THE FIRST DECADE OF SPACE RESEARCH

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GETTYSBURG
PENNSYLVANIA 17325
Indio, California
January 31, 1968

Dear Dr. DuBridge:

In the ten years since "Explorer" was successfully fired into orbit, American scientists have been responsible for an unbelievable number of brilliant accomplishments in the field of space. Yet, when we recall the many weeks just preceeding that memorable date and feel again the tensions occasioned among our population by the earlier Russian feat in orbiting Sputnik, we cannot fail to look upon the first Explorer flight as a turning point in our space program.

Initiating our own effort some years after the Soviets had obviously begun conducting preliminary experiments, our scientists must be credited with an accomplishment that, in view of this handicap, can be ranked as one of our brightest technical achievements.

With best wishes to all gathered to celebrate this historic event,

Sincerely,

Dwight D. Eisenhower

Dr. Lee A. DuBridge
Pasadena, California

THE FIRST DECADE OF SPACE RESEARCH

IN COMMEMORATION
OF THE
TENTH ANNIVERSARY
OF THE LAUNCH OF
EXPLORER I

FEBRUARY 1, 1968

AT 3:55:05 a.m. Greenwich Mean Time on February 1, 1958, Explorer I was injected into orbit by the Jupiter-C launch vehicle. The information sent back from its Geiger counter resulted in the discovery of the van Allen radiation belts—the first, and still one of the most significant scientific discoveries in space.

The region of space traversed by Explorer I extended from 220 miles above the earth's surface out to a distance of 1563 miles. Its orbit carried it back and forth over an area between 33.3 degrees north and south latitude. Data from the Explorer were transmitted to earth in the first space test of the then-new Microlock system, a technique which has subsequently developed into the primary means of deep space communications.

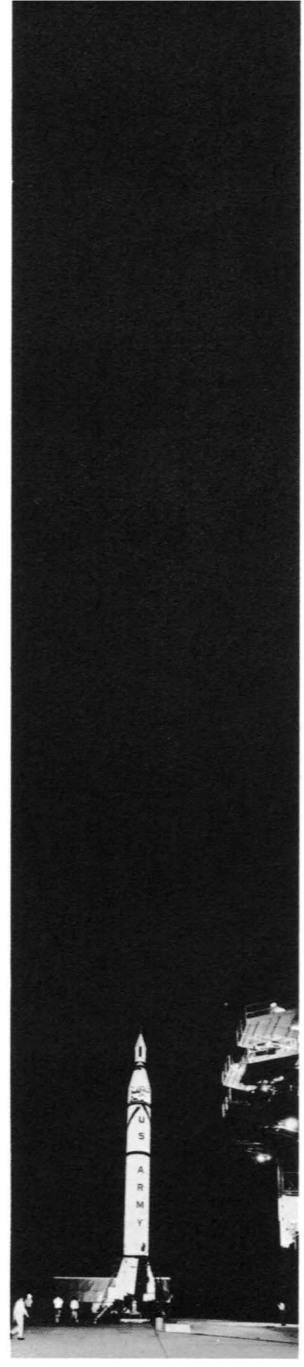
The working payload of Explorer I was slightly more than 18 pounds; Explorer's successors weighed hundreds and even thousands of pounds. Today's powerful launch vehicles are capable of orbiting payloads weighing up to 285,000 pounds.

The Redstone booster of Jupiter C, a giant of its day, is now literally a museum piece. It has been replaced by the Atlas, the Titan, and the mighty Saturn. The 10-foot helical antennas of the original Microlock system have disappeared in favor of radio telescopes with dish antennas up to 210 feet in diameter. The radiation measurements begun by Explorer I have been elaborated by a long series of Explorer and Pioneer spacecraft both in orbit around the earth and, independent of earth, in their own orbits around the sun.

Spacecraft are now used to relay voice and television across the world. Satellites scan the weather patterns of the entire earth. Men have followed Explorer into orbit in a series of launchings which became almost routine, and the vehicle that will carry astronauts to the moon has been flight-tested in space.

