

METEOROLOGY

Nimbus Views Weather

Pictures of very high quality have been sent by the weather satellite Nimbus I, using automatic picture transmission, to stations around the world—By Ann Ewing

► ALL PHOTOGRAPHS from the world's largest weather satellite, 830-pound Nimbus I, have remarkable clarity and detail.

They are picked up on earth by the system called APT, for automatic picture transmission, a relatively inexpensive method for receiving weather pictures from satellites at stations around the world.

During the first orbit on which the camera was turned on, U.S. Weather Bureau stations in New York, Boston and San Francisco, as well as other places, simultaneously received pictures of very high quality. The television cameras on Nimbus I are similar to those that sent back the highly detailed pictures of the moon's surface from Ranger 7.

Although the polar orbit of Nimbus is far from being circular, as had been planned, this will not interfere with its operations. Instead of a 576-mile circular orbit, Nimbus has a perigee of 262 miles and an apogee of 578 miles. It completes one polar orbit every 98.7 minutes.

The first photograph taken by Nimbus I, from about 500 miles over Baton Rouge, La., at 1:19 p.m. EDT on Aug. 28, showed the east coast of Mexico and Texas, and also the western edge of Hurricane Cleo.

Difficulties with the Thor Agena launch vehicle caused the elliptical orbit, Dr. Morris Tepper, director of meteorological programs division in the National Aeronautics and Space Administration, told a news conference in Washington, D. C.

Nimbus I is oriented so that its cameras always face earthward. Its polar orbit was planned to keep the weather satellite always in the sunlight for one-half of each orbit. This will be accomplished despite the highly elliptical orbit.

This elliptical orbit is resulting in greatly increased resolution in the photographs of earth and its cloud layers. If Nimbus had gone into the circular orbit, its cameras would have been able to see only objects larger than one-half mile across. At perigee of the ellipse, objects as small as one-fourth of a mile are visible.

There is also valuable information to be found by studying the varying resolution of the cameras as the satellite changes altitude, according to Dr. Harry Press, in charge of Nimbus at NASA's Goddard Space Flight Center, Greenbelt, Md.

Completion of one elliptical orbit takes less time than a circular one would have—98.7 minutes versus 103.5 minutes—so more orbits and, therefore, more pictures can be made in a day.

Nimbus was supposed to go into a circular orbit 576 miles above the earth. When the second stage of the Thor Agena B rocket carrying the satellite burned out after only 0.84 of a second,

instead of firing for almost four seconds, Nimbus entered its elliptical orbit.

When the Nimbus is on the earth's dark side, it takes pictures of the earth's heat radiation using the High Resolution Infrared Radiometer, or HRIR, built by Radio Corporation of America, which also built the advanced television cameras aboard and the APT system, as well as the solar cell paddles.

The pictures taken at night using HRIR are also remarkably clear. The infrared system aboard Nimbus takes a strip of pictures about 1,500 miles wide covering half of the earth north to south at a time.

The infrared photographs, as well as the sunlit ones, are expected to be of great help to weather forecasters all over the world.

Primary ground station for Nimbus is at Fairbanks, Alaska.

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ASTRONOMY

A Day on Venus Lasts 248 to 258 Earth Days

► VENUS ROTATES on its axis once every 248 to 258 earth days, astronomers have measured.

This accuracy, five times greater than ever before, was achieved using the world's largest radio-radar telescope, at Arecibo, Puerto Rico. Cornell University, Ithaca, N. Y. astronomers also confirmed the previously reported observation that Venus rotates in the opposite direction from that of the earth and most other planets in the solar system.

Announcements of the latest determinations were made simultaneously by the Air Force Office of Scientific Research and by Dr. Gordon H. Pettengill, associate director of the Arecibo Ionospheric Observatory, at the International Astronomical Union meeting in Hamburg, West Germany.

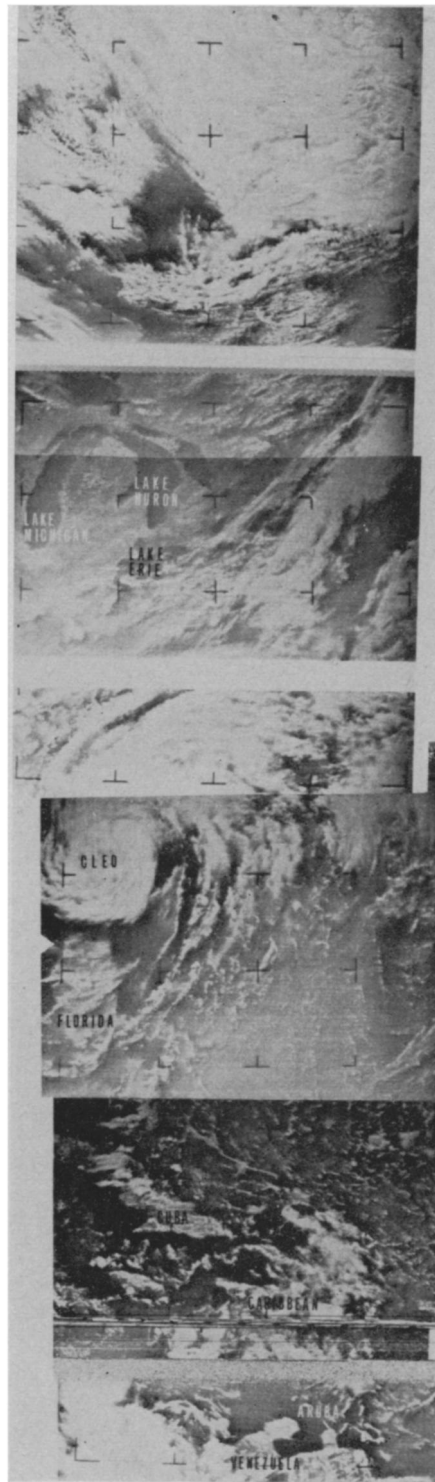
Previously, the most accurate measure of Venus' rotation was made by scientists at the Jet Propulsion Laboratory, California Institute of Technology, Pasadena. They had determined that the rotation period was between 239 and 293 earth days.

Both the Arecibo and the JPL findings were made using radar astronomy, which involves bouncing a radar pulse beam off the surface of a planet and studying its return reflection.

The frequency with which a planet turns each "side" to the sun has a great effect on the temperatures and winds in its various regions.

The Arecibo study also showed that Venus' axis has a celestial (ecliptic) latitude of minus 86 degrees, give or take two degrees, and a celestial longitude of 250 degrees, give or take 30 degrees.

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WEATHER-EYE—Four photographs taken by Nimbus I, the National Aeronautics and Space Administration's weather satellite, are shown in this composite picture. The area covered includes, from top to bottom, Northern Canada, Great Lakes, Atlantic coastline, Hurricane Cleo and Florida, Bahama Islands, Cuba, Aruba and the northern coast of Venezuela. Distance between the cross marks is approximately 220 miles.