

enlighten basic phenomena of plasma theory and hydromagnetics. The present volume, like that of 1950, illustrates this characteristic.

However, though the part of the 1950 volume which had to do with basic theory seemed to be the best part of the volume, I must confess to have been a little disappointed by the new book. Whereas the 1950 volume was a pioneering volume, the many developments since 1950 have deprived the new volume of much of the pioneering flavour. Also the multiplicity of the new topics introduced has meant that the discussion could not always be complete; in fact, at times it is somewhat vague and inconclusive. Not infrequently a diagram is used as a substitute for detailed analysis; this is unfortunate at times, as when one is led to suspect that the analysis is incomplete (p. 190) or that it actually would not support the conclusions drawn from the diagrams (p. 128). Again, certain important papers are omitted from the otherwise very detailed bibliography—perhaps because the discussion does not normally go deeply into mathematical arguments. One may example papers like those of Parker (1957) and others, bridging the gap between hydromagnetics and single-particle theory, a gap which Alfvén has sometimes chosen to stress in recent years.

Finally, the book at times departs from the basic theory to embark on more troubled waters. For example, it points out (p. 55) that the original Chapman-Ferraro theory of magnetic storms did not take into account the possibility of an interplanetary magnetic field; this is correct, and recent presentations of the Chapman-Ferraro theory have had to be modified to meet this criticism. On the other hand, theory and satellite observations also combine to show that the field when a stream from the Sun impinges on the Earth cannot be obtained simply by superposing the fields of the stream and the Earth; but the discussion on pp. 55-57 appears to be based on precisely this superposition. Points like these are small defects in a volume devoted to basic theory, but they rankle.

T. G. COWLING

A SOURCE-BOOK OF MICROWAVE ENGINEERING

Microwave Engineering

By Dr. A. F. Harvey. Pp. xlii + 1313. (London and New York: Academic Press, 1963.) 250s.

THE sheer size of this book gives rise to the rather obvious comment that it is inconveniently bulky, and would perhaps have been better produced in two volumes. It also serves as a testimony to the industry of its author in gathering together such a mass of information. It is worth noting that Dr. Harvey lists more than 10,000 references.

Microwave engineering is a vast subject, and the task of writing a book covering all its aspects is truly formidable. It is possibly beyond the power of any individual to do so with complete success, and it must be admitted that the book is not wholly successful, chiefly because it attempts too much. Dr. Harvey has undertaken to describe not merely main principles and typical devices, but often several variants of each device. Large though the book is, there is simply not enough room to discuss so many topics adequately.

The book begins with an account of electromagnetic wave propagation, including propagation in waveguides of various kinds, followed by chapters on practical forms of waveguide and on waveguide circuit elements. Next follow chapters on the measurement of power, attenuation, impedance and wave-length, and on the measurement of the properties of materials, together with a survey of the properties of the more important materials. Parallel plate systems and periodic and guiding structures are then dealt with, the latter leading into two rather sketchy

chapters on microwave valves. Optical type techniques and antennae are treated; these two chapters are among the more successful. The authoritative and effective Chapter 15, on mechanical design and manufacture, gives a clear and comprehensive account of constructional techniques; an account which will be a valuable addition to the literature. Dr. Harvey then deals with receivers, duplexers and frequency stabilization. There follows a description of industrial and biological aspects of microwave radiation, and chapters on particle accelerators and microwave communication and radar systems complete the book. The material is presented in a unified manner, and there is an exceptionally complete and well-organized index.

It has already been said that there are certain weaknesses in the book. The highly condensed 'hand-book' style which the author has adopted leads to ambiguities and uncertainties unless the reader has a fairly good background in microwave theory. In descriptions of apparatus or experimental results there is seldom much difficulty, but when underlying principles are being explained the arguments are often lacking in clarity and precision. Assumptions made and conditions for validity are often not clearly stated.

The book is almost completely non-critical. This is perhaps inevitable when the coverage is so wide. On a single page of text there are typically ten or more references; it is clear that with this density of reference a critical approach to each is out of the question. The book would have been more useful as a text if the author had selected the most significant 10 per cent of his enormous list of references and written the book critically around them. On the other hand, there is a corresponding advantage as the book serves as an extremely convenient source book. It is not a text-book for the student, but it will be of value to the professional microwave engineer. In many cases, it will save the trouble of looking up the references by providing enough information for the purpose, but if a detailed study of any topic is needed, it will usually be necessary to go back to the original papers.

In summary, the encyclopaedic character of Dr. Harvey's book brings disadvantages as well as advantages. I myself feel that the book would have been more valuable if its coverage had been more restricted and its style more critical, but its usefulness as a source-book will earn it a place in the library of any microwave laboratory.

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TELEVISION TECHNOLOGY AND APPLICATION

Television Engineering

Report of the International Television Conference held in London, 31st May-7th June, 1962. Pp. viii + 577. (London: Blackie and Son, Ltd.; distributed for the Institution of Electrical Engineers, 1963.) 240s.

THE International Television Conference was organized in a number of sessions covering the whole field of television.

The session on systems standards dealt mainly with ways of saving bandwidth and its most economical use. The two most interesting ones were the application of Mertz's classical investigations to the interleaving of sound within the picture and the saving of bandwidth by de-randomizing the picture information. In the pick-up tube field, substantial improvements in resolution and performance of vidicons and progress with the 'Plumbicon' (lead oxide target vidicon) were reported as well as electron optical problems in image orthicons. There are now transistorized image orthicon cameras available. Frequency assignments in the ultra-high-frequency and very-high-frequency fields on a national and international scale were discussed.