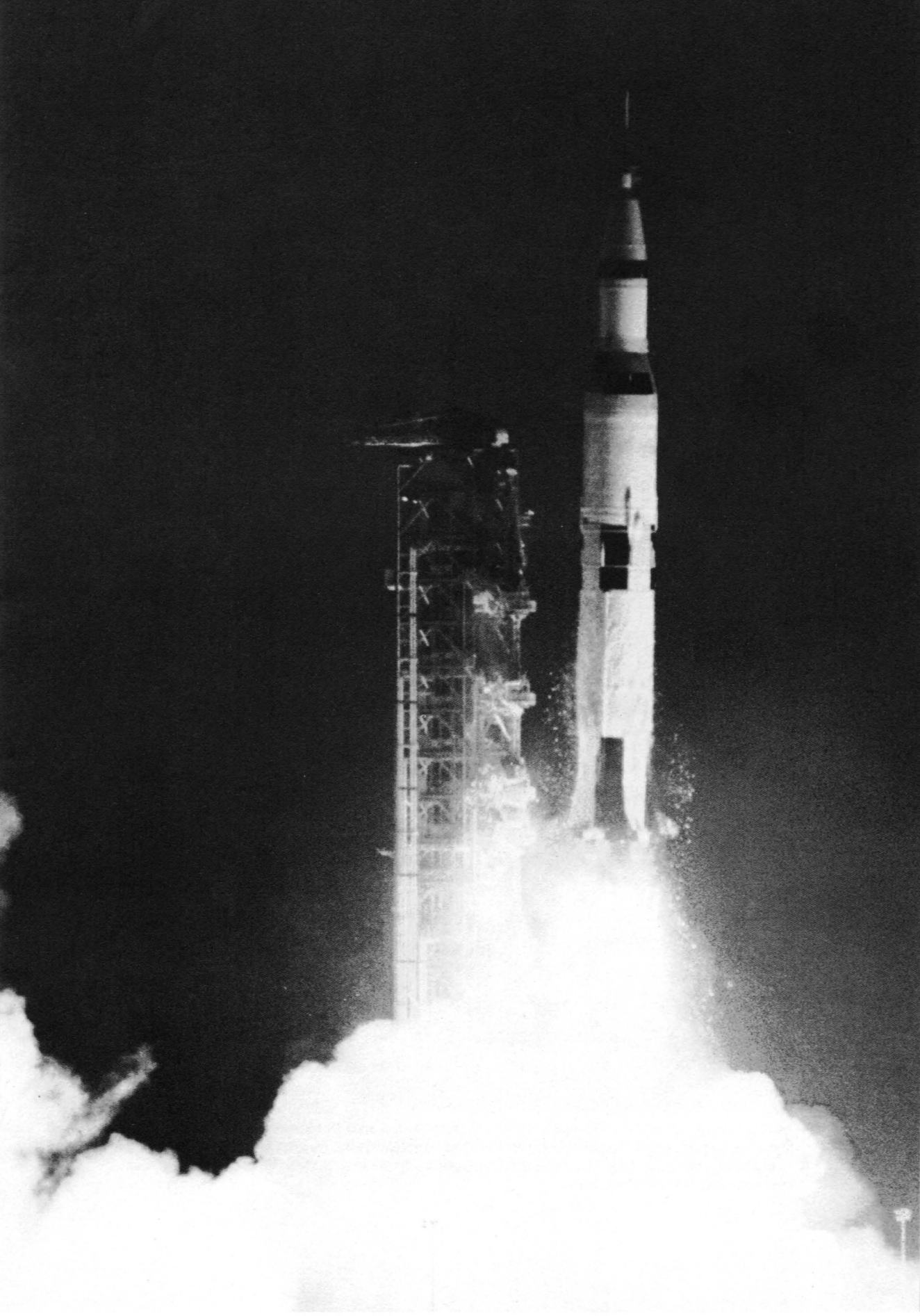
The program which began as an adjunct to the scientific objectives of the International Geophysical Year is now the principal business of one of the largest federal agencies, the National Aeronautics and Space Administration. America has completed its first decade in space research and begins its second with a wealth of knowledge and a supply of tools which 10 years ago seemed beyond imagination.

