to map the temperatures of the earth's surface were not ready in time to be placed aboard. These sensors are expected to be ready when Tiros II is launched during the latter half of 1960.

Mosaic to Emerge

When the pictures taken by Tiros I during several of its 99.2-minute trips around the earth are pieced together, they will produce the largest picture of the earth's cloud cover ever obtained. These mosaics will show the clouds over the entire sunlit side of the earth from 50 degrees N. latitude (the Canadian border) to 50 degrees S. latitude (the southern tip of South America).

Weather Bureau and NASA scientists were jubilant yesterday and predicted such pictures would lead to a much better understanding of the weather-making process and this, in turn, would lead to better and longer-range weather forecasts.

The orbit of Tiros I will take it over all of Communist China and a large portion of the Soviet Union. NASA officials said they foresaw no international complications because the TV cameras cannot see enough detail to make them useful for reconnaissance.

One of the cameras is capable of seeing objects somewhat less than one-tenth of a mile in size, however, and this could conceivably detect objects as large as naval vessels and military installations. This camera will cover a square area 100 miles across with each shot.

The second camera will photograph an 800-mile square with less detail. Each of the TV units can produce and store 32 "still" shots at 30-second intervals. After each takes its limits of pictures, it stops and waits until the satellite passes over a ground station. At this point, the ground station sends up a radio command that triggers the radio transmitters. The pictures are "read out" of the magnetic tapes and the tapes are wiped clean. The ground station then radios a signal back that sets the electronic clock in the unit for the next series of pictures. By modifying this signal, the project officers can get the satellite to take pictures during the particular part of the orbit they are interested in.

With proper timing, it will be possible to build up the entire cloud cover picture on the sunlit side of the earth in several hours. The process will then be started over again in order to keep up with the changes in cloud formations.

The scientists connected with the program expect to get detailed pictures of hurricanes and cyclonic patterns and hope enough detail will show up to reveal individual cloud types, tornado breeders and thunderstorms.

"Only one-fifth of the earth's surface is being covered by weather stations today," said Harry Wexler, meteorological director at the U. S. Weather Bureau. "We are getting very little data over the oceans, over deserts, and over polar regions."

"By launching several satellites in polar orbits, we will be able to keep track on weather developments all over the world," He added.

Tiros I is believed to be the first successful weather observation satellite ever launched. The Soviet Union has done nothing comparable, so far as is known. The United States attempted to get a rough picture of the cloud cover with Vanguard II (launched Feb. 17, 1959) but the unit wobbled so much it has not been possible to build up a picture with the data radioed from its single phototube detector, although NASA hasn't given up yet.

The Federal space agency pointed out yesterday that its Tiros I was an experiment, not an operational weather system, although it may be the forerunner of one. The unit is about the size of a bass drum—42 inches in diameter and 19 inches high—and is covered with 9000 tiny solar cells that are converting sunlight into electricity to charge the batteries that power its electronic equipment.

The useful lifetime of the satelite is expected to be about 3 months, although it may stay in orbit for a number of years. The useful lifetime is limited because the unit will some day begin to wobble. If one of the more critical electronic components burns out first, its life may be even shorter.

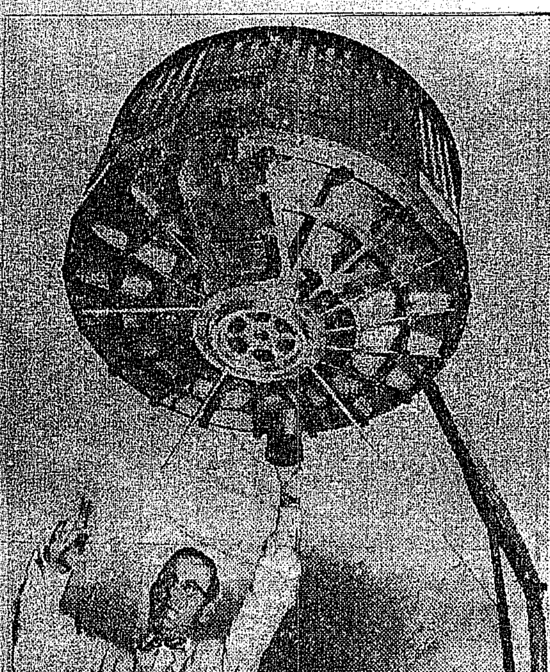
The unit is not wobbling now because it is spinning at 12 revolutions per minute, and damping devices mounted along its rim have removed the initial wobbling, if there was any.

