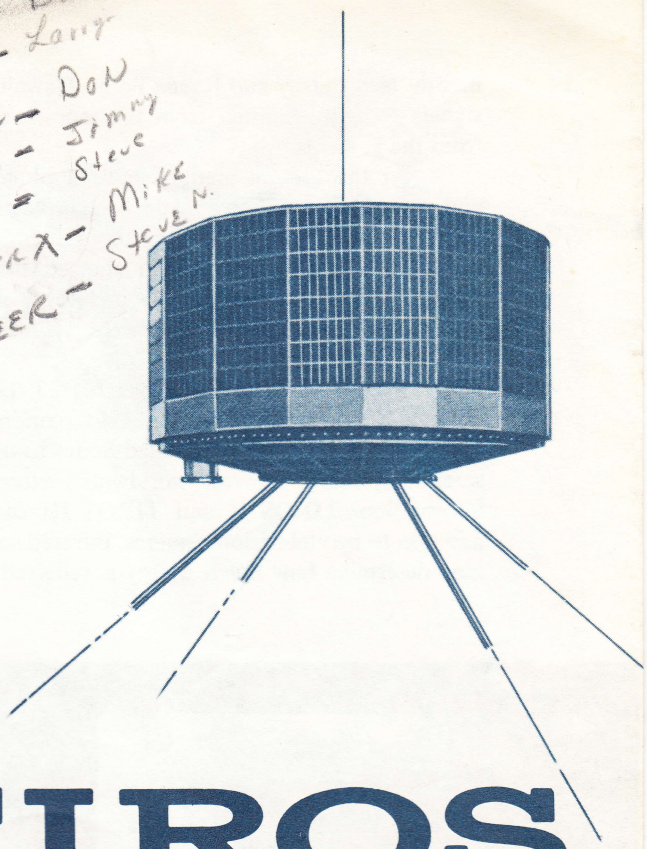


TIROS

TELEVISION INFRA-RED OBSERVATION SATELLITE

THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

NASA

TIROS

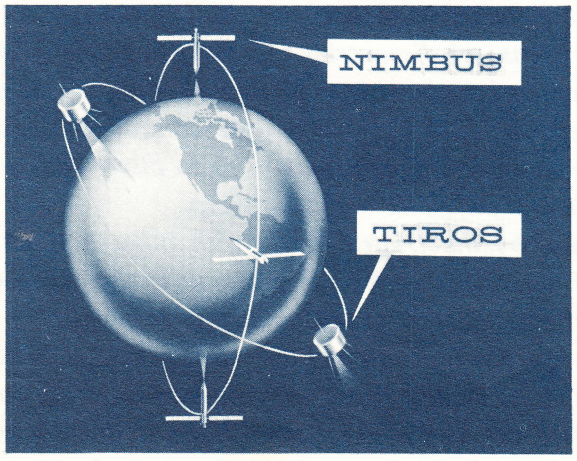
WEATHER SATELLITE

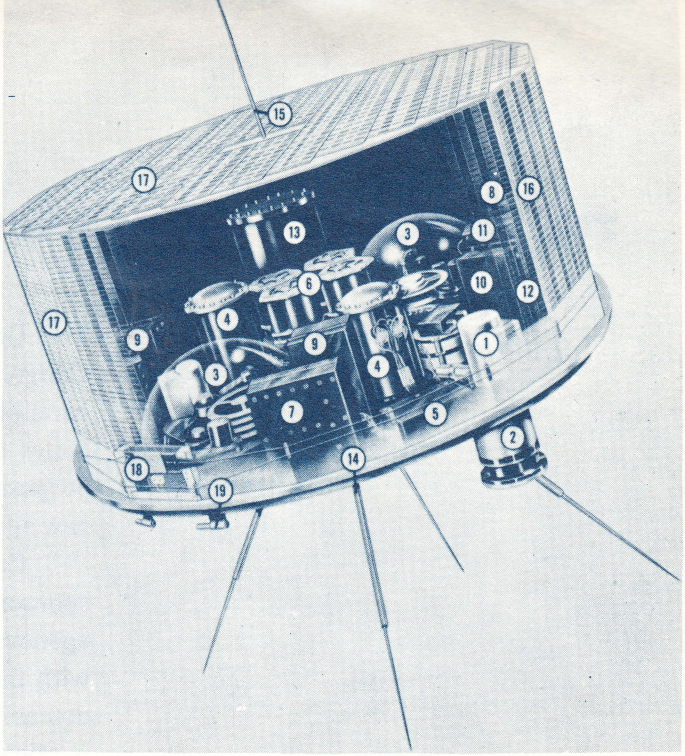
Mark Twain, America's beloved humorist, once observed wryly that "Everybody talks about the weather, but nobody does anything about it." Contrary to this observation, however, meteorologists, or "weather men" as they are commonly called, have worked for many years to improve the accuracy of weather forecasting. They were buoyed to great new hopes with the launching on April 1, 1960 of TIROS I, the world's first meteorological satellite, to provide cloud pictures. TIROS I, a camera-carrying, picture-taking satellite, was the forerunner of a weather observing system in space which will some day help us to protect ourselves against the ravaging effects of weather. It may also be one source of the data which can be used to study the ultimate feasibility of weather control.