OPPOSITE: Wernher von Braun of the U.S. Army's Redstone Arsenal, Iowa State University's James A. van Allen, and William H. Pickering of the Jet Propulsion Laboratory triumphantly hold aloft a model of Explorer I as announcement is made of the successful mission of the first U.S. artificial satellite.

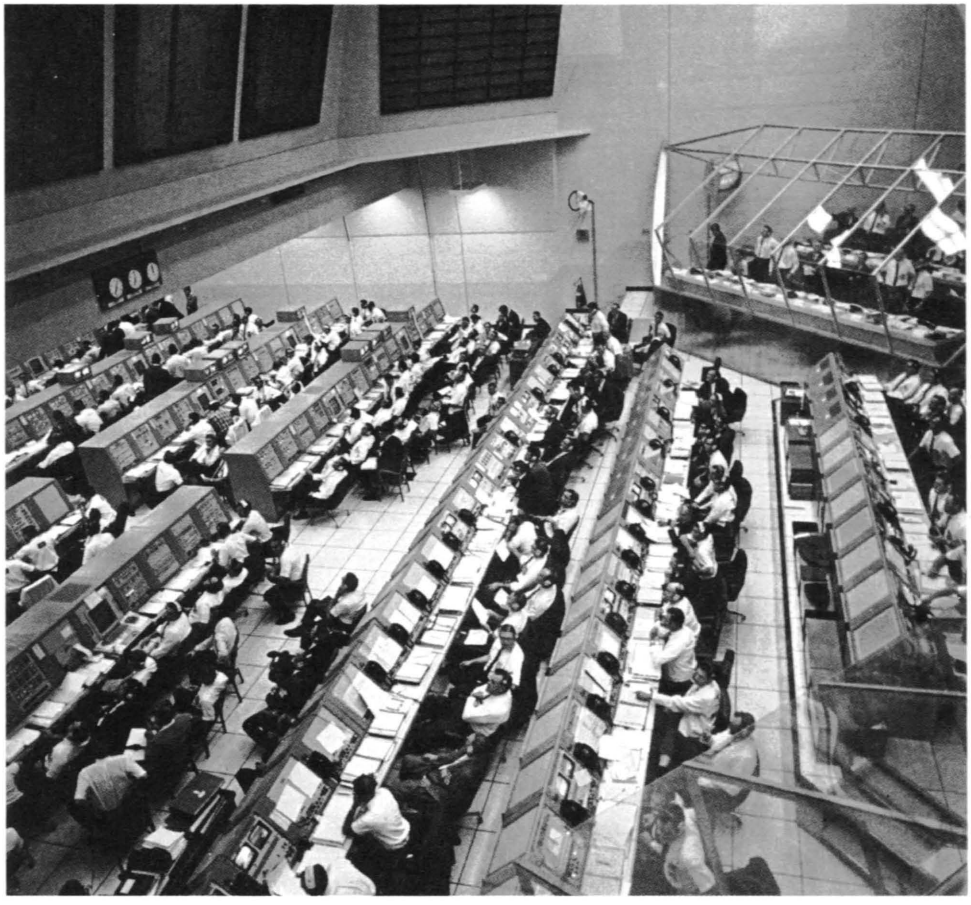


The vehicle that launched Explorer I on its historic mission was the four-stage Jupiter-C. The three upper high-speed stages used JPL-developed solid rockets; the first stage was the U.S. Army's Redstone rocket, which produced 83,000 pounds of thrust. The complete vehicle was about 70 feet long and weighed 64,000 pounds.

OPPOSITE: Saturn V, the vehicle designed to launch the manned Apollo flights, dwarfs the Jupiter-C. Three hundred and sixty three feet tall and weighing 6,225,025 pounds, the Saturn is capable of producing more than 7,500,000 pounds of thrust, burning 15 tons of fuel per second.