Spin gives the satellite stability the same way that a spinning wheel gives a bicycle stability. This is why it is easy to balance on a bicycle that is moving but difficult to stay up on one that is stationary.

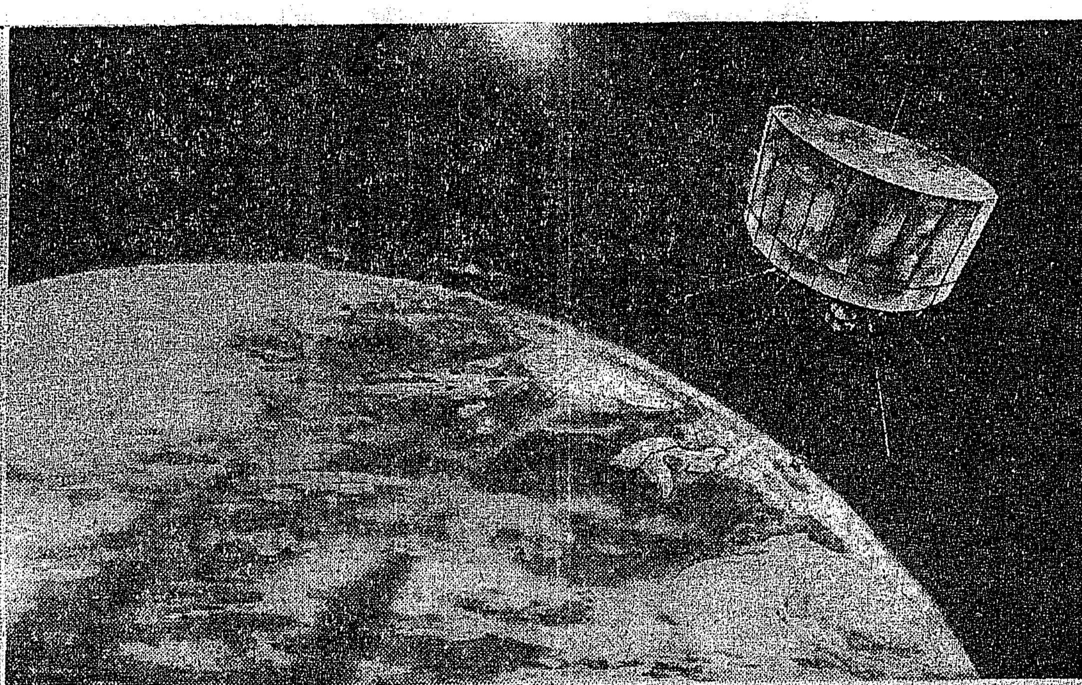
Tiros I will gradually spin slower and slower, however, because of the drag of the earth's magnetic field. It is expected to slow down to 9 rpm in about 20 days. At that point, one of the ground stations will trigger a pair of tiny rockets the size of the carbon dioxide pellets that are used to charge water. These rockets, mounted along the rim, will spin the satellite back up to 12 rmp. This will be done three times. When the spin finally drops below 9 rpm, however, wobbling is expected to set in and begin to blur the picture.

The satellite and the special ground station equipment was designed and constructed for the space agency by RCA under the technical supervision of the Army Signal Research and Development Laboratory. The Air Force Ballistic Missile Division was responsible for the three-stage Thor-Able launching rocket.

The guidance system used was the one developed for the Titan intercontinental missile.



Abraham Schnapf, assistant project manager for the Tiros satellite, moves the vehicle for a pre-flight test at Princeton, N. J. His left hand holds the lens of a television camera.



This artist's drawing for the National Aeronautics and Space Administration purports to show Tiros far above the Pacific. The symbols on earth indicate the principal ground installations of the system at Kaena Point, Hawaii, lower left, and Ft. Monmouth, N. J., on the horizon. The weather satellite is one of the most complex electronic systems yet sent into space.