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Bell System Centennial: 100 Years of Publishing on Telecommunications

This year the United States is celebrating the bicentennial of its founding—200 years of change, crises, and invention. At the beginning of the nation's second century, in March 1876, the "speaking telephone" was invented. With it began 100 years of research and development in telecommunications—a technology whose influence on the growth of the nation and, indeed, of all western nations, has been profound. The continual improvement and expansion of telecommunications has depended on the depth and diversity of technical research and development. And, if research and development is to encompass all the economic and physical requirements of a growing telecommunications system, it must be founded upon an active exchange of ideas.

Inventiveness in any organization engaged in research and development can be ascribed not only to individual intelligence, but also to the participation of its members in the exchange of ideas—among its own people and throughout the scientific community. Indeed, it is apparent that the *process* of exchange is an active element in the development of ideas. For example, it is recorded that Alexander Graham Bell's invention sprang from a mistranslation of a German text. Bell had the impression from Helmholz's book *Sensations of Tone* that the author had telegraphed vowel sounds over a wire. Although Bell later discovered the mistake, the idea led him to a study of electricity.

In this anniversary article, we note that timely, open publication of advances in telephony has a history as old as the telephone itself.

For example, Bell dated his invention February 14, 1876, found it would carry voice on March 10, and described the instrument in his paper "Researches in Telephony," which he read on May 10 at a meeting of the American Academy of Arts and Sciences. The paper was subsequently printed in Volume XII of the Academy's *Proceedings*. (We found Bell's original paper so refreshing as an expression of his thought and technique that we have reprinted it as the first article in this issue.)

Similar in function to professional journals and magazines, professional societies like the Academy are created to be forums for the exchange of scientific and technical information. As electrical engineering was emerging in the late 19th century as a discipline with an increasing volume of specific knowledge, the American Institute of Electrical Engineers was formed. (Bell was a cofounder and was elected president in 1892.) Discussions at professional society meetings included philosophical and operational topics as well as technical matters. For example, the practical viewpoint of today's systems engineering is clearly identifiable in "Telephone Engineering," J. J. Carty's paper in the 1906 *Transactions* of the AIEE. A year later General Carty became AT&T's Chief Engineer.

In 1876, Sir William Thompson—later Lord Kelvin—observed the operation of the telephone at one of Professor Bell's lectures and reported the discovery to a meeting of the British Association. In 1877, Bell went to England and demonstrated his instruments at a meeting of the same association. The idea caught on so rapidly that only ten years later there were 200,000 telephones in operation in England. Today, even before the new technology of lightwave communications has become commercially feasible for telephone signal transmission, the scientific community throughout the world is keeping pace with the most recent developments in the United States through Bell System publications and Bell System patents.

The founders of the telephone industry early established the policy of open publication that has remained a characteristic of the industry. This policy has been based on the protection of proprietary information afforded by the patent systems of the United States and other countries, and often the publication of new technology is to be found in issued patents. This policy of early publication and patenting is frequently a direct stimulus to invention. As a case in point, the rapid evolution of the telephone transmitter in 1877 and 1878 can be traced in the series of inventions by Edison, Hughes, Blake, Berliner, De Jongh, Mix and Genest, and Hunnings.

In the first thirty years of telecommunications development, Bell System workers depended upon such established professional publica-

tions as *Science Magazine*, *The Proceedings of the American Academy of Arts and Sciences*, the *Philosophical Magazine*, and *Silliman's Journal*. But in 1912, the Bell System started the first of a series of company publications with the first issue of the *Western Electric News*, which combined news of employee activities with articles on new research techniques and technical developments.

A decade later, in 1922, the need for a specialized medium of exchange among scientists and engineers in telecommunications, and specifically between the research and development areas in the Bell System and those in industry, academia, and government, was affirmed in the Foreword to the first issue of *The Bell System Technical Journal*: "A casual examination of recent technical literature dealing with electrical communication would show articles which touch upon almost every branch of human activity, which we designate as science. . . . With this intense and growing interest in the proper application of scientific methods to the solution of the problems of electrical communication, it is natural that a widespread desire should have arisen for a technical journal to collect, print, . . . and make readily available the more important articles relating to the field of the communication engineer. These articles are now appearing in some fifteen or twenty periodicals scattered throughout the world. . . . The need already felt for such a journal will grow keener as new developments extend the scope of the art and the specialization of its engineers of necessity increases."

While *The Bell System Technical Journal* became the primary voice of Bell System research and development, several other technically dedicated publications were started: *The Bell Laboratories Record* was established in 1925 and at the present time provides functionally descriptive articles on the discoveries and developments at Bell Laboratories. *The Bell Telephone Quarterly* (1922–1940), established as a medium of information exchange among the telephone companies, was superseded by *The Bell Telephone Magazine* in 1941; and *The Western Electric Engineer* (begun in 1957) contains articles by Western Electric engineers on all phases of engineering in the manufacture of telecommunications equipment. Parallel with the establishment of these source publications, significant technical papers were published in the *Western Electric Reprint* series, begun in 1919, which evolved into *The Bell Telephone System Technical Publications* (Monographs), published until 1967. On the management side of the business, *The Bell Journal of Economics* was begun in 1970 with the object of encouraging scholarly interest and thought in the application of economics, to the study of regulation, firm and market organization, and the study of interdisciplinary issues in law and economics.

Other telecommunications companies also responded to the need for technical information exchange. Publication of *Electrical Communication* was begun in 1922 by the International Western Electric Company and has been continued since 1925 by the International Telephone and Telegraph Corporation. Now published by General Telephone and Electronics, the *GTE Automatic Electric Technical Journal* was begun in 1913 as *Automatic Telephone. Ericsson Technics* was begun in 1933 by the Swedish firm Telefonaktiebolaget L M Ericsson, and the *Philips Telecommunication Review* was established in 1934 by the Philips' Telecommunicatie Industrie B. V., Netherlands.

One of the oldest continuing journals in the field is *Tele.* Published by the Central Administration of Swedish Telecommunications, *Tele*'s origins can be traced back to 1895. *Telephony*, one of the leading U. S. commercial publications in the field, was started in 1901 and was followed by *Telephone Engineer* in 1909 (now *Telephone Engineer and Management*).

With technical and scientific specialization have come journals to embrace each new field, e.g., optics, acoustics, materials, computers, circuit theory, etc. We find that, in the last decade, almost 19,000 papers by Bell System authors were published in these specialized journals and magazines, nationally and internationally.

This fundamental requisite for free exchange of information, which has been evident since the inception of telecommunications, will be equally necessary in the future if the industry is to maintain its scientific, technical, and, in the final analysis, functional integrity. The Bell System through its own publications and contributions to professional societies and technical journals remains dedicated to this principle.