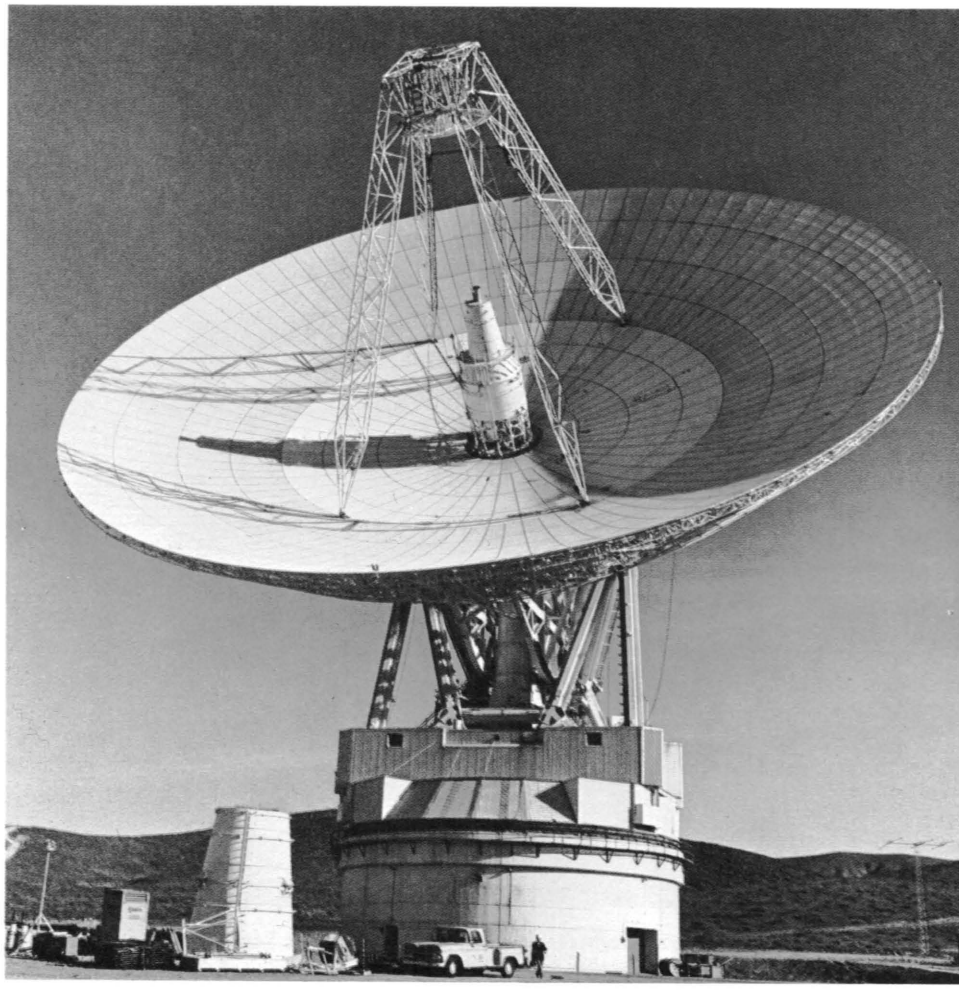


The facility in which flight data from Explorer I were received was little more than a room with tables holding teletypes, clocks, and a few chairs and desks for the engineers in charge of the mission.



