SPACE

Survey Moon With Laser

Suitable landing sites on the moon may soon be located by means of an optical laser system which would light up areas a mile wide on the lunar surface.

➤ THE BEST LANDING sites on the moon may be found at the lowest cost with an optical laser system, a device that would shine an extremely strong beam of light on areas a mile wide on the lunar surface.

This method seems to be the most advantageous now known, short of sending a soft-landing probe or an orbiting satellite to the moon, Dr. Charles H. Wilcox of Hughes Research Laboratories told SCIENCE SERVICE.

The finest photographic telescope now available can "see" objects only one-quarter of a mile across, but its pictures give no clues to height distribution since the actual depth in dark areas between peaks cannot be determined, and smaller peaks are obscured in the shadow of larger ones. Besides, the atmosphere interferes with moon photography.

The system Dr. Wilcox proposes consists of a short-pulse ruby laser, which stands for light amplification by stimulated emission of radiation, and a radar system.

The laser, operating by using a source of light to energize billions of atoms in the ruby crystal to very high energy levels, emits an extremely narrow and brilliant beam of light. The short-pulse laser Dr. Wilcox proposes to use can measure height to about five feet on the moon peaks, on slopes within a crater or the surrounding moonscape.

This laser has a pulse energy of one billion watts, each lasting for one-hundred-millionths of a second. The laser would be hooked up to an inverted telescope to collimate the beam. For reception of the light reflected back from the moon, Dr. Wilcox suggested that a large reflector dish such as the 100-inch Mt. Wilson telescope would be ideal.

However, since this telescope is already used for many important projects, he would plan to use a solid radar dish, about 90 feet in diameter, covered with silver. He said the National Aeronautics and Space Administration already has such dishes available for tracking purposes. These antennas are now using radio frequencies but could be used to measure reflected light waves with a higher sensitivity than has ever been done before.

Dr. Wilcox, assisted on the project by Alexander D. Jacobson, said that he believes an experiment could be performed within a year, and that the first results from an operational system surveying the moon could be achieved within two years. He said it would probably be possible to survey a crater for moon-landing in about one month, after the system is working. It would also be possible to map cracks if they are more than a mile deep, he said, and to survey flat areas.

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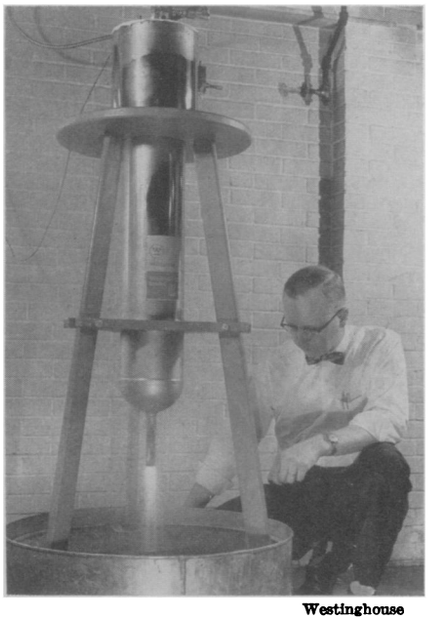

Westinghouse

HEAT INTO ELECTRICITY— ***White hot gases are passed through a superconducting magnet to convert heat into electricity.***

PHYSICS

Superconducting Magnet Teamed With Generator

➤ THE LATEST prospect for power generation uses super cold and electric currents that flow almost forever.

Not yet practical, a new kind of electrical generator is being fashioned.

The most recent step is teaming up a very powerful superconducting magnet operating at temperatures hundreds of degrees below zero with the new kind of electrical generator.

Putting this combination to work is considered by scientists at Westinghouse Research Laboratories a major advance in the direct conversion of heat into electricity. It is another step toward electric power generation by magnetohydrodynamics, or MHD, in future earth and space power plants.

MHD converts heat directly into electricity by passing a stream of white-hot gas through the field of a strong magnet. However, such a strong magnetic field is needed that most of the total output of the MHD generator goes into maintaining the field.

A superconducting magnet, once operating, needs no power to continuously produce a magnetic field far stronger than that of electromagnets usually used. A new magnet developed by Westinghouse scientists makes it possible to produce the magnetic field in air, outside the bath of liquid helium in which superconducting magnets must be immersed.

With development of this magnet, which fits around the MHD generator like a ring on a finger, it became possible to team up the magnet and the generator, representing remarkable extremes in temperature. Liquid helium keeps the magnet at a temperature of 452 degrees below zero Fahrenheit, within seven degrees above absolute zero.

An inch away, hot MHD gases stream through the magnet's field at 4,500 degrees Fahrenheit. A wall of liquid nitrogen that insulates the helium vessel and a stream of running water around the MHD gases effectively isolate these extremes in temperature.

The experimental program was under the direction of Dr. W. S. Emmerich, head of the MHD research section.

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ASTRONOMY

Clues to Mars and Venus Atmospheres on Earth

➤ CLUES to the atmospheres of other planets, such as Mars and Venus, can be found and checked on earth.

Gilbert Yanow of Douglas Aircraft Co. in Santa Monica, Calif., said his studies on the earth's atmosphere may make it possible to determine how atmospheres on other planets were formed and are still being formed and changed. This will be very helpful also to better understand information received from the unmanned probe sent near the planet Venus.

In a preliminary study, Mr. Yanow has already found that Mars probably has a high ionosphere. To reach this conclusion, he assumed a basic chemistry for Mars using the same technique as that which has been very promising in analyzing the earth's atmosphere.

First he studied the available literature on the composition and development of the earth's atmosphere and discussed this with leading scientists in the field. He considered the original chemistry of the atmosphere when it was first formed and then studied the changes that occurred as the sun shone on it.

He then set up equations from this information on an IBM 7090 computer capable of making 27 million calculations in 300 minutes. From this he was able to calculate particle concentrations at different altitudes and what chemical compounds existed and their amounts.

The studies included the investigation of the following: molecular nitrogen and oxygen, atomic nitrogen and oxygen, nitrogen oxide, ions of the above five and electron density. He also tried to calculate temperatures at various altitudes.

Answers ground out on the computer should tell what actually is present in the atmosphere. Mr. Yanow said results were close to data gathered by balloons and rocket experiments.

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