ticles, the two neutrinos, radar astronomy, aperture synthesis, and quasi-stars. Most of the revision comes in the last two chapters which deal with the use of rockets and satellites for scientific research.

An outline of the contents (some comments accompanying) reveals the scope of the work. Chapter 1: a brief historical account of the period 1900-1925, an account of the atomic structure of matter, some methods for determining masses and other properties of atoms and their electrons; Chapter 2: wave mechanics and some of its consequences; Chapter 3: a variety of subjects including the influence electrons exert on the electrical and magnetic properties of solid materials as in vacuum tubes, transistors and ferromagnets, superconductivity, superfluidity, the principles involved in high speed computers, masers, lasers, and the Mössbauer effect. This was one of the most interesting chapters, with particularly cogent accounts of superconductivity, superfluidity, and the Mössbauer effect; Chapters 4 and 5: relativity as applied to macroscopic and to atomic dimensioned bodies, respectively—several topics in these chapters were characterized (perhaps not surprisingly, in this level work) by a lack of clarity such as in the question of the reality of space contraction and time dilation, or by conceptual difficulties as with the topics of zero point field energy, and polarization and field fluctuations in the vacuum; Chapter 6: tools employed in studying the nucleus including accelerators, counters, cloud, bubble and spark chambers, along with some results obtained with their use; Chapter 7: large scale utilization of nuclear energy through the use of uranium fission; Chapter 8: high energy particle physics; Chapter 9: most concerned with neutrinos and conservation relations—in this and the preceding chapter, the challenge of the task of coping with the barrage of entities forthcoming from high energy physics is made amply clear via the author's valiant, but not always successful, struggle for clarity in his own account; Chapter 10: the shift is now to large scale phenomena, beginning here with a very interesting account of the plumbing of radio-astronomy into our galaxy and beyond; Chapter 11: exploration of earth's upper atmosphere; Chapter 12: artificial satellites, lunar and planetary probes.

The book is qualitatively, rather than analytically, descriptive in manner. Although a very few subjects seemed tossed in in a rather sketchy manner (for example, second sound in liquid helium II), and despite the wide range of topics, the work did not seem superficial. An overall impression was received of a closely knit, compact ensemble with not many loose ends dangling. Part of the reason for this is the use of frequent cross referencing within the body of the text to relevant items appearing either earlier or later in the text.

The author employs the cgs system of units and chooses (to the chagrin, and accompanied by the gritting of teeth, of the reviewer) to use centrifugal rather than centripetal force in describing orbital motions.

To specialists who suffer from the occupational hazard of physics tunnel vision or progressive deterioration of perception of peripheral fields of physics, the partial panorama provided by this book could be a refreshing eye-reopener, if they would but maneuver it into their restricted fields of view. To physics and physical science teachers at all levels, the book should prove valuable as a mind stretcher and a perspective broadener, imparting to the mind the sense of quickened living and well-being that in a bodily sense follows a good stretch taken by someone who has been sitting around a lot. Finally, a third but perhaps smaller group to whom this book should appeal is that comprised of bright, curious (and serious) students, from high-school seniors on up.

Roger W. Clapp, Jr.

Associate Professor
Physics Department
University of South Florida
Tampa, Florida 33620

July 31, 1967

About the Reviewer: Roger Clapp is Associate Professor of Physics at the University of South Florida where he has been located since 1963 following several years as a Research Physicist at Redstone Arsenal. Dr. Clapp did his graduate work at the University of Virginia; his research interests are in solid state and surface physics and in thin films.

Sourcebook on Atomic Energy, 3rd ed. By S. Glasstone. D. Van Nostrand Company, Inc. (1967). 856 pp. $9.25.

This book, which is published under the auspices of the Division of Technical Information of the Atomic Energy Commission, has been regarded as a classic in its field for many years. Now appearing in an updated third edition, this encyclopedia of nuclear science remains the most straightforward reference available to the non-specialist. Its role in the past and continuing development of nuclear science and technology is acclaimed by Dr. Glenn T. Seaborg in a foreword which notes that over 100,000 copies of the previous English language editions have been sold since the appearance of the first edition in 1950, plus editions in a number of foreign languages.

If the expansion of successive editions of this book from 532 pages in 1950 to 625 pages in 1958 to 865 pages in 1967 can be taken as a measure of the rate of growth of nuclear energy applications, it would appear that their doubling time is less than 20 years and is decreasing. It is indeed fortunate that the rapid developments of this field have been followed closely and interpreted by one who is so eminently qualified for this role. In describing these developments, Dr. Glasstone has skillfully retained and expounded the underlying theoretical concepts while avoiding all but the most elementary mathematics. Embedded in the narrative is also a concise history of nuclear science up to 1967.

The organization and style of presentation of the third edition is essentially the same as in the preceding editions. The only change of notation is the placement of mass numbers as left superscripts rather than as right superscripts (e.g., ${}^{27}_{13}\mathrm{Al}$ rather than ${}_{13}\mathrm{Al}^{27}$). The familiar double-column format and the paragraph numbering system have been retained. The latter feature is most helpful in view of the internal cross-referencing which is encountered throughout the book. Footnote explanations are used frequently to supplement the text and accompanying each chapter is an extensive list of references which is a new feature in this edition. A seven-page author index has also been provided in addition to a meticulously complete, 19-page subject index.

A new chapter on elementary particles has been added. In spite of Glasstone's skill at unveiling the bare essentials, this chapter remains an order of magnitude more abstract than the others. However, it is unlikely that a more explicit treatment can be found and we should be thankful to have a mentor who can tell us, even obliquely, what the particle physicists are saying. A separate chapter

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