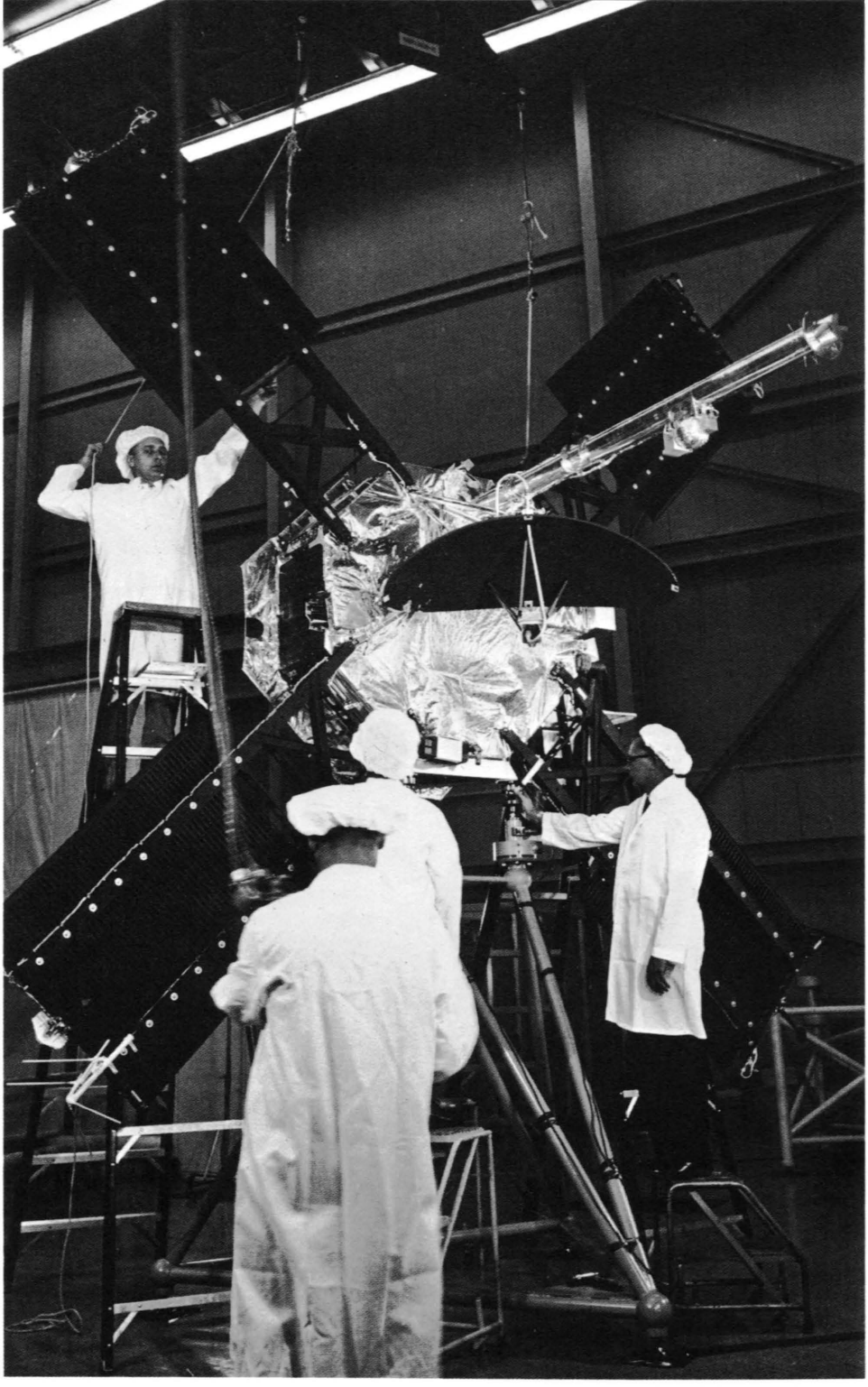
The three fully equipped "firing rooms" at the Kennedy Space Center Launch Control Center, one of which is shown here during the Apollo 4 mission, contain some 450 consoles with the controls and displays required for the spacecraft checkout. In addition, each firing room is equipped with 15 display systems capable of providing digital information instantaneously. Sixty television cameras positioned around the Apollo/Saturn V transmit pictures on 10 modulated channels, and 112 intercommunication channels are used by the crews in the checkout and launch countdown.

Nineteen men and a dog—most of them working part time—comprised the entire crew of the Nigerian tracking station. The helical drum antenna on the left tracked Explorer I as it passed over Africa.

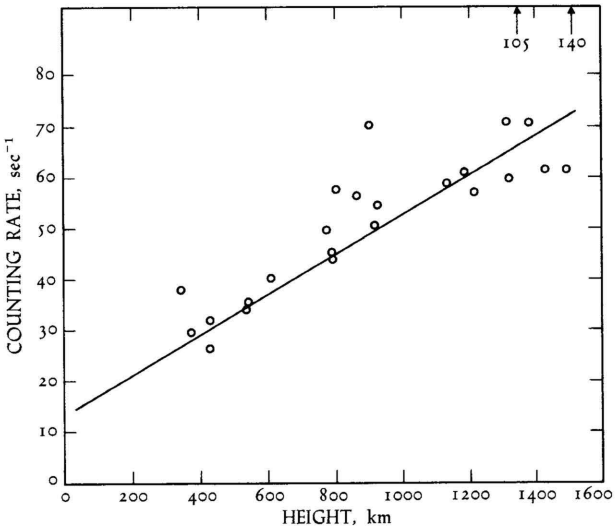


Communications with spacecraft today are maintained by advanced antenna systems such as the 210-foot giant pictured here, which is part of NASA's globe-encircling Deep Space Network of tracking stations that keep uninterrupted watch over probes millions of miles out in space.

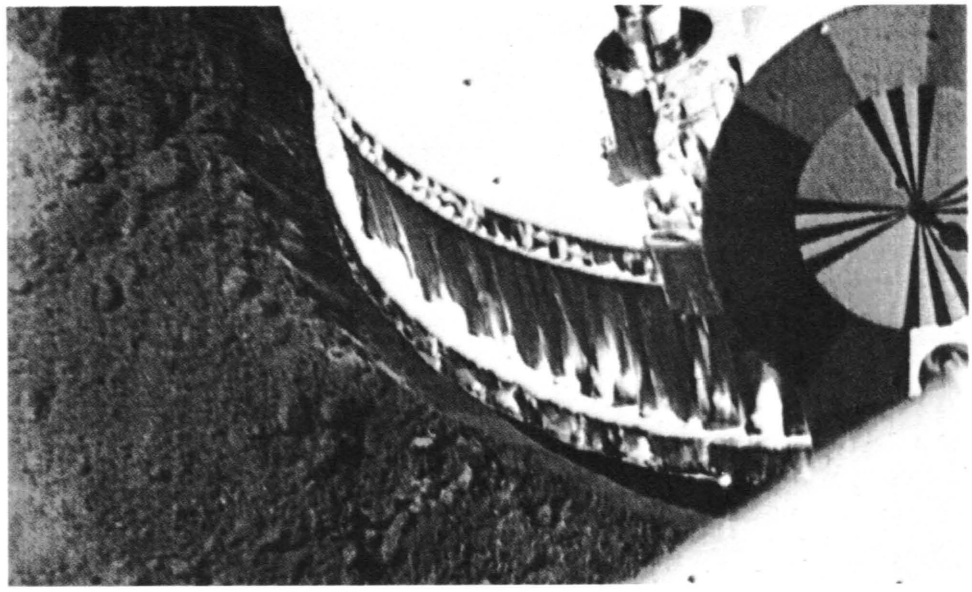
The 18-pound Explorer I payload with its motor (shown here with Explorer Project Manager Jack E. Froehlich) was 80 inches long and 6 inches in diameter. On January 31, 1958, Explorer I was successfully injected into an elliptical orbit ranging from 220 to 1563 miles above the earth. Although no longer transmitting a signal, the spacecraft is still in orbit today.



In the past 10 years, the national space effort has produced communications and weather satellites, manned earth-orbiting flights, and probes to the moon and the planets. The complex planetary spacecraft, Mariner V, is shown here being readied for its flight to Venus. With its solar panels extended, the 540-pound probe measured 18 feet across and over 9 feet from base to top. In the course of its mission, Mariner passed within 2500 miles of Venus and sent back data about the planet, its atmosphere, and the interplanetary environment from distances as great as 50 million miles from the earth.



One of the most significant results of the first Explorer mission was the discovery of the intense upper-altitude radiation belts encircling the earth —the van Allen Belts. The graph at left, based on data collected by the Geiger counter when the satellite was being tracked over Southern California, shows the increase in counting rate with increasing altitude.



The transmission of information from space has undergone considerable evolution since the flight of Explorer. Pictures of Mars have been sent back to earth from a distance of millions of miles, and the reception of photographs from the moon has become almost commonplace. The quality of such photographs has improved steadily as new and ingenious techniques were devised to enhance their quality. Objects as small as 1/2 millimeter across are clearly visible in the Surveyor picture above, which shows one of the spacecraft's footpads, with a photographic target attached to it, resting on the lunar surface.

OPPOSITE: The last decade also saw the beginnings of the nation's manned space activities. Manned vehicles have orbited the earth, providing valuable information about human reactions in a space environment, spectacular photographs of the earth, and the engineering and navigation data needed for future missions deeper into space. The Project Gemini astronaut shown here demonstrated man's ability to withstand the rigors of space without the protection provided by the spacecraft.

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