mass coordinates, that is necessary for complete understanding.

The price of the book will probably discourage students from buying it unless compelled to, which is a pity since they are more likely to benefit from it than their more prosperous elders.

Solid State Physics: Advances in Research and Applications. Vol. 2. Edited by Frederick Seitz and David Turnbull. 468 pp. Academic Press Inc., New York, 1956. $10.00. *Reviewed by J. A. Cowen, Michigan State University.*

Solid state physics is growing at such a rate that even the specialist in the field can appreciate well written concise articles on those phases of the study of solids which lie outside of his own immediate interests. Having started quite late among the various annual review volumes which are so popular today, *Solid State Physics* as a unit will satisfy the most demanding reader.

The two articles by Pake and Knight—one a review of the general technique and theory of nuclear magnetic resonance, the other on the specific problem of magnetic resonance in metals—complement each other. Intentionally or otherwise, this juxtaposition makes both articles more valuable and might well represent an aim of the editors in future volumes.

Nearly half of Shull and Wollans' article on neutron diffraction is devoted to the application of neutron diffraction to the study of magnetic ordering and the superlattice. This is as it should be for much of what we know about antiferromagnetism and ferrimagnetism is due to these experiments and their explanation.

The remaining half of the volume contains two papers, "The Theory of Specific Heats and Lattice Vibrations" by J. de Launay and "Displacement of Atoms by Irradiation" by F. Seitz and J. S. Koehler. Speaking as a nonspecialist, both of these were readable and interesting.

This reviewer feels that the summary included by Knight which indicated the direction of current research and the place of the topics which he discussed in the general scheme of magnetic resonance in metals was a very useful addition and hopes that the editors of the series will encourage future authors to include such summaries.

Control of Nuclear Reactors and Power Plants. By M. A. Schultz. 313 pp. McGraw-Hill Book Co., Inc., New York, 1955. $7.50. *Reviewed by T. Teichmann, Lockheed Aircraft Corporation.*

Over the recent years the analysis and design of electronic feedback circuits and to a large extent of electronic control systems have become almost mechanical due to the wide-spread use of the Laplace Transform Methods and of Bode and Nyquist diagrams. The use of a transfer function to describe the behavior of systems has become almost second nature to electronics people but there is a great deal of work to be done yet

in some of the newer fields, such as nuclear engineering, in the extension of these methods. Mr. Schultz has taken a substantial first step in this direction in his book on the control of nuclear reactors and power plants.

The problem of establishing the use of Laplace transform or general transform methods in such a new field consists of several parts. It is necessary to set up the basic physical equations and show how they may be solved in terms of the Laplace transform and it is then necessary to solve a variety of simplified but basic problems by these methods and indicate the significance of the solutions. In the problem of nuclear reactor and power plant control, both these stages lead one beyond the usual electronic type of approach mainly because of the more complex physical equations and because of the approximations which are required in order to linearize the systems. After an introduction briefly outlining the similarity of reactor power plants and direct current generator systems, the author of this book discusses the elementary physics of reactor control without however drawing on any knowledge of nuclear physics. In the next chapter these kinetic equations are then solved in the time domain and then rewritten in the frequency domain. At this stage the book adopts the frequency approach almost completely with however an occasional return to the temporal equations in order not to lose sight of the physical significance of what is going on. An interesting feature of the introduction of the frequency approach is a close tie-in with sinusoidal input signals and the justification of such an approach on the basis of the reactor experiments performed by Harrer, Boyer, Krucoff, and others. A treatment of automatic reactor control follows which is very redolent of sections on automatic controls in electronic circuit books with due regard to the additional complication introduced by such things as delayed neutrons and nonlinear terms. The treatment then digresses to discussion almost in hardware terms of various reactor control mechanisms. Thereafter, the author discusses nuclear power plant control in rather qualitative terms and then establishes the basic transfer functions for reactor power systems and the corresponding block diagrams. The discussion then continues to the question of reactor control radiation detectors and the significance of such measurements on the reactor power system. There follow some extensive discussions of the operational control problems associated with startup, including some quantitative results, power operation, in this case largely qualitative and shutdown, almost entirely qualitative. The final chapter is concerned with simulators for reactor control systems. The book also includes a series of problems all given at the end on the material in the various chapters.

The material of this volume should prove of great use to reactor engineers and also of interest to feedback experts who would like to see the application of these techniques to new physical systems. It is a little disappointing that no extensive discussion is given of nonlinear effects and their treatment in reactor control systems. A certain amount of criticism may also be

leveled at the author's desire to straddle both the transfer function and the differential equation aspects of the reactor control system, as a result of which the treatment is not always completely satisfactory from either aspect. However, taken as a whole the book should be an excellent and useful addition to the science of nuclear engineering.

Measurements of Mind and Matter. By G. W. Scott Blair. 115 pp. Philosophical Library, Inc., New York, 1956. $4.50. *Reviewed by R. B. Lindsay, Brown University.*

This little book by the well-known chemist and rheologist explores some fundamental questions regarding measurement in both physical science and psychology. In it he reviews some ideas about the theory of dimensions of measured quantities which he has previously developed in connection with his own rheological investigations. Much has been written on dimensional analysis by a great many distinguished scientists and scarcely any field of physics has aroused more controversy. The author, having been often faced in his researches with the necessity of directly comparing different physical properties of substances which behave like solids on one time scale and liquids on another, has lost his reverence for the classic principle of dimensional homogeneity. He believes that there should be some way of associating directly and quantitatively viscosity and elastic modulus in the sense, to put it crudely, one might like to say that so many apples are equivalent to so many oranges. Most physicists have fought shy of trying to build theories involving such equations, even though analyses of this sort are common in every day life.

Mr. Scott Blair discusses clearly and entertainingly his theory of what he calls quasi-properties, necessary in the making of dimensionally heterogeneous comparisons. Numerous illustrations are presented, particularly from psychology, and an interesting relation is developed to the Gestalt idea. The first four chapters provide a very simple presentation of the standard theory of physical measurement which any college student of elementary physics could read with ