Nuclear Fuel Services fuel reprocessing plant near Buffalo, New York. He gained seawater conversion experience on such Bechtel projects as the Southern California Metropolitan Water District's study of a nuclear power desalting plant, analyses conducted for the OSW and USAEC on large nuclear-saline water conversion plants, and other sponsored studies for the development of water conversion process materials technology and facility designs. Before joining Bechtel in 1958, Mr. Davis was the Director of the USAEC Reactor Development Division.

OUTSTANDING COVERAGE

Title Scientific Satellites

Author William R. Corliss

Publisher U.S. Government Printing Office, 1967

Pages vii + 822

Price $3.00

Reviewer William C. Bartley

The objective of this book on unmanned scientific satellites and the scientific experiments they carry is, according to the Foreword, to record the development of space equipment and instrumentation, and thus to provide a ready reference on how scientific results have been obtained. The result is a useful earth-satellite encyclopedia for the layman, a condensed handbook for the spacecraft engineer, and a refresher course for the space scientist in measurement techniques outside his discipline.

The book is divided into three parts. The first contains two chapters: a thumbnail review of near-earth space science and its objectives, and a very readable capsule history of scientific satellites. The first chapter, in addition to providing the nonscientist with an overall perspective of earth physics research, lists the principal competing arguments for unmanned automated vs manned spacecraft for scientific investigations. Unlike many documents that describe space exploration in a monotone of unrelieved facts and figures, this volume is written in an empathic style that generates in the reader enthusiasm for the subject. The second chapter is an excitingly told story of satellite concepts beginning with Hale's "Brick Moon" of 1870.

The second part is a seven-chapter handbook on satellite technology: construction, dynamics, data handling, launch vehicles, and the like. It outlines the technical phases of feasibility, design, and integration, and leads to an appreciation of the magnitude of effort and time required from inception to launch for the development of a spacecraft.

Comprising Part Three are four chapters describing satellite experiments in physics and astronomy and one chapter on unmanned satellite biology and bioastronautics. The components and physical theory of ~100 representative instruments are described in understandable terms. The reviewer will comment only on the treatment of cosmic ray instruments, the field in which he is most qualified.

Under "Satellite Astronomy" the author describes the basic geometry and operation of these instruments with some thoroughness but is more ambiguous in describing total experiment details. For example, he lists *direction of arrival* as a major parameter and mentions earlier, under "Solar Physics," how one measures cosmic-ray anisotropies. Not explained is how a typical telescope array on a spin-stabilized spacecraft can accurately resolve anisotropies using a sun-synchronous computer. In general, this section of the book omits signal conditioning techniques, which are critical ingredients in the design of many experiments.

Because of the large amount of material to be covered, explanations of physical phenomena are overly simplified and hence some incorrect statements appear, e.g., ". . . galactic cosmic rays are omnidirectional, and moderated only when a tongue of solar plasma diverts them away from the Earth (Forbush decrease)." Actually, galactic particles are anisotropic (directional) to varying degrees, depending upon their energies, due to co-rotation of the cosmic rays with the sun—the cause of the well-known diurnal variations in cosmic rays seen at the earth's surface. These are subtle points, however.

The book is well organized and free of typographic error. An alphabetized bibliography for each chapter and an index appear at the end of the book. Appended is a comprehensive catalog of virtually all unclassified unmanned scientific satellites and experiments flown since 1957, complete with sketches and photos.

Naturally the treatment is superficial, but of the many reference works on scientific spacecraft available today, this one is outstanding for its overall coverage.

William C. Bartley is a scientific co-investigator with K. G. McCracken on cosmic-ray experiments for seven NASA flights: Pioneer deep space probes VI, VII, VIII, D, and E, and Explorer satellites XXXIV and IMP-G. With BS and MS degrees in electrical engineering from Michigan State University, he moved up through circuit and systems design to a management position in the integrated circuits group at Texas Instruments before joining in 1963 the Southwest Center for Advanced Studies, Dallas, where he set up a cosmic-ray spacecraft payloads development group. He was manager of that group until joining the National Academy of Sciences, Washington, D.C., in 1967. He is currently active in the work of the Space Science Board and the Committee on Solar-Terrestrial Research.

BOOK ANNOUNCEMENTS

Although the following will not be reviewed, they may be of interest to some of our readers:

Space Systems Technology, Regis D. Heitchue, Jr., Ed., Reinhold Book Corporation, 1968, x + 300 pp, $15.00

Proceedings of the Sixth Symposium on Nondestructive Evaluation of Aerospace and Weapons Systems Components and Materials, Southwest Research Institute and Society for Nondestructive Testing, Inc., Co-sponsors, Western Periodicals, 1967, viii + 575 pp, $20.00