General Telephone and Electronics Corp.

'REDDER' RED PHOSPHOR—The biggest technical problem facing the color television industry, that of finding a material which will produce a true red on the screen, has been overcome with development of a new red phosphor. Dr. Albert K. Levine of the General Telephone and Electronics Laboratories, co-inventor of the new phosphor, is shown above holding a container of the material which is glowing under excitation from an ultraviolet light.

ASTRONOMY

Decade Astronomy Plan

To prevent stagnation of astronomy in the U.S., the National Academy of Sciences has called for a program that would double ground-based facilities—By Ann Ewing

➤ U.S. ASTRONOMERS urgently need a new generation of large research telescopes to sustain the promising attack of the last half century on fundamental questions of the structure and history of the universe, a panel of the National Academy of Sciences has reported.

The scientists concluded that enough instruments of the necessary size for work in exciting frontier areas of astronomy and cosmology are not now available, and outlined a ten-year program that would approximately double the nation's ground-based astronomical facilities.

"If new facilities are not created, either through private funding or through government support, then gifted young astronomers will turn to other fields, the promise of astronomy will remain unfulfilled, and American astronomy will surely stagnate in this country," the panel stated.

The proposed program calls for the construction of two major optical telescopes in addition to the projected 150-inch Kitt Peak reflector, both to be as large as the 200-inch instrument on Mt. Palomar, and at least one of which would be in the Southern Hemisphere. Also called for is the construction of a mammoth radio telescope of very high resolution that might consist of about 100 separate parabolic reflectors, each about 85 feet in diameter.

In addition, the panel proposed the undertaking of design studies, looking ahead to the building of the "largest feasible" optical reflector and steerable radio telescope.

Anticipating that already crowded facilities will be faced with at least a doubling in the number of graduate astronomers during the next decade and additional need for scientific support of planetary investigations and space observatories, the panel also recommended that funds be provided for:

1. Twelve fully equipped modern reflecting telescopes (four of 60-84 inches and eight of 36-48 inches), and approximately 15 specialized radio instruments of limited power, to be operated by universities or other research institutions with strong graduate departments.

2. Two large, fully steerable parabolic antennas of the 300-foot class for galactic studies, monitoring of cosmic radio sources and radar experiments.

3. Augmenting the proposed extension of Owens Valley Observatory by an additional six steerable parabolic reflectors.

4. Experimental programs to study the improvement of photographic and electronic recording techniques, the automation of telescope operations, and more efficient acquisition and reduction of observational data.

The total cost for construction and operation of the new facilities outlined by the panel is estimated at $224 million during the ten-year period, the maximum annual expenditure of $26 million occurring during the fourth and fifth years of the program.

The recommendations are contained in a 105-page report, "Ground-Based Astronomy—A Ten-Year Program," prepared by the panel on astronomical facilities established in 1962 by the Academy's Committee on Science and Public Policy. Chairman of the panel is Dr. Albert E. Whitford, director of the University of California's Lick Observatory.

The astronomy report is the first of several dealing with various disciplines being prepared under the direction of the Committee on Science and Public Policy with financial support from the National Science Foundation.

"Today," the report said, "some of the deepest problems of astronomy and cosmology appear to be on the verge of yielding." Among those cited by the panel are how stars are formed, why they condense from the interstellar medium into double, triple and multiple systems that revolve around each other, the origin of radio signals from stars and galaxies, and, perhaps most fundamental of all, the origin of the recently discovered large-scale ordered magnetic fields in certain regions of space.

SPACE

Robot Lunar 'Scientist'

➤ THE FIRST SCIENTIST to reach the moon from the United States will not be an astronaut, or even a human being at all, but a robot chemist with a built-in laboratory called a mass spectrometer.

The robot will reach the moon several years before the first astronaut, aboard an unmanned Surveyor spacecraft. Its job will be to analyze the rocks, dust and minerals on the moon's surface and then to transmit the results back to earth.

The mass spectrometer works by breaking down any substance—solid, liquid or gas—into atoms of its basic elements. By separating the atoms according to mass, the device can tell what molecules, elements and isotopes are present, and in what relative quantities.

Although the airlessness of the moon will make the work relatively easy, since this type of spectrometer can only operate in a vacuum, there are still numerous problems in designing a completely automatic robot.

Trouble will begin for the robot when it arrives on the moon. Although the Surveyor will supposedly make a "soft" landing, it will still be quite a "thump." After such a jolt, the robot will have to readjust its own delicate mechanisms.

In addition, it must operate for long periods of time under its own power, despite temperature changes of hundreds of degrees. Cosmic rays, static electricity from the lunar dust, radiation and meteorites all threaten the instrument's survival.

Although part of the work of Surveyor's various instruments concerns the Apollo program, the mass spectrometer might help to answer questions about the origin and evolution of the solar system. Since the moon has probably remained unchanged in space for more than four billion years, analysis of its surface and structure might give information on the nature of the primordial material from which earth and other planets were formed.

As far as Project Apollo is concerned, the only "direct" information about the surface that U.S. astronauts will have to land on has come from the photographs taken by Ranger 7 last July. While the pictures were remarkably clear, information from them is incomplete and subject to conflicting interpretations.

Design of Apollo's Lunar Excursion Module which will actually land the astronauts on the moon) is now in its final stages and definite information is important.

One device being investigated for use in the robot laboratory is a laser beam to vaporize solid moon material for analysis.

The "chemist" is being developed by Nuclide Corporation, State College, Pa.

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