The Cottrell program, originally planned to run for five years, is now being extended into its sixth year to continue the flow of contributions to science made possible by tapping a research reservoir not previously explored to any great degree, the report states. In the five years completed, this grants program had supported research projects in 217 institutions in all 48 states. Cottrell grants totaling some $2,300,000 were made by Research Corporation to finance this work, which represents about 750 project years of scientific investigation.

FACILITIES FOR RESEARCH

IONOSPHERIC LABORATORY ON WHEELS

In an effort to obtain more comprehensive data on the ionosphere, the National Bureau of Standards has put into operation a mobile research unit of two prime movers and two trailers equipped to make ionospheric soundings at points midway between permanent transmitting-receiving stations. Some sixty permanent ionospheric research stations are now located at various points on the earth, each of which has been concerned with collecting local data on the characteristics of the ionosphere, a series of electrically conducting layers in the earth's atmosphere. Because these layers are continuously changing, knowledge of their behavior in reflecting radio waves is necessary in order to maintain regular and reliable radio communications. One of the services provided by the Bureau's Central Radio Propagation Laboratory has been to collect and analyze ionospheric data from stations all over the world and to make available its predictions of usable frequencies for radio communication between any two points at any time.

During the past 20 years the technique of vertical-incidence ionosphere soundings by the use of pulse transmitters scanning over a wide frequency range has been adopted internationally for recording the virtual height and degree of ionization for each of the ionosphere layers. Although vertical incidence reflection principles are basic to the understanding of radio propagation, they are rarely encountered in practical radio communication. The wave received at a distance from the transmitter impinges on the ionosphere obliquely in its journey from the transmitter to the receiver. However, theory indicates that much information about oblique incidence propagation can be inferred from data obtained at vertical incidence. The St. Louis experiment and all of those to follow are designed to record simultaneously both vertical and oblique incidence data, and from an analysis of the information the relation between oblique and vertical incidence reflectors will be more exactly deduced.

The new mobile unit's first project, begun earlier this year, was intended to give information on ionospheric radio wave propagation between an NBS station located at Sterling, Virginia and a leased transmitting station operated by Washington University, St. Louis, Missouri.

Both stations were to transmit simultaneously pulses of radio energy directed to strike the ionosphere obliquely. The radio waves were propagated in west and east directions respectively, and each station received the other's signals. Because the pulses pass all the way up to the ionosphere at the mid-point of the path and then are reflected down again, the travel times are greater than if the signals were to travel directly along the earth's surface. From the time delays involved, the time of ionospheric travel between the stations can be obtained and the heights of reflection calculated. During the transmission, the radio frequencies used at both ends of the paths are slowly but simultaneously varied. At the higher frequencies the time delays are greater because these waves travel to greater altitudes before they are reflected. Meanwhile the mobile station located at the critical point of the propagation path transmits signals vertically upward and receives its own echoes. By recording the heights and degree of ionization of the several layers, the heights at which the oblique incidence signals should theoretically be reflected can be calculated.

The "St. Louis Experiment" involves comparatively short distances. However, it is known that the discrepancies between theory and practice increase in magnitude as the distance between transmitter and receiver becomes greater. To investigate this effect, the mobile unit will be placed at the mid-point of much more widely spaced permanent installations. The next stop may be between the Sterling station and one in the Hawaiian Islands, Alaska, San Francisco, Puerto Rico, or Panama. Before the program is completed, the mobile unit will have been placed at the mid-point of the path to most of the Bureau's ionosphere stations in the western hemisphere.

Within a few years, and after a number of further experiments at specially chosen mid-point locations, the Bureau expects to have sufficient information about ionospheric radio propagation to map accurately the paths of radio waves across the country and into other parts of the world.

James Stratton Thompson

James Stratton Thompson, professor and chairman of the physics department at Illinois Institute of Technology since 1934, died on August 6th of a cerebral hemorrhage at the age of fifty-one. Dr. Thompson was educated at the University of Chicago and began his professional career at Armour Institute of Technology, predecessor of the Illinois Institute, in 1924 as an instructor in physics. Since 1925 he served as consulting physicist for the F. E. Simpson Radium Institute in Chicago, becoming an expert on radium emanation. A past president of the Chicago Physics Club, he was a member of the American Physical Society, the American Association of Physics Teachers, and the American Association for the Advancement of Science.