

Principles of Electricity

applied to

Telephone and Telegraph Work

A Training Course Text

Prepared for Employees of the

Long Lines Department

AMERICAN TELEPHONE AND TELEGRAPH COMPANY

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PREFACE

THIS book has appeared in a number of editions over the past three decades, the latest prior edition being dated 1938. Its purpose has remained the same throughout this period—namely, to serve as a basic text on elementary electrical principles for use in the technical training of employees in the Long Lines Department of the American Telephone and Telegraph Company.

Although truly fundamental principles do not change with time, the rapid growth and development of the communications art over the years has necessitated the incorporation of numerous new or changed illustrative applications in each new edition. This, of course, remains true for the present volume. In addition, the accelerated extension in recent years of radio and very high frequency techniques has made it desirable to include a great deal of new material in the fields of electronics and electromagnetic radiation. This has required the introduction of certain basic concepts and principles not dealt with in earlier editions, as well as numerous examples to illustrate their applications in practice.

The variety and scope of the subjects covered in the book make it necessarily rather voluminous even though some material included in previous editions has been omitted in this. Every effort has nevertheless been made to treat each subject taken up as briefly as is consistent with a reasonably adequate presentation of the related theory and fields of application.

It is important for the reader to recognize that the book is not, and is not intended to be, a comprehensive treatise embracing the entire field of electrical communication. Its subject is electrical theory. Such descriptions of communication equipment and circuits as are included were selected primarily to illustrate practical applications and many of them have been somewhat arbitrarily chosen. The objective has been only to cover the essential general principles of basic electrical theory and to illustrate each principle briefly by one or more of its significant applications in the communications field.

The use of higher mathematics is avoided entirely in this book, and even the more elementary branches are employed as sparingly as possible. A general knowledge on the part of the reader is assumed of only those branches of mathematics ordinarily taught in High Schools, including Algebra, Geometry, Logarithms and Trigonometry. In addition, it has been thought desirable, in the Chapters dealing with the solution of alternating-current networks and with wire transmission theory, to make some use of simple Vector Notation. This may involve the introduction of certain mathematical concepts not familiar to all readers, but it is believed that the great simplification that may be effected with this convenient mathematical tool will more than justify any additional study time that the reader may find needed to master its practical use.

A general knowledge of elementary Physics and Mechanics is also assumed. The first Chapter of the text, however, reviews very briefly some of the fundamental physical principles that are particularly applicable to various subjects discussed in later Chapters.

A word of caution is perhaps needed regarding the use of the circuit drawings, tables, and other statistical data included at various points in the text. The circuit drawings are presented primarily as a means of illustrating the principles under discussion. Although they may be reasonably representative of actual practice, they may or may not conform in detail with any situation familiar to the reader. Similarly, the tables and other data represent the best information available at this time, but they are subject to change and are not intended as a substitute for data issued in current formal instructions.

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32 Avenue of the Americas,
New York, N. Y.,
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