

the main topics of present-day geophysical research, and clearly is intended for a reader who knows some basic physics and would like to learn more about his environment. As such it can be recommended for the sixth form and the university, for it is accurate, clear and furnished with good diagrams. There is only one feature that I found mildly irritating: that, with very few exceptions, proper names are avoided. But surely it is a disadvantage for the reader not to be told, for example, that the mode of formation of rain described in this book is always called, in meteorological literature, the 'Bergeron-Findeisen process', or that the initial discovery of the high-level warm layer from observations of meteors was the work of Lindemann and Dobson?

GRAHAM SUTTON

## PRINCIPLES AND APPLICATIONS OF TRANSISTORS

### Fundamental Principles of Transistors

By Dr. J. Evans. Pp. xii + 332. (London: Heywood and Co., Ltd., 1962.) 50s. net.

### Physical Principles and Applications of Junction Transistors

By J. H. Simpson and R. S. Richards. (Monographs on the Physics and Chemistry of Materials.) Pp. xiv + 519. (Oxford: Clarendon Press; London: Oxford University Press, 1962.) 63s. net.

ALMOST all authors of books on the transistor began their scientific lives before 1948, the year transistor action was discovered. They have therefore come to this subject by way of others, such as the thermionic valve, computer design or network theory. Many of the readers of the books may be much younger, but again their interests and background knowledge are diverse; some view the device as a product of the physics of semiconductors and some as the starting point for new electronic circuits and systems. This spread of both authors' and readers' points of view and the rapid advances in technology, electrical performance and applications combine to increase the difficulty of choosing most suitably the approach, coverage and attention to detail in a new book.

Certainly we have yet to repeat, for the transistor, the happy position reached by the early '40's in books on the thermionic valve. For then we had several, mostly coming from the United States, which were notable for being balanced in content, soundly based scientifically and well written. While the inference that all books on the transistor can be lightly dismissed must not be drawn, none has chosen a coverage and approach which have marked it as an obvious example for others to follow, with depth of detail as the only variable. However, the task of authors may be easing for the subject is now acquiring some inertia.

The first edition of Dr. Evans's book, published six years ago, was well received; it was a descriptive effort which did not tax newcomers, but stimulated thought with provocative comments. The second edition seems less lively in style but otherwise much in keeping with the first. Some topics, particularly the diffused-base transistor, are much expanded, and there is more quantitative detail. The main themes are unchanged as the physics of semiconductors and *p-n* junctions, the prediction of the properties of transistors, and transistor technology. A chapter on the basic theory of semiconductors, part of the first theme, makes some telling points, but one must have some reservations about such an abbreviated account of the bedrock of the subject. Readers who have investigated fuller accounts may be apt to undervalue the book because this chapter so lightly skips over complications. The *p-n* junction is dealt with at slightly greater length;

here mention could have been made of the current/voltage relationship when generation in the depletion layer predominates, and the capacitance of a junction should have been calculated as  $dQ/dV$  without reference to the parallel plate capacitor, which is a poor analogy. The chapters on the internal operation and electrical properties of transistors give attention to most key features, but the reason that a graded base introduces a drift field might have been given more convincingly. The account of transistor technology covers many processes, with fair comment on them. Unfortunately the planar technique, announced in 1960 and soon recognized as a powerful competitor to many others, escapes attention.

The second book is based on a course of lectures, given to electrical engineers working for a master's degree, by two of the staff of Canada's National Research Council. It might almost be said to start where the other leaves off, for it concentrates on applications. Only the first sixth deals with principles, largely by description rather than analysis except for three appendices. Key formulae are given with occasional comments on their less-obvious features; but more enquiring readers must turn elsewhere for the underlying physics. The next third of the book deals with what threatens to prove one of the least tractable parts of the subject—the representation of the electrical properties of the transistor. If it is done without attention to prediction based on the physics of junctions, the purpose of any account of the physics is largely lost; but the physics reveals an electrical behaviour not easily simulated by any simple network of conventional generators and passive elements so that users turn to empirical representations which are more compatible with their methods of network design and analysis. The authors fluctuate between equivalent circuits and two-port parameters without sufficient comment, and allow description of the structures of several types of transistor, common and rare, to intrude. Noise and bias stabilization are dealt with more neatly. Switching properties are described by the approach of Ebers and Moll rather than that of Beaufoy and Sparkes. The second half of the book describes and analyses the commoner transistor circuits. It will help many newcomers to an understanding of past design for it is very readable; a lengthy chapter on negative feed-back justifies itself particularly by the variety of methods of application considered. But more emphasis on designing to accommodate tolerances and some attention to transistor logic circuits might have been expected in a book of this length.

Both books have sufficient appeal in price and presentation that they may well be widely read; and they deserve to be, as part of any introduction to the large branch of electronics depending on the transistor.

J. R. TILLMAN

## PHARMACEUTICAL STANDARDS

### British Pharmacopoeia 1963

Published under the direction of the General Medical Council. Pp. xxviii + 1210. (Published for the Council by the Pharmaceutical Press, London, 1963.) 100s.

### British Pharmaceutical Codex 1963

Pp. xxxvi + 1433. (London: The Pharmaceutical Press, 1963.) 105s.

THE publication of the tenth edition of the *British Pharmacopoeia* and the eighth edition of the *British Pharmaceutical Codex* on the same day and, of even more significance, that they should officially supersede all previous editions on January 1, 1964, is one more tangible sign of the increasing co-operation which is developing in the essential but ancillary services that support general medical practice in Britain. This double publication modifies a pattern which was established with the first