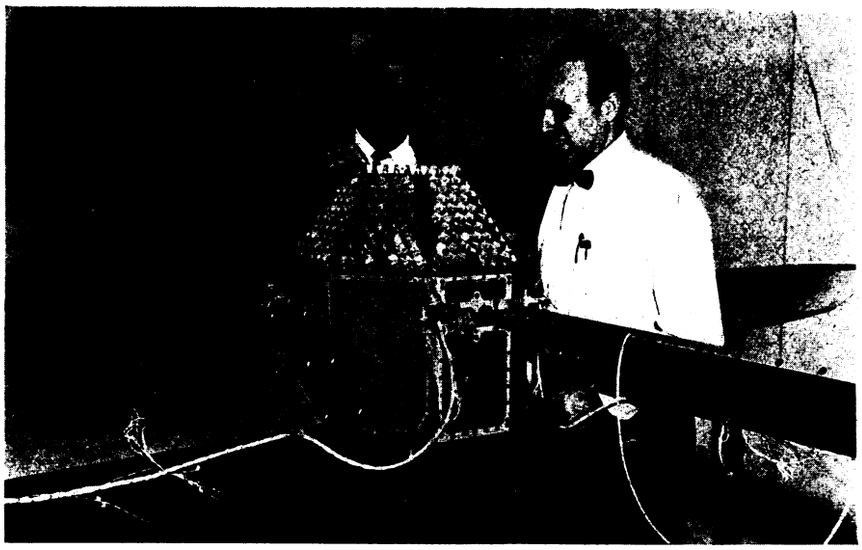

NASA

IONOSPHERIC MIRROR—Edwin L. Marshall (left), satellite test coordinator, and Dr. Donald R. Bianco, project engineer, Applied Physics Laboratory, Johns Hopkins University, examine the glistening S-66 crown of quartz crystals that will reflect a beam of light to earth from outer space.

SPACE

Satellite to Study Mirror

A close-up inspection of the ionosphere, mysterious mirror surrounding earth, will soon be made with the new four-bladed satellite S-66—By Walter Wingo

➤ MAN'S ENORMOUS, invisible and mysterious mirror in the heavens, the ionosphere, will get a close-up inspection late this month to find out where it is cracked and why sometimes the whole thing shatters, causing great confusion on earth.

The mirror is vital to rapid communication, long-range navigation and the control of missiles.

At its Pacific Missile Range the United States is readying the four-bladed S-66 satellite to do the inspecting. It will go up and down the globe, from pole to pole, at an altitude of 600 miles.

The S-66 path will be inside the mirror, which actually is a blanket of electrified particles beginning about 35 miles up and extending several thousand miles into space.

This blanket is believed to be produced by ultraviolet and X-rays from the sun. The degree of electrification waxes and wanes as the sun rises and falls daily.

In the early days of radio, man discovered that if he beamed a signal into the sky, it would bounce off the mirror and be picked up on receivers in far-off lands.

Later he noted that the higher the concentrations of electrons in the ionosphere, the higher the radio frequencies it could reflect.

But the concentration never got so thick that it could bounce back frequencies as high as those in the television bands. That is why, in order to send television pictures between continents, we must build an artificial mirror of Telstar satellites.

At times, when storms are noted on the sun, the ionosphere goes haywire. Radios pick up static, shortwave reception fades to nothing, radioed news photographs are badly garbled and teletype messages read as if monkeys were at the keys.

On February 10 and 11, 1958, the sun suddenly ejected a vast cloud of electrified gases which enveloped the earth. Radio links with ships and aircraft in the North Atlantic immediately blacked out.

Messages could be relayed only as far as the line of sight went. To avoid disasters, 100 planes were strung out across the ocean, forming a radio bucket brigade.

This peculiar relationship between solar activity and the way we pick up radio signals is the main subject S-66 is designed to study.

The satellite will report its findings on small and large irregularities in the ionosphere to 40 ground stations around the globe.

Such a survey, the National Aeronautics and Space Administration said, will be as important in predicting variations in communications as the Tiros satellite's photographs of cloud covers have been in predicting weather.

Certainly the ionosphere changes as rapidly, and sometimes as dramatically, as the weather.

• Science News Letter, 84:85 Aug. 10, 1963

COMMUNICATIONS

U.S. Fires Satellite For Link With Africa

➤ THE UNITED STATES established the first space communicatiosn link with Africa by firing up Syncom II, a high-altitude satellite designed to orbit the earth conveniently once every 24 hours.

The National Aeronautics and Space Administration reported that the first contact by voice and teletype had excellent quality. The signals were sent from a ship at Lagos Harbor, Nigeria, to ground terminals at Lakehurst and Ft. Dix, N.J.

Syncom I, launched last Feb. 14, nearly reached the altitude of 22,300 miles needed to hang motionless over a point on the spinning earth. However, its radio sending devices failed.

The new Syncom was not slated for a true "stationary orbit," which would require that it be directly above the equator. It is inclined about 30 degrees and appears to trace out a long, narrow figure eight every 24 hours over the Atlantic between Africa and South America.

Unlike the Telstar satellite, Syncom is not equipped to send television images.

Syncom blasted off from Cape Canaveral aboard a nine-story Delta rocket. It went first into an elliptical orbit about 140 miles up.

Later, a timer in the spacecraft fired another motor that took it into another orbit ranging from 21,280 miles to 22,760 miles above earth.

The top of the final figure eight path planned for the satellite is about 30 degrees north of the equator and the bottom about 30 degrees south. Syncom will never stray more than a few degrees east or west of 55 degrees west latitude.

A "stationary" satellite does not require the elaborate and costly ground equipment needed to track lower-altitude satellites.

Since it will be so high and in the sunlight 99% of the time, the Syncom will be able to get full use of its solar power plant. Also, no active temperature control system is needed on Syncom and fewer batteries are required, resulting in weight savings.

At separation from the third stage of the Delta rocket, Syncom weighed 147 pounds. Without fuel, it weighs 86 pounds. It is shaped like a giant tuna fish can, 28 inches in diameter and 15.5 inches high.

• Science News Letter, 84:85 Aug. 10, 1963

METEOROLOGY

Students Design Satellite For Tropical Observation

➤ A PROPOSED weather satellite named MITROS, for MIT Tropical Observation Satellite, has been designed by graduate students at Massachusetts Institute of Technology, Cambridge, Mass. The student project involved 60 graduate students from half a dozen different departments of the school.

If actually built and put into operation, it will circle the equator and will be used for observations of the earth's tropical surface from 30 degrees north latitude to 30 degrees south.

• Science News Letter, 84:85 Aug. 10, 1963