mains to be done, and in which we hope we shall see contributions in the future from the authors of the present book.

Besides the strictly mathematical assessment of the communication power of several modes of communication the book stresses the nature of language in communication. Here a complete treatment of human language would seem to me to involve a greater emphasis on stages of communication within the human nervous system than a casual reading of the book would indicate. Language is a matter in which the crude nonhuman measurements fail to give an adequate account of the tremendous losses of information inseparable from nervous reception and the transmission of language into the brain. I say these things not as a hostile criticism, but as comments in the spirit of the authors themselves on fields of study, namely linguistics, which I think the future will show to lie well within the purview of the communication engineer.

The present book like my own *Cybernetics* represents a first essay in a field which promises to be well documented within a few years, and its level is of a high degree of simplicity. In my book, I have taken the privilege of an author to be more speculative, and to cover a wider range than Drs. Shannon and Weaver have chosen to do. I wish to repeat that in a new subject it would be a shame if all the authors followed the same thought, and that there is not only room, but a definite need for different books which vary widely in their degree of concreteness on the one hand, and in speculativeness on the other. I salute my colleagues in having written a well worked and intellectually independent approach to the problems of cybernetics.

Norbert Wiener
Massachusetts Institute of Technology

Luminescent Solids

INTRODUCTION TO THE LUMINESCENCE OF SOLIDS. **By Humboldt W. Leverenz. 569 pp. John Wiley and Sons, Inc., New York, 1950. $12.00.**

Among the recent books on luminescence, Leverenz's volume is characterized by an effort to correlate the vast amount of technical information obtained in the rapid development of applications—like television, radar, and fluorescent lighting—with the more slowly progressing fundamental investigations. An introductory 50-page text on physics, chemistry, and crystallography, from which the subject of luminescence is supposed to be developed, is followed by a commendably explicit discussion of phosphor syntheses and by chapters on constitution and energy levels and on the luminescence process. A "resumé of useful phosphors" (describing many of their properties) forms the transition to a chapter on practical applications. Both theory and experiments are presented mainly in the form of a collection of material, loosely organized with the help of some "simplifying demarcations" and "outstanding general features". Repetition with minor variations is frequent, but apparently deliberate, and some subjects are treated in unexpected places. Aspects of practical importance are dealt with clearly and competently, not only in the final chapter but throughout the book.

The author's fondness for broad and sweeping surveys, apparent in many of his earlier publications, has induced him to include a good deal of material which will be considered irrelevant by most readers. Few will profit by a definition of Avogadro's number, by a tabulation of the properties of electrons, photons, neutrons, and protons or by an enumeration of nuclear forces. Leverenz's aptitude at condensation and graphic expression is far more usefully employed in his exposition of current theories, both generally accepted and controversial ones. His presentation of the former, though often in unconventional terms, seems perfectly sound, and the discussion of the latter includes some highly enjoyable common sense criticism of too flexible models and of untenable generalizations, and it maintains a healthy skepticism with few exceptions. In his preface, the author explains that "history is generally omitted" because it would be "tedious and confusing to the uninitiated". History may not be desirable in a book of this type, but the reason given is flimsy. History could certainly be interesting and revealing —that depends entirely on the historian; but as seen from the author's point of view, the history of luminescence looks as follows:

"During the alchemical infancy and haphazard growth of the phosphor art, the resultant desultory and greatly dispersed literature on luminescence of solids has become cluttered with confused terminologies, incorrect data, and baneful misconceptions. As an antidote, this book attempts to be objective, to provide a rational terminology, and to furnish a critical guide to the general literature."

This is just about what nearly every book on luminescence has tried to achieve in the past forty years, and most (not all) of their respective authors have regarded their work as the end of the period of baneful misconceptions. So did, for example, the great—though fallible—pioneer in the field, Philipp Lenard, with whom Leverenz shares also the sharp distinction made between experiments originating or repeated in one's own laboratory, and others. The still unsatisfactory definition of many phosphors gives a good deal of justification to such an approach, but in many places Leverenz carries it to absurd extremes. Details of this part of recent history would be, indeed, both tedious and revealing. The enormous list of recent references to hundreds of authors turns out to be no guarantee of a fair presentation of their work, and the "guide to the literature" leads in too many cases to quite unnecessary detours. Altogether, this reviewer finds few statements which he believes to be definitely wrong, but many which he considers seriously misleading. However, in as unsettled a field as phosphorescence, this is neither surprising nor a serious criticism.

Leverenz's book is certainly a most welcome complement to the recent volumes by Kroeger, Pringsheim, and Garlick. Containing, as it does, a large amount of information not easily found elsewhere, it will be useful to everyone seriously interested in the luminescence of solids, provided that he applies to the book itself the author's injunction that "Those who intend to become active in the

field of luminescent solids should refer frequently and *critically* to the literature." (The italics are Leverenz's.)

