

pellers and windmills, together with a good introduction to supersonic flow. The section on hydraulics includes an introduction to the theory of open water courses, and shock waves on running water, together with a sketch of the theory of water turbines and pumps. The extensive section on meteorology gives an account of the basic theory of winds and of the general circulation of the air over the surface of the earth. Numerous other topics are covered in this book, including, for example, the theory of heat transfer and lubrication; but perhaps enough has been said to indicate its immense range.

Throughout this great survey, the hand of the master is evident in the powerful use of quite elementary theory to correlate complex phenomena in applied dynamics. On one hand, the book is admirably suited to a student who is approaching the subject for the first time and who wishes to start from its physical basis; on the other, it is, in fact, almost a small encyclopædia which can be used with great profit as a book of reference by the most advanced research students.

RADIO TECHNIQUES FOR RADAR

Radio and Radar Technique

By Dr. A. T. Starr. Pp. xviii+812. (London: Sir Isaac Pitman and Sons, Ltd., 1953.) 75s. net.

THE great advances in radio and electronic techniques which have taken place in the past two decades were largely stimulated by the war-time work on radar. Most of this work has already been published in a vast number of papers in the technical and scientific journals. The American and some British work has been collected together in the very comprehensive series of books prepared by the Radiation Laboratory, Massachusetts Institute of Technology, and published by McGraw-Hill. A good deal of the British work has also appeared in the much more compact but still fairly comprehensive series published by the Cambridge University Press. The aim of the present book is to compress most of this work into a single volume. The author has of necessity had to exercise discrimination in choice of material, leaving aside much that is only of limited interest or has become obsolete. That he has succeeded in covering the field in a single volume, even though somewhat bulky, is no small achievement, and there will be many who will prefer to have the material for easy reference in this form. Most of the subject-matter has already appeared in print; but the author frequently adds valuable hints for the engineer based on his own wide experience of these techniques. The compression necessary in such a volume will, however, lead most serious workers in the field to read the more specialized books on the different aspects of the subject which have already been published.

The main broad advances which have been made lie in the use of circuit techniques to generate the wide variety of wave-forms which enable modern electronic equipment to carry out such complex functions, and in the extension of the usable radio spectrum to the microwaves. Since much of the equipment was designed to work at the limits set by random fluctuations of a fundamental nature, a much better appreciation of the properties and character of electrical 'noise' was obtained. These matters are dealt with, and, in particular, the development of valves for the generation of microwaves is discussed.

Chapters are also included on aerials and waveguides, and on the principles of modulation and communication of information generally.

Some mathematical treatment is given in the text; but the bulk of the theory is relegated to a long series of appendixes which occupy about one-quarter of the book. A bibliography is given at the end of each chapter; but this seems to have been chosen rather arbitrarily, and is by no means a complete account of the original papers nor a suitable guide for a beginner to the literature on the subject. Frequently reference is made to war-time reports of Government establishments. These reports are not generally available, and in any event contain material which has been published elsewhere. The book is well produced though the scale of many of the figures is too small for numerical use. For a book containing such a wealth of information the price is not excessive.

R. A. SMITH

MASS SPECTROMETRY

Mass Spectrometry

Report of a Conference organized by the Mass Spectrometry Panel of the Institute of Petroleum and held in Manchester, April 20-21, 1950. Pp. vi+205. (London: Institute of Petroleum, 1952.) 30s.

MASS spectrometry has rapidly become a technique of major importance in both routine testing and research investigations, and it was with the object of assisting in the application of this technique that the Mass Spectrometry Panel of the Institute of Petroleum was formed. The present volume reports the proceedings of a conference, organized by the panel, held in Manchester in 1950, and is a valuable addition to the literature on this subject.

Fourteen papers by established workers, surveying almost the whole field of mass spectrometry, are conveniently divided into four distinct groups, the first group dealing, appropriately, with the fundamental problem of the ionization and dissociation of molecules, and comprising four papers covering topics such as the measurement of appearance potentials and the consideration of the information derived from these, the determination of bond dissociation energies, and the detection of free radicals. The second group is concerned with instrumental aspects of mass spectrometry and contains a description of a French mass spectrometer followed by a paper discussing aspects of ion source design—one of the most important features of the modern mass spectrometer.

Applications of the mass spectrometer and the preparation of standard gases for calibration purposes are dealt with in the third and fourth groups; these are of more general interest and may, therefore, be the sections of greatest appeal to the reader not closely connected with this type of work, since the subjects discussed include isotope enrichment, isotope abundance measurements, syntheses using carbon-13, and some uses of stable isotopes. Also included in this section is a valuable discussion of the problems involved in the preparation of standard hydrocarbon samples.

A most acceptable feature is the provision of a very complete and classified bibliography on mass spectrometry from 1938 to the end of 1950; this in no small measure makes amends for the delay in the publication of the report.

JAMES BELL