meteor collisions.

This would cut down the hazard of

meteors in space by a factor of about 100, Dr. Fred L. Whipple, director of the Smithsonian Institution's Astrophysical Observatory, has calculated.

Collisions with some of the many millions of meteors in space will probably not be a major danger in travel outside the earth's atmosphere, Dr. Whipple reported to the Office of Naval Research. He suggested placing an extra skin on the outside of the vehicle, separated by an inch or two from the inner skin.

The meteor, striking the outer skin, will explode there and only the gas vapor will hit the inner skin. The gas vapor does not have the crater-producing power of the meteor and will not cause punctures. Dr. Whipple estimated the cost of space ship "bumpers" would not be much more than automobile bumpers on a relative basis.

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ROCKETS AND MISSILES

NASA Scientists Puzzled By Balloon's "Sparklers"

MYSTERY surrounds the United States space agency's test of a 100-foot balloon on Wednesday, Oct. 28. No one knows what the little sparkling lights were that twinkled around the sphere.

Seen by hundreds of persons, including scientists of the National Aeronautics and Space Administration, the lights sparkled faintly during the brief time the balloon was illuminated by the sun.

NASA reported "there is tremendous scientific interest" in the lights, and two prominent theories as to what they may have been.

One is that bits of the aluminum coating may have flaked off the huge plastic balloon as it was inflated 250 miles above the earth.

The other theory is that the casing may have broken when the balloon was ejected into space, scattering metal fragments around the balloon.

To solve this puzzler, NASA scientists will study photographs made during the balloon's brief flight. The exact number was unavailable, but NASA reported 15 to 20 tracking stations had been alerted to the balloon shot, and that one station alone took 40 or 50 pictures.

These will be examined to determine the size of the sparklers, the paths they traveled and how long they twinkled. Before this can be done, the scientists will have to determine when each picture was taken and where the balloon was at that moment.

No date was mentioned by which time the answer may be known.

NASA definitely ruled out speculation that the balloon carried a network of flashing lights to warn airplanes as it fell through darkness into the Atlantic Ocean. This was unnecessary, NASA said, because range clearance already had been obtained from the Federal Aviation Agency in Norfolk, Va., and no airplanes would have been in the vicinity.

The balloon was launched from Wallops Island, Va., and was believed to have plunged into the ocean 500 miles due east.

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