For the first time, in TIROS I, man was provided with a satellite's-eye view of cloud formations over much of the world. From the satellite's orbit, 450 miles high, two television cameras relayed over 22,000 pictures to weather scientists on earth. Study of these pictures confirmed that they enabled man to identify and locate storms and details of their structure that might otherwise be missing using conventional observational networks.

Shaped like a giant pill-box, 42 inches in diameter, TIROS I weighed 270 pounds and stood 19 inches high. Its top and sides were covered with 9,200 solar cells which transformed the sun's light into electricity for recharging the satellite's nickel-cadmium batteries.

Computers predicted the path of TIROS I. Using this information, the cameras were programmed to turn on only when the satellite was facing the earth and only when the area over which TIROS I was passing in sunlight.





1. TV cameras
2. Wide-angle camera lens
3. Tape recorders
4. Electronic timer
5. TV transmitter
6. Chemical batteries
7. Camera electronics
8. Tape recorder electronics
9. Control circuits
10. Auxiliary controls
11. Power converter
12. Voltage regulator
13. Battery charging regulator
14. Transmitting antennas
15. Receiving antenna
16. Aspect indicator
17. Solar cells
18. De-spin mechanism
19. Spin-up rockets

To remain stable in orbit, TIROS I maintained a spin rate of about nine revolutions per minute. When the spin rate dropped too much, a pair of tiny rockets located on opposite sides of the rim of the satellite's base plate were fired through radio command by ground stations to increase the spin rate.

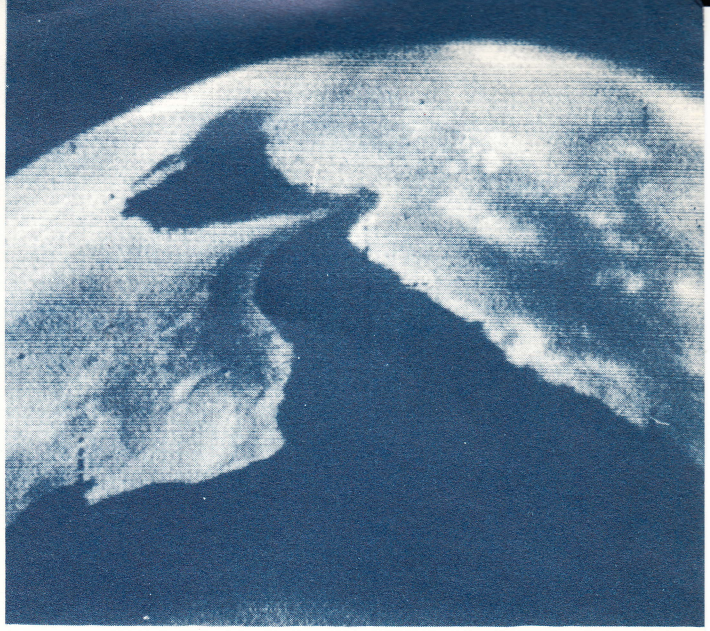
The two cameras in TIROS I were designed to supplement each other. One, a wide-angle camera, took a strip of overlapping pictures, each covering an area about 800 miles square. The smaller camera covered about 70 miles square showing more detail, usually within the wide-angle camera's scope.

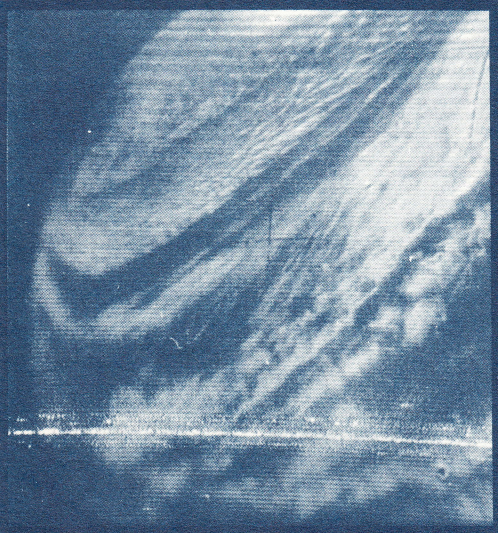
Connected to each camera was a magnetic tape recorder which could store signals representing up to 32 photographs. When TIROS I came within range of the two ground stations, located at Ft. Mon-

mouth, New Jersey and Kaena Point, Hawaii, picture signals were transmitted from the tapes, or directly from the cameras.

