

## ROCKETS AND MISSILES

# Transit Makes History

► FOR THE FIRST TIME in satellite tracking history, the positions of satellites have been photographically verified.

Extremely accurate tracking has shown scientists where the Transit satellites were located at all times within half a mile, Dr. Richard B. Kershner, supervisor of the space development division of the Johns Hopkins University Applied Physics Laboratory, Silver Spring, Md., told the Philosophical Society of Washington.

He said careful measurements made of photographs taken by the Smithsonian Baker-Nunn satellite tracking cameras have shown the satellites were just where they were expected to be.

Another result of the tracking program of the Transit navigational satellites has been a more complete description of the earth's shape. The slight pear shape of the earth, in addition to its bulging equator, is backed by Transit tracking data. Recent information suggests that the earth is more like a wrinkled pear—its crust having

wrinkled up like the skin of an old pear, Dr. Kershner said.

The Transit satellite system is scheduled to go into operation in 1962 as a world-wide navigational network for ships and planes. Two of the satellites were launched in 1960, Transit I-B in April and Transit II-A in June.

Dr. Kershner said the Transit satellites contain very stable oscillators that transmit on four frequencies. By using the Doppler effect, the shift in frequency due to the motion of the earth and the satellite, anyone who knows where the satellite is located can figure out his own position on earth.

He said it is also possible to figure out the position of the satellite from this shift. The Doppler effect is a common phenomenon. Sound waves coming from a moving object appear to have a higher pitch as the source of the sound approaches and a lower pitch as the source moves away.

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## METEOROLOGY

# World Weather Research

► THE RUSSIANS have once again failed to respond to President John F. Kennedy's invitation to cooperate in science efforts to benefit all mankind.

A Soviet meteorologist, named to an international panel under the United Nations' World Meteorological Organization, did not come to Washington, D. C., for a special meeting to discuss plans for sharing on a world-wide basis weather information from satellites. This is an area in space exploration in which the United States has undisputed leadership.

A message to the panel from the Soviet Meteorological Center expressed regret that they were not able to send a representative. This lack of participation in the panel by the USSR appears to be a consistent policy.

The failure of the Soviets to give this cooperative effort in weather research by satellites will delay the transmission of benefits from such research on a world-wide scale, weather experts said.

They noted that, except for the U. S., the USSR is the only nation with the meteorological satellite capability. They are hopeful that ultimately there will be cooperation in this field between the two countries.

"It seems only logical that sooner or later we will get together in weather research by means of satellites such as Tiros I and II and the Nimbus, polar-orbiting weather satellite now under construction," Dr. Harry Wexler, director of meteorological research for the U. S. Weather Bureau and the U. S. representative to the U.N.'s WMO, said.

"We have the capability, between the two of us, to plan for supplemental orbits that could in a short time yield a full picture of world weather."

To date, Soviet space efforts have been limited to spectacular firsts without any follow-through or back-up programs, except for their lunar shots. Even there, once the pictures were taken of the previously unseen side of the moon, there was no attempt to do it again or better.

U. S. space programs have pioneered in weather research and efforts to expand communications in programs that "demand" follow-through, Dr. Wexler said. But information received from Tiros cannot be made available to every one of the 110 member nations of the WMO.

"We lack the facilities to do this by ourselves," he explained.

The U. S. does, however, announce the frequencies upon which the weather facts are transmitted to its own stations so that these may be picked up by any country or stations with the equipment to receive the data.

U. S. weather researchers are hopeful that recent plans announced by 16 West European nations to explore space will concentrate on satellite weather research.

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## ASTRONOMY

## New Map May Show Man Where to Land on Moon

► A LUNAR MAP showing where high and low areas are located is ready for the first men who land on the moon.

The contour map was prepared by Dr. Ralph B. Baldwin, astrophysicist and vice president of Oliver Machinery Company, Grand Rapids, Mich.

Dr. Baldwin took a series of measures

of 696 points on photographs taken with Lick Observatory's 36-inch refractor.

He then determined the contours of craters as small as one mile in diameter. He estimates the possible error for any single determination of height to be about two-fifths of a mile.

The map shows several features very clearly. All the great maria (so-called by the ancient Romans because they thought the dark areas of the moon were seas) are low areas. The areas believed by some scientists to have been formed by asteroidal impacts were found to be very low.

Earlier contour maps of the moon include one made by the German astronomer J. Franz in 1899 from 55 points. He used photographs of the moon's edge. Librations of the moon cause changes in the apparent direction of lunar features, allowing height determination to be made on the stereoscopic principle.

In 1958 G. Schrutka-Rechtenstamm recalculated the Franz measurements, using 150 lunar features, at Vienna University Observatory and in collaboration with J. Hopmann published an improved chart.

Full details of Dr. Baldwin's moon map will be published in his forthcoming book on the moon issued by the University of Chicago Press, he reports in the current *Sky and Telescope*, 21:84, 1961.

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## ROCKETS AND MISSILES

## Traffic Congestion Seen As Future Space Problem

► TRAFFIC CONGESTION may be one of the most serious problems man may have to face when he starts commuting regularly from earth to outer space.

This new frontier gradually is becoming cluttered with earth-launched orbiting vehicles and other debris. The successful launches of the SAMOS II, the U. S. Air Force's new "watchdog" satellite; the solid-fuel propelled Scout satellite by the National Space Administration; as well as the USSR's 7.1 ton Sputnik and the Venus satellite has increased to 40 the number of objects now orbiting the earth.

These include 17 U. S. satellites, two USSR Sputniks, and the Venus probe plus two parts of the space platform from which it was launched, several "dead" rocket bodies and other space junk.

They will soon be joined by French and English built satellites, probably of the smaller sports-car variety, as well as vehicles to be launched by the joint efforts of 12 Western European nations now meeting in Strasbourg, France.

Made-in-U. S. orbiting astronomical observatories, weather, TV and other communication satellites as well as the larger economy-sized USSR spacecraft to be boosted upward in the future also promise to diminish the wide open look that has up to now characterized outer space.

Control over the amount of traffic plus the travel routes will depend on international agreement. United States space scientists already are worrying about this problem.

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