RADIO

Ultra-Short Radio Waves Sent Around Curvature of Earth

Marconi Again Achieves "Impossible" in Transmission With Two-Foot Waves Over Distance of 94 Miles

GUGLIELMO Marconi has again confounded the prophets. He has shown that his ultra-short radio waves are able to pass through mountains and even curve around the surfaces of the earth to receiving stations far below the horizon.

History repeats itself again. For in 1901 Prof. H. M. Poincaré, distinguished French mathematician, predicted that communication with electrical waves would be limited to about 165 miles. In that same year Marconi demonstrated that electrical waves could be sent and received across the Atlantic.

Modern theorists had predicted that the ultra-short waves would act like light waves from a searchlight and would not be detectable beyond the horizon. Messages have now been sent from the inventor's yacht to an experimental station 94 miles away in inland Italy, more than three times the predicted distance.

The explanation for this property of the waves to bend about the earth and to curve around objects is not known. Theorists have attacked the problem by treating the radio waves as light waves and have extended the diffraction theory which explains the microscopic bending of light around corners to the ultra-short radio waves, but without marked success.

Vast Transmission Field

The success of Marchese Marconi in perfecting the transmission and reception of these ultra-short radio waves opens up a vast field in the modern science of the transmission of information.

Marconi's new waves are only two feet long as compared to the ordinary radio waves of about 900 feet. Their most distinctive feature is that they are almost like light waves and can be focussed upon a receiver, thus allowing private communication. It is thought that they can not be reflected back from the ionized layers of the upper atmosphere, which act as huge reflectors to ordinary radio waves. A beam of the ultra-short waves directed upwards would pass through this region which is about 200 miles above the earth and shoot off into interplanetary space.

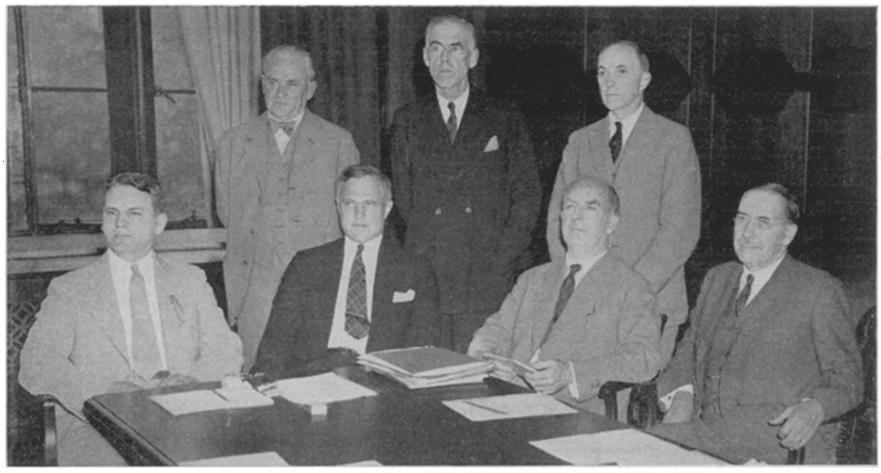
Marconi and other Europeans, as well as investigators in this country, are using the ultra-short waves much like a searchlight. Since the waves are not much longer than light waves they may be focussed and projected by parabolic reflectors and antennae similar to a section of an automobile headlight. These "quasi-optical" waves are thus not adapted to long distance communication but may readily be devoloped for private communication between stations where telegraphy or telephony is impracticable.

In contrast to long radio waves, the Marconi waves have the advantages of being efficiently projected in small directive beams, requiring minute amounts of power, of not being affected by atmospheric disturbances, and of allowing secrecy of communication.

The renewed interest in these short waves brings up the question of allocation of wave lengths to various types of broadcasting. In the earlier days of radio the commercial broadcasting stations received the then popular band of wave lengths from about 200 meters to 550 meters. The amateur radio experimenters were given the then impractical short wave band from 5 meters to 100 meters. But time has shown that the latter band is extremely valuable and it has been encroached upon by the police, air transport lines, and governmental services. The congestion that has arisen may be relieved by the growing use of the ultra-short waves from about 5 meters down to 5 centimeters or about 2 inches. Below this minimum wave length the waves are too greatly absorbed by the atmosphere to be valuable for communication purposes.

More Channels

Although the spread in wave length of these quasi-optical waves is very small, the frequency range is enormous. Carrier waves of commercial broadcasters have a range of frequency from 500 kilocycles to 1500 kilocycles and as each station needs about 10 kilo-



AT FIRST MEETING OF PRESIDENT'S BOARD

These scientists attended the first meeting of the Science Advisory Board of the National Research Council, recently named by President Roosevelt to aid the Government in coping with scientific problems, (SNL, Aug. 19, '33, p. 123), which was held in the National Academy of Sciences building in Washington August 21, 22, 23. Left to right—Isaiah Bowman, Chairman, National Research Council, and Director, American Geographical Society; R. A. Millikan, Director, Norman Bridge Laboratory of Physics, and Chairman of the Executive Council, California Institute of Technology; Karl T. Compton, Chairman of the Committee, and President, Massachusetts Institute of Technology; C. K. Leith, Professor of Geology, University of Wisconsin; W. W. Campbell, President, National Academy of Sciences; Frank B. Jewett, President, Bell Telephone Laboratories; and John C. Merriam, President, Carnegie Institution of Washington. The two members unable to attend this meeting were Gano Dunn, President, J. G. White Engineering Corp.; and Charles F. Kettering, President, General Motors Research Corp.