At the ground stations both a photographic and a magnetic tape were made. Meteorologists identified the photograph locations through a combination of tracking reports which showed the course TIROS I was taking when the pictures were taken and major landmarks which were visible on the photographs.

TIROS II, launched November 23, 1960, and TIROS III, launched July 12, 1961, continued the long-range program of the United States to develop a satellite system to provide worldwide meteorological information. TIROS II and TIROS III carried, in addition to two television cameras, infrared sensors to help determine how much energy is reflected and re-

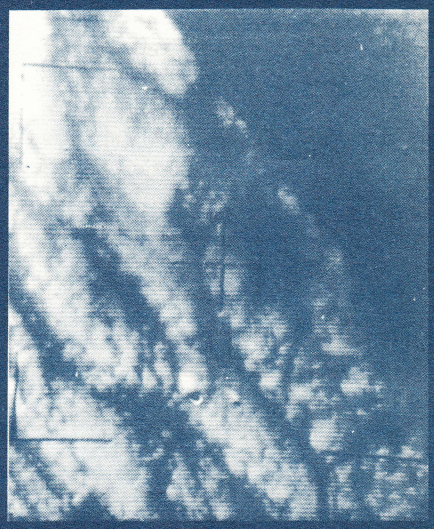




▲ Persian Gulf and Gulf of Oman

◄ cloud system over central Pacific

close-up of same cloud system using narrow angle camera ►



radiated by the earth and its atmosphere. Data reduction and evaluation teams of weathermen worked on an experimental basis with the information received from TIROS II. TIROS III was used for a special 9-week international weather observation study.

Pictures from TIROS I, II, and III will be available to weather experts all over the world for analysis and study.

By comparing these pictures of cloud formations with weather reports from ground stations and aircraft for the same areas and periods and by using TIROS data from areas where ground stations cannot be economically maintained, meteorologists are building a storehouse of information on the earth's weather systems and how they act.

TIROS I, II, and III were all very successful experiments, but are not in themselves operational weather systems. Future satellites now being developed will carry improved instruments which will take more detailed pictures of clouds over larger area, estimate the height of their tops, and possibly identify area of rain or snow. One of these advanced, more sophisticated satellites will be called NIMBUS. Eventually a system of several of such satellites will provide data on weather conditions over the entire globe several times a day.

THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

On July 29, 1958 President Eisenhower signed an act of Congress creating the National Aeronautics and Space Administration. The act declared "that it is the policy of the United States that activities in space should be devoted to peaceful purposes for the benefit of mankind." On October 1, 1958 this new agency was established.

Congress provided that aeronautical and space activities sponsored by the United States shall be directed by this civilian agency, "except for activities peculiar to or primarily associated with the development of weapons, military operations, or the defense of the United States." The act further states: The aeronautical and space activities shall be conducted so as to contribute materially to one or more of the following objectives:

- *The expansion of human knowledge of phenomena in the atmosphere and space;*
- *The improvement of the usefulness, performance, speed, safety, and efficiency of aeronautical and space vehicles;*
- *The development and operation of vehicles capable of carrying instruments, equipment, supplies, and living organisms through space;*
- *The establishment of long-range studies of the potential benefits to be gained from, the opportunities for, and the problems involved in the utilization of aeronautical and space activities for peaceful and scientific purposes;*
- *The preservation of the role of the United States as a leader in aeronautical and space science and technology and in the application thereof to the conduct of peaceful activities within and outside the atmosphere;*
- *The making available to agencies directly concerned with national defense of discoveries that have military value or significance, and the furnishing by such agencies, to the civilian agency established to direct and control non-military and space activities, of information as to discoveries which have value or significance to that agency;*
- *Cooperation by the United States with other nations and groups of nations in work done pursuant to this Act and in the peaceful application of the results thereof; and*
- *The most effective utilization of the scientific and engineering resources of the United States, with close cooperation among all interested agencies of the United States in order to avoid unnecessary duplication of effort, facilities, and equipment.*

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