

The Bell System Technical Journal

*Devoted to the Scientific and Engineering Aspects
of Electrical Communication*

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FOREWORD

MODERN industry is characterized by the extent to which scientific research and technique based on precise study have contributed to its progress. So complete has been the adaptation of and reliance on scientific research in many industries that it is difficult at this time to visualize the state of affairs of two or three decades ago, when substantially all industry on its technical side was dependent for advancement on cut-and-try, rule-of-thumb, methods of development. Today in many industries the management would not think of embarking on a new project without consulting their research engineers.

Many industries have proved the benefits to be derived from the utilization of that organized knowledge provided both in the fields of the physical sciences and in those newer fields which have to do with psychology and economics. There are still greater numbers of industrial organizations where the adoption of scientific methods has been slow. However, the time will undoubtedly come when every industry will recognize the aid it can derive from scientific research in some form as it now recognizes its dependence for motive power on steam or electricity rather than on muscular activity.

Upwards of one hundred years ago there was adopted in earnest by scientific men, principally in university laboratories, the program of searching deeper into the unknown, to discover new principles and new relationships of a kind which had at the time very little apparent practical interest to mankind as a whole.

Out of this work, and in time, have grown entirely new industries. From the fact that these industries sprang directly from the research laboratory, it was inevitable that they should be conspicuous because of the number of their men trained in the methods of scientific research. Equally inevitable was it that these new fields of endeavor, originating as they did and being staffed as they were, should be the ground where industrial research would find its first and largest development. And not the least of the advantages which obtained in these newer industries was the absence of age-long traditions tending to ultra-conservatism as to new undertakings, and more particularly as to the employment of the new types of mind.

The results up to the present indicate clearly that the electrical and chemical fields in industry as we know them today, are the places where the greatest advances have been made in the utilization of research methods and research men. Other, older and more basic industries are rapidly following the general path marked out by the successes already obtained in these fields. Hence, it is expected that shortly all industrial activities will be based on the results obtained by trained investigators, using the tools of modern scientific investigation.

Just as applied electricity is a leading exemplar of the benefits to be obtained by an intelligent use of scientific knowledge, so electrical communication of intelligence is a leading exemplar in the field of applied electricity. This branch of applied electricity is a pioneer among those recognizing the practical value of scientific research. It is interesting to note that electrical communication is credited with having organized a research laboratory prior to the first university course in electrical engineering.

More than ever before, the communication engineer must seek exact solutions of his problems. If his results do not always attain the certainty he desires, the reason is the absence of complete knowledge with regard to one or more essential facts. But true knowledge of what things limit the solution of a problem is frequently more than half the battle of obtaining the missing facts. Sometimes these unknown facts can be obtained by a search through the remoter parts of the vast scientific storehouses which have been built in times past. Frequently, however, the search discloses the entire absence

of the thing sought for, and new researches are begun with definite ends in view. Thus it has come about that the communication engineer has become an original investigator and is extending the boundaries of human knowledge and supplementing the advances of pure science to find solutions for his various and sundry problems.

Hence, while well equipped physical and chemical laboratories are still a necessary part of the communication engineer's equipment, he is equally active in pushing his investigations in many other directions. Questions involved in the making of proper rate schedules and adequate fundamental plans for new construction are originating profound researches in such fields as political science, psychology and mathematics. 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 or reprint, 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 and in the majority of instances receive their first and last printing in these widely separated mediums. 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. It is hoped that the BELL SYSTEM TECHNICAL JOURNAL will fill this need, and as implied above, it is intended that the range of subjects treated in the JOURNAL will be as broad as the science and technique of electrical communication itself.

While many of the articles which will appear in the JOURNAL will be original presentations of some phase of the research or development or other technical work of the Bell System, it is not intended that the JOURNAL should be the sole means by which this work is presented. Just as in the past, original articles and papers will continue to be presented before various societies and in different technical and non-technical magazines. Moreover, the JOURNAL will reprint articles on important research and development work in the communication field generally so that the results of such work may be given greater publicity and become of greater value to communication engineers.