CONTRIBUTIONS OF NORBERT WIENER TO COMMUNICATION THEORY

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Information theory, communication theory, detection theory are terms now commonly used by engineers who are concerned with radio or telephone communications, electromagnetic and sonic measurements, seismic measurements, and indeed the transformation, storage and transmittal of data from any source by electronic or mechanical devices. They are terms also used by scientists concerned with the function of the human brain and nervous system, the behavior of small groups of people, the interplay between men and machines, and the behavior of whole societies. Coupled with the study of transmittal of information is the study of use of information in mechanisms, and at least one direction this latter study leads is toward the modern theory of control. Norbert Wiener was interested, as is well known, in this whole broad expanse of problems; he made this interest completely explicit in his invention of the word cybernetics, and his explication of its meaning in the book *Cybernetics* [**138**].* One of Professor Wiener's contributions to the scientific society was his recognition and insistence that communication and control problems which occur in very different contexts often have the same essentials; or, stated differently, that there was potentially a science of communication and control. However, it is beyond the scope of these remarks, and beyond my competence, to talk about his work from such a general point of view; so the comments here shall refer only to communication theory as it applies to electrical engineering technology.

In *I am a mathematician* [**177**] Wiener says "One interesting problem which we attacked together was that of the conditions restricting the Fourier transform of a function vanishing on the half line. This is a sound mathematical problem on its own merits, and Paley attacked it with vigor, but what helped me and did not help Paley was that it is essentially a problem of electrical engineering." The solution to this problem for functions of class L_2 is contained in Theorem XII of *Fourier transforms in the complex domain* [**92**], where it ostensibly plays the role of a key result in the theory of quasi-analytic functions. This theorem was explicitly pointed out to engineers, and its implica-

* The bold-faced numbers in brackets refer to numbered references in the Bibliography of Norbert Wiener. Bold-faced numbers in parentheses refer to the References at the end of this article.