

logues. Some readers may also be misled by the curious confusion between UT2 and Ephemeris Time, which is erroneously stated to be dependent on the rotation of the Earth. They will, however, find the first and last chapters of more interest; these deal, respectively, with the Astronomers Royal and their staffs (what a wealth of material from which to choose) and with the changing status of the observatory. Perceptively written, they go beyond the mere recording of events, and analyse changes and trends and their future significance. The last 10, 20 and 30 years have seen fundamental changes—in control, direction, function, equipment and staffing—greater than in the previous 270 years; and it is perhaps premature to do more than record them. The author's assessments and views as to the future will be studied with interest, even if not with universal agreement.

In Volume 3, Derek Howse has had the more straightforward—but not less onerous—task of describing the buildings and instruments at Greenwich. He has produced a definitive record that is worthy, in every respect, of the traditions of the observatory. Authoritative, well documented, comprehensive and detailed, it is also admirably planned and presented. The first chapter is devoted to a narrative account of the growth of the buildings, and is supplemented by an appendix showing ground plans at six dates. This is followed by

detailed descriptions of the instruments, arranged in chapters according to design or function; for each is given precise factual data, method of use, and history. Almost every instrument is included in the 130 illustrations, which also include specimens of the published results obtained with the more important of them. The style is direct and economical—and very readable. Altogether, it makes a superb publication which represents many years of patient research and devoted labour by the man mainly responsible for transforming the war damaged and neglected buildings, and their contents, into their present excellent condition. It is appropriate that the Director of the RGO, Dr A.

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Hunter, should have contributed an introduction to this volume. He refers to the pride which members of the Greenwich staffs had in their historic establishment; they had also, and still have, affection. This volume in particular will give them—and many others—universal pleasure. □

High Energy Astrophysics and its Relation to Elementary Particle Physics. Edited by Kenneth Brecher and Giancarlo Setti. Pp. 591. (MIT Press: Cambridge, Massachusetts and London, 1974.) n.p.

THIS book is a collection of the lectures given at the International School of Astrophysics held in Erice, Sicily, in the Summer of 1972. The lectures have taken more than two years to be published although the publishers had hoped to reduce the publication time by printing the book in typescript format. This delay in publication is a major drawback to the book, especially as far as the lecture course on X-ray astronomy by Giacconi is concerned. That subject is not static and three years ago the physics of accretion discs was not fully appreciated. My major criticism of the book, however, is that most of the lectures present personal views of high energy astrophysics and related topics. For example, Hagedorn writes on his theory of strong interactions, implying an upper bound to the temperature during the early stages of the universe; that must be compared with Hoyle's Machian type cosmology

in which he hopes to determine the masses of fundamental particles.

The lectures on observational astrophysics (Arp, Burbidge and Sargent) are, with the exception of that from the first of these authors, less one-sided. Sargent presents a good review of the standard determination of the Hubble constant and the deceleration parameter. Unfortunately, there are many diagrams rather than photographs of galaxies and clusters—it would be nice to see what some of the objects really look like. Arp presents very much his own interpretation of the redshift problem (the possible physical association of objects with high and low redshift) and there are books available which present both sides of this argument.

The school was, and presumably the book is, intended for graduate students in astronomy, but I would hesitate to recommend this volume to that particular group. Some of the contributions (for instance, those by Sargent and Hagedorn) give an extensive list of references, whereas others give no references at all. But as the book is generally very readable it is at least good bedside reading.

Andrew Bolton

Guide to positional astronomy

Positional Astronomy. By D. McNally. Pp. xiii+375. (Muller: London, March 1975.) £8.50, cloth; £4.25, paper.

THERE are some who may feel that a new introductory text on positional astronomy is superfluous, in view of the comprehensive nature of W. M. Smart's *Textbook on Spherical Astronomy*; they would, however, have missed the point of McNally's book. The ground covered (necessarily very similar to that surveyed by Smart) begins with a chapter establishing a background of spherical trigonometry. This is followed by a very clear introduction to coordinate systems, a discussion on methods of time measurement, and a chapter outlining the derivation of first-order corrections for those factors (from refraction to proper motion) which displace the image of a star from its geometrical position. Eclipses, occultations and transits are dealt with, and there is a useful section on plate measurements by the method of dependences. Two chapters cover elementary orbit theory and the determination of the elements of a planetary orbit, and the book concludes with a consideration of the information obtainable from observations of binary star orbits.

Intended for the first year undergraduate as an introduction to the concepts underlying astrometry, the strength of this book lies in the organisation of its material. Each chapter follows logically, introducing further refinements to measurements and techniques as necessary. And the appendices, which summarise many formulae and the relationships between them, are particularly handy for quick reference.

The subject matter is also refreshingly up-to-date, particularly in the chapter on 'time', but it is regrettable that the presentation is not more modern. That shortcoming, and the rather dry style of writing, combine to render *Positional Astronomy* a textbook in the traditional mould, and one which is not easy to read through from cover to cover. With the widely held view among many undergraduates that the study of astrometry is a necessary evil, perhaps it would have been more helpful if the author had taken a more 'popular' approach.

As a text, however, this book succeeds, and it should prove a useful guide to the working astronomer who needs to refer to astrometrical techniques as a means to an end. It may well enjoy more acclaim in this market than in that for which it was originally intended.

Heather A. Couper