GUIDE TO THE LITERATURE OF MATHEMATICS AND PHYSICS INCLUDING RELATED WORKS ON ENGINEERING SCIENCE

BY NATHAN GRIER PARKE III

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GUIDE TO THE LITERATURE OF MATHEMATICS AND PHYSICS

including related works on engineering science

by

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second revised edition

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Preface to the Second Edition

The number of books which have appeared since the original edition of the guide makes a new edition long overdue. The number of entries has doubled, reaching more than 5000. A thorough revision of the subject headings and the orienting paragraphs was made for numerous practical reasons, the most important of which is that the books fit better under the new subject headings. It is inevitable that this edition would show a selection biased in the direction of applied mathematics. The books selected and the comments made should be of the greatest use to those who use mathematics. The peripheral books are those which might be of some help in trying to formulate problems in mathematical terms. Perhaps the applied mathematical point of view is inevitable because it is logically the applied mathematician who would be most interested in having a working understanding of the main features of all of mathematics and theoretical physics who would go to the trouble of writing such a guide.

The first edition was written single-handed. This edition has benefited by the generous help of many friends. My first efforts to include some of the Russian literature have been guided by Morris Friedman and Nelson Logan. The annotations benefit from material found in prefaces and reviews. In mathematics, my debt to the stimulating "Development of Mathematics," by E. T. Bell, is obvious and acknowledged. The original book list was typed by Alice Viano and the final draft was typed by Marie Eaton, Barbara Watson and Barbara Platt. The final proofreading of the manuscript was the work of two members of the laboratories, Paul Sally and John Riley and of my wife, Ann, who also sat out two summer vacations devoted to the selection of books and annotations of subject headings. Without these vacations from a heavy consulting practice, this book would never have been revised. As it is, my publisher, Hayward Cirker, has waited patiently and understandingly through four years of delays and altered deadlines since first expressing his desire to bring out a revised edition. During the critical period of selecting and organizing, my collaborator, Marguerite Chamberlain, gave selflessly of her time, energy, and the results of her long experience with the M.I.T. Eastman Library. "Eastman" was the research library for mathematics, physics and chemistry at M.I.T. In addition, this revision has benefited by ten years of intermittent informal discussions covering a gamut of topics, books and ideas.

The first part of the guide has not been revised. The philosophy behind it is still my way of scientific life. It has served for graduate work and it continues to serve in my life as a consultant. It could hardly be rewritten with the same freshness and enthusiasm. The second part of the guide deals with books and a growing subject matter. It represents a four-year period of review, examination and revision that has been arduous but intellectually rewarding and stimulating.

NATHAN GRIER PARKE III

Carlisle, Massachusetts
June 1956

Preface

This guide to the literature of mathematics and physics has been written to meet a long-standing need. Mathematics and physics are playing roles of increasing importance in engineering and in the other sciences. Thus there exists a large group of people who cannot maintain an independent awareness of the mathematical and physical reference literature but who can make effective use of a classified guide. This group includes scientists, engineers, librarians, and students.

In order to make this guide of maximum usefulness to engineers and applied scientists, the narrow limits of mathematics and physics have been exceeded and a considerable number of books on aeronautical, electrical, radio, and mechanical engineering have been included—sufficient, in fact, for most reference work.

Many users will not be familiar with library technique. A number may find reference, reading, and study in these fields difficult and discouraging. Part I, General Considerations, offers some suggestions along these lines.

Part II, The Literature, is the bibliographic part of the guide and contains about 2,300 entries under some 150 subject headings. Under each subject heading is a paragraph or two delineating the subject, suggesting related headings, and in some cases singling out titles that will prove useful as a point of departure.

The basis of selection is of practical interest. About half of the titles make up the author's professional library. The mathematical titles were augmented by a careful scrutiny of the reviews that appeared in the Bulletin of the American Mathematical Society, 1934–1945. The physics titles were augmented by a careful survey of the "Subject Catalog," Fine Hall, Princeton University. The engineering titles and those of general interest were less systematically compiled. The entire list has been compared with the reference collections at the Library of Congress, Johns Hopkins University, and the Massachusetts Institute of Technology. The comparison is favorable.

A bibliography of this scope has a special usefulness, which it is well to point out. The bounds of knowledge are so great that it is impossible to know in detail more than a small fraction of the information that could be used. Thus there is an increased emphasis on knowing where to find and how to assimilate information as it is needed. Browsing through a guide of this sort should build up a knowledge of what is available and where it is located.

Concord, Mass.,
April, 1947.

Nathan Grier Parke III.

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PART I
GENERAL CONSIDERATIONS

CHAPTER I

The Principles of Reading and Study

READING and composition are closely correlated skills. If one knows where to put an idea when he writes, he will know where to look for it in the writing of a competent and skillful author. It is a well-known fact that the average technical graduate arrives at his place of business with little or no writing skill.[1] It is not generally known or recognized that he has an equally small amount of reading skill. No one but the man himself knows the low efficiency with which he transfers ideas from the printed page to his mind, what a strain those undigested chunks of raw information put on his memory. Yet if he could write easily and effectively, he would also discover that the same technique in reverse would ensure his reading easily and effectively. The paragraphs of a skillful author are evidence of design; they follow in some rational order and each is devoted to the development of one idea. Usually the first or last sentence, called "the topic sentence," summarizes the idea. It either prepares the reader's mind to receive the remaining sentences, which qualify and modify it, or else it draws the principal conclusions that follow from the preceding sentences in the paragraph. The skillful reader is aware of such techniques and when he is reading studies the author's plan of exposition. Having discovered it, he is able to store the facts in his own mind in the same orderly fashion. Thus reading and writing are related skills; progress in one is accompanied by progress in the other.[2]

This chapter is devoted to reading and study. For convenience of exposition, the acts of reference, reconnaissance, and study have been discussed separately. Reference to obtain facts is the most frequently practiced type of technical reading. "Reconnaissance" is a term that has been chosen by the author to describe the practice of surveying a book

[1] This is not intended as a reflection on the technical schools. They have been emphasizing "English for Engineers." The difficulty lies in the student who is so overwhelmed with the wonders of technology and the intricacies of science that anything so mundane as English and composition is not worthy of serious attention. It is not until later that he sees an excellent technical idea miss its mark for want of a clear and convincing presentation.

[2] In this connection see the excellent little text by Davis, Fassett, Green, Packard, and Schorer, "Direct Communication," Heath, Boston, 1943.