

is now devoted to cosmic rays whereas, in the previous edition, the corresponding chapter included a section on strange particles. The chapter which in the second edition was entitled "Fundamental Particles" has been revised and is called "Fundamentals of Electricity and Matter." Most of the other chapters have been revised to some extent, and those chapters dealing with applications have been expanded significantly.

One does not expect to find much to criticize in a book by Glasstone and this is no exception. There are a few misprints and other trivial errors, but the intent of the text is clear, even to the cursory reader, in each instance. It seems certain that this book, in its new edition, is destined to remain the classic reference in its field.

William G. Pettus

The Babcock & Wilcox Company
Lynchburg, Virginia 24505

January 25, 1968

About the Reviewer: William G. Pettus holds a PhD in Physics from the University of Virginia. Since 1956, Dr. Pettus has been a senior experimental physicist with Babcock & Wilcox's Critical Experiment Laboratory in Lynchburg. His work has included experimental and theoretical investigations of neutron resonance absorption phenomena, Fermi age measurements in water and various metal-water lattices, and the development of neutron spectrum measurement techniques.

Servomechanisms. By L. J. Bulliet. Addison-Wesley Publishing Company, Reading, Mass. (1967). 276 pp. \$9.95.

An interesting problem arises in the consideration of the type of education needed by the technician, operator, or maintenance engineer in some of our complex process plants. In nuclear-power-plant instrumentation and control systems, we want technicians to be able to fix things fast. To some extent, we are far less concerned with a technician's basic knowledge concerning why something works than we are with his familiarity with how it works. We want the technician to be familiar with all of the input-output symptoms of working and malfunctioning systems. Then, when something goes wrong, it would be very nice if he could reach into the cabinet and replace the right card or component in true serviceman tradition. This type of operation or maintenance function requires only knowledge of the specific devices on hand and a strict set of procedures, such as "measure this voltage first," etc. The theoretical background required by the fixer can be minimal.

Bulliet's book starts with the premise that our operators and maintenance engineers of the future will be graduates of junior colleges, technical institutes, or possibly two-year community colleges. On this basis, they can be given more than radio ham training or training in the application of simple mechanical skills such as those known to the automobile repairman. *Servomechanisms* is an attempt to go one step beyond the simple description of control devices in an effort to at least reach the maintenance supervisor. The assumption is made that he should be capable of designing simple servo systems, if not high performance ones.

The dilemma arises in the assumption of background knowledge. The book is beautifully simple and clear, but requires previous exposure to a very good high school physics course or a supplementary mechanics course. And

although physical intuition is used in the derivation of the equations, the language requires a background of at least one year of calculus. Most of the text is based on an intuitive feel for variations in the parameters of second-order differential equations. Many of today's plant technicians simply do not have this background. If a student does have this type of background and physical feel, under normal circumstances he would be likely to go on and get an engineering degree. As an engineering text for the examination of design problems and principles, Bulliet must compete with fifteen or more texts on servomechanisms that are better suited to this purpose.

This book might be more valuable for those in other engineering fields who want a cursory view of the principles of servo systems without getting too involved. Bulliet's book reads fast and anyone with an engineering degree should have little difficulty working his way through it in a couple of nights. The elementary servo language is there as are the operating principles. Descriptive material is provided on synchro devices as followers and error detectors. A good explanation is given of the operation of magnetic amplifiers and saturable reactors. Problems are presented at the end of each chapter; many require descriptive rather than mathematical answers. The problem of the "hunting" servomechanism is emphasized, but the reader should not expect to be able to design his way out of any specific oscillating situation. The serious reader, however, would be able to discuss and describe very clearly the parameters of a servo problem to a design engineer. Well, maybe that is what we should expect of our technicians, the ability to describe a problem so well that the solution is at once apparent to someone skilled in the art.

M. A. Schultz

Milletron Incorporated
Pittsburgh, Pennsylvania 15238

November 4, 1967

About the Reviewer: M. A. Schultz was brought up as a radio engineer in the exciting days when Bode and Nyquist theory were coming in to displace the Routh stability criterion in the design of stable servomechanisms. His early experiences in the field were painful, particularly when told by the captain of a destroyer to stop tearing the mast down with a hunting radar antenna mechanism or get the blankety blank radar set off the boat. Possibly as a consequence, Mr. Schultz transferred his allegiance to the nuclear business in 1949 and became the author of the first servomechanism text in the nuclear field, Control of Nuclear Reactors and Power Plants.

Radiation Heat Transfer. By E. M. Sparrow and R. D. Cess. Brooks/Cole Publishing Company, Belmont, California (1966). 322 pp. \$9.50.

The dramatic growth of interest and research activities in radiation heat transfer in recent years is best demonstrated by the sudden appearance of several books devoted solely to this subject. The aim of the present book, as stated by the authors, is to provide a contemporary account of radiation heat transfer suitable for use as a college text as well as a reference source for both research workers and practicing engineers. In view of the difficulties associated with writing a research-oriented text for an active and rapidly changing field, the authors have achieved their