Frank Urbach
Eastman Kodak Company

One of a Series

FUNDAMENTALS OF RADIO-VALVE TECHNIQUE. **By J. Deketh. Philips Technical Library, Eindhoven, Netherlands. Elsevier Book Company, Inc., New York, 1949. $5.00.**

This volume, the first of a new series of books published by the Philips valve factory at Eindhoven in the Netherlands, deals with the physical principles, manufacture, and properties of modern valves. The style is exceptionally clear and is largely descriptive, although important details (mathematical or otherwise) are always given. The first five chapters provide an introduction to electron emission and to the basic principles of radio valves, including a short chapter on secondary emission. The text is illustrated by numerous helpful diagrams. In particular, the frequent use of a standard form of diagram to illustrate the potential distribution through a valve under many different conditions is an excellent idea. There follow three chapters describing the manufacture of valves in the Philips factory, which illustrate fully the construction and assembly of their many components. The author compares three methods of construction, namely, glass valves with pinch, glass valves with pressed glass base, and metal valves. The techniques referred to are entirely those of one manufacturer, and are typical of European rather than American practice.

The ninth chapter describes briefly the problem of reception and the operation of typical receivers, leading to the classification of valves according to their functions, while six further chapters outline the valve properties. Characteristic curves are described and two excellent chapters are devoted to the action of the various grids in multi-electrode valves and to the influence of inter-electrode capacities on operating characteristics.

Chapter XV, entitled "Consequences of Curvature of the Characteristic," describes the various types of distortion and cross-modulation arising from this cause. The criteria used in numerical examples relate to commercial standards and distortion figures quoted as "permissible" may seem rather high to the physicist. The analytical representation of the transfer characteristic is discussed in the succeeding chapter.

Use of valves for power amplification, rectification, oscillation, frequency conversion, gain-control, and automatic volume control is described in later chapters. The treatment is sufficiently thorough for most design purposes, but it appears that these subjects will be greatly expanded in later volumes of the series. The clear presentation of material is fully maintained in these chapters. Also included is a section on negative feedback which presents this subject clearly and touches on the criteria for stability in feedback circuits. The remainder of the book deals with thermal and valve noise; undesirable phenomena such as mains, hum, and microphony; and faults due to such factors as intermittency and leakage in the valve electrode assembly.

A comprehensive appendix provides a good account of the relation between various systems of units—the author uses the Giorgi (mks) system—and includes a large number of formulae and graphs for the electronic designer. References are included in the text of the book but the bibliography provided relates only to Philips' publications.

The book is a model of clear, straightforward presentation. It assumes very little prior knowledge of the subject but does not shirk the more difficult aspects. It is highly recommended for students, for specialists in other fields, and for all who desire the clearest possible introduction to electronics. In fact the subject is so clearly presented that many experienced in electronic techniques will find it useful as a reference work.

Other books of the Philips series already announced are: Books II, III, and IIIa, *Data and Circuits of Receiving and Amplifying Valves;* Books IV, V, and VI, *Applications of the Electronic Valve in Radio Receivers and Amplifiers;* and Book VII, *Transmitting Valves.* The aim of the series is to make available to the users of electronic apparatus a clear account of the properties and applications of electronic valves. Books II, III, and IIIa will be of interest to those wishing to have data on the valves of this particular European manufacturer. The other three volumes will be of more general interest as they deal with the applications of valves to circuit problems.

J. R. Whitehead
British Ministry of Supply

How to Write It

AUTHOR'S GUIDE FOR PREPARING MANUSCRIPT AND HANDLING PROOF. **80 pp. John Wiley and Sons, Inc., New York, 1950. (Formerly published as** THE MANUSCRIPT.**) $2.00.**

With the intent of reducing confusion and keeping alterations—and therefore expense—to a minimum, the *Author's Guide* is a detailed set of explanations and instructions to authors of technical books on how to bring up a well-mannered manuscript. The fact that it explains as well as dictates means that there is much in it which should be of use to those who are seeing papers through publication in the journals though it should be borne in mind that all publishers have local ground rules.

Anyone with a book in mind could well profit by referring to this book about books before preparing his final manuscript draft. A flow chart included up front, which shows what happens to a manuscript once it disappears into the publisher's hands, is of a complexity sufficiently awe-inspiring to soften even the most unregenerate author and make him receptive to the suggestions that follow. The suggestions themselves are sensible and flexible. They cover such matters as preparation of the manuscript and of illustrations, checking the editing, minimizing the effect of alterations, correcting galley and page proofs, etc. A glossary of terms should help the uninitiate penetrate the mysterious world of the printer and might save him from the embarrassment of altering instructions to the printer in the mistaken belief that gross editorial liberties have been taken.