

SPACE

Sun-Watchers Keep Alert

Ground observers constantly keep a close watch on the sun in the eventuality that a solar flare which could be dangerous to space travelers should occur.

► WHILE ASTRONAUTS orbit the earth aboard Gemini spacecraft, a group of sun-watchers look out for them and if necessary warn them of dangers.

The sun-watchers are not part of some religious cult, but are "space weathermen" who monitor the sun's activity before and during the flights in order to keep the Gemini control center at Houston informed of any potentially dangerous flares or solar bursts.

The watchers' observation post is at the National Bureau of Standards' Central Radio Propagation Laboratory (CRPL) in Boulder, Colo.

This is where flares, solar particle streams and solar-caused magnetic storms in earth's atmosphere are constantly recorded and analyzed.

When a solar flare occurs, it is too late to warn unprotected space travelers against its immediate effects, which will be felt by a man in space at about the same time as the flare is seen from earth. However, warnings of the more dangerous delayed effects are still vital, particularly the arrival of energetic solar protons.

A sun-watch was kept during the flight of Gemini 4, beginning at 5:00 p.m. E.S.T., about 12 hours before launch, on June 2. At the time the sun appeared relatively quiet and no major happenings were pre-

dicted over the "hot line" between Boulder and Houston.

By June 3, some small flares had been observed, general solar activity had increased somewhat, and so had the possibility of a major flare.

Friday, June 4, was quiet again, and the CRPL closed its doors at the end of the day with no plans for reports over the weekend.

However, that evening reports of interesting activity on the southwest part of the solar disk began to come in from California. Mt. Wilson Observatory and Lockheed Observatory both noted changes in the sun's magnetic field.

The CRPL forecasters went back to work, confirming the reports and correlating new ones from the Vela satellites, as well as from observing groups in Hawaii and the Philippines. Solar activity was on the upswing, and the CRPL alerted other observatories around the globe to join the watch. A constant stream of information was fed to Houston.

On Saturday, June 5, the laboratory issued a special report predicting greater likelihood of a major flare in the near future. They were right. At six minutes after one p.m. on Saturday, the sun erupted.

Although the flare was relatively small according to optical measurements, "con-

siderable" electromagnetic radiation resulted, along with "significant geophysical effects."

The sun-watchers will continue throughout the Gemini program. If NASA's plans for untethered space-walks beginning with Gemini 9 go as scheduled, then up-to-the-minute information on solar activity will become more and more vital.

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GEODESY

PAGEOS to Help Find Size and Shape of Earth

See Front Cover

► PAGEOS, the Passive Geodetic Earth Orbiting Satellite, scheduled for launch sometime during the first half of 1966, will be a near replica of Echo 1 launched by the United States in 1960. However, no instrumentation will be attached to the surface of the PAGEOS satellite such as the radio tracking beacons on Echo 1.

PAGEOS, seen on this week's front cover, will serve the geodesist simply by acting as a point source of light in the sky as it reflects sunlight. Simultaneous photographs of this light source will be taken against the star background by two or more widely separated ground-based cameras. Use of the satellite will continue for at least five years during which time the necessary photogrammetric observations can be made for a purely geometric determination of the size and shape of the earth.

The PAGEOS sphere will be fabricated of tough plastic film. The outer surface will be coated with a thin film of aluminum, making the sphere highly reflective. Weight of the sphere may not exceed 130 pounds.

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SPACE

Soviet Photographs Show Back Side of Moon

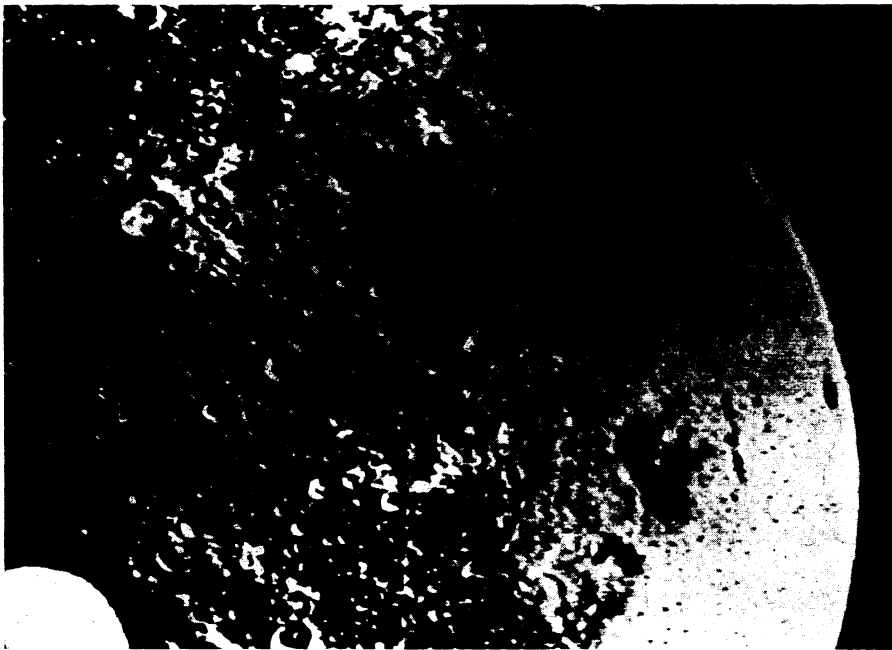
► SOVIET SPACECRAFT Zond 3 took pictures of areas on the back side of the moon not previously photographed, leaving only a small wedge of the moon to the imagination.

The official Soviet news agency Tass said that the new photographs confirm indications of the first pictures of the back side of the moon taken by another Soviet satellite, Luna 3, in 1959. Fewer seas and more mountainous areas are prominent than on the visible lunar surface. Also, the density of craters is higher on the far side than on the near.

The sophisticated equipment used allowed a definition of 1,100 lines per frame and 860 dots along each line, comparable to the U.S. Ranger series. Mariner 4 used 200 lines in photographing Mars.

The pictures were taken from a distance of about 7,192 miles from the moon. Transmission of the photographs from the probe to earth was done at a distance of 1,364,000 miles, when the earth presented a sufficiently small target for precise aiming of the directional antenna installed aboard the space vehicle.

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UPI

IN BACK OF THE MOON—The equatorial and northern parts of the back side of the moon (north to the right) are shown in this picture transmitted to earth by Zond 3, a Soviet lunar probe. The pictures were taken from about 7,200 miles away from the moon.