SPACE

Satellite Laser Test

If a March 1964 test of bouncing a laser beam off a satellite is successful, it would pave the way for future use of laser beams in communications systems—By Ann Ewing

➤ THE FIRST TEST of whether a laser light beam can be bounced off an earth-circling satellite will be made next March, the American Association for the Advancement of Science was told in Cleveland.

If successful, the test will pave the way for the future use of laser light beams reflected from satellites for communications between two points on earth.

The laser experiment is only one of several aimed at improved communications that will be carried aboard the four-bladed S-66, or Polar Ionosphere Beacon satellite now scheduled for launch in March from Cape Kennedy, Florida.

Lasers are electronic devices that generate highly intense beams of only one frequency of light. Laser stands for Light Amplification by Stimulated Emission of Radiation.

One surface of the S-66 holds 360 one-inch diameter reflectors, Dr. Henry H. Plotkin of the National Aeronautics and Space Administration's Goddard Space Flight Center, Greenbelt, Md., said. They are designed so that light from the laser striking the satellite from any angle will be reflected back to its earthly source.

By measuring the time it takes for the light to go to the satellite and back, the satellite's position in space can be determined with higher precision than by conventional radio. Locating a satellite by laser light would be as precise as photographic positioning, Dr. Plotkin said, with the added advantage that its distance can also be told.

Dr. Plotkin said another possible space project being actively investigated is to introduce information, such as telemeter records from the satellite's instruments, into the laser beam before it is reflected back earthward.

Also being checked out is the possibility of putting messages on the laser beam from earth to satellite, then having this information read out by another plain laser beam.

After the S-66 is launched, an 18-inch telescope, near NASA's Wallops Station, Virginia, will optically track the S-66 during periods when the spacecraft will be illuminated by the sun and the tracking station is in darkness. When the satellite is spotted with the telescope, the laser device mounted on the telescope will be flashed and, it is hoped, be reflected to its source.

The laser itself is a six-inch synthetic ruby rod that becomes highly energized as it gathers energy from a gas-filled flash lamp of xenon mounted closely parallel to it. Both ends of the rod are polished to act like mirrors. Green light from the xenon excites chromium atoms within the ruby rod to emit red light.

As the red light is reflected back and forth inside the rod, the bouncing rays hit other excited chromium atoms and stimulate them to give off more red rays, which are all in phase with each other and all parallel as they bounce back and forth.

Within a fraction of a millionth of a second, the chain reaction builds to a powerful beam that bursts out one end of the rod. Because the light is all in phase, or coherent, the laser beam does not spread out as much as ordinary light before reaching its target.

Primary aim of the S-66 satellite is to make measurements of use in plotting the form and structure of the ionosphere, allowing scientists to describe its behavior under varying conditions of solar activity, season and time of day.

The ionosphere is the earth-covering, invisible blanket of electrified particles, or mirror, that reflects radio waves. It is vital to radio communications and missile control. Flight path of the S-66 will be inside the ionosphere in a circular polar orbit.

The ionospheric survey will be as important to predicting frequency changes and blackouts in communications as the Tiros weather satellite photographs are in helping to predict the weather. Ionospheric "weather" changes just as rapidly as does earth's weather.

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GENERAL SCIENCE

Dr. Eyring President Of A.A.A.S. in 1965

➤ DR. HENRY M. EYRING, dean of the graduate school and professor of chemistry and metallurgy at the University of Utah, has been chosen president-elect of the American Association for the Advancement of Science. Dr. Eyring will take office in January 1965. This is the second major scientific post to which Dr. Eyring has been named within the past two years; he is presently serving as president of the American Chemical Society.

Dr. Laurence M. Gould, professor of geology at the University of Arizona, on Jan. 15 becomes president of the American Association for the Advancement of Science. Dr. Gould succeeds Dr. Alan T. Waterman, former director of the National Science Foundation, who is completing his term of office. The association's presidential succession was announced at its annual meeting in Cleveland, Ohio.

An authority on the Antarctic, Dr. Gould joined the University of Arizona faculty early in 1963 after retiring as president of Carleton College, Northfield, Minn., where he had served as the institution's chief executive since 1945. He joined the Carleton faculty in 1932 as professor of geology, and directed the U.S. Antarctic Program during the International Geophysical Year.

Dr. Gould was second in command of the first Byrd Antarctic Expedition and also served as geologist with the Putnam Baffin Island Expedition in 1927 and the first University of Michigan Greenland Expedition in 1926.

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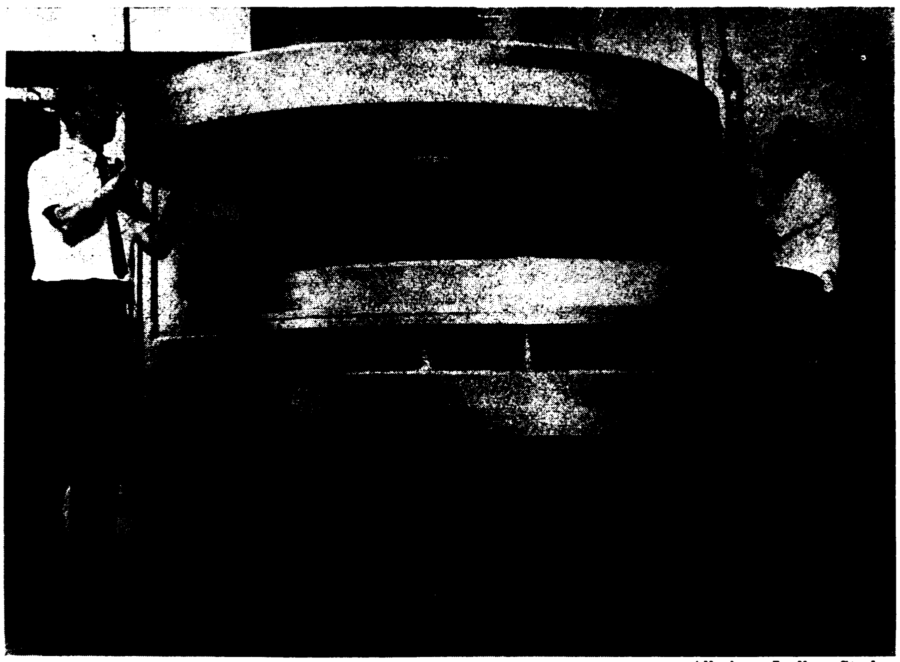

Allegheny Ludlum Steel

HEAVY WEIGHT CHAMPIONS—These stainless steel weights are being built by Allegheny Ludlum Steel Corporation, Pittsburgh, Pa., for a new dead weight tester at the National Bureau of Standards. The tester will be used as a standard to calibrate devices measuring thrust, force and weight of rockets and missiles, and will have a 300,000 pound capacity for both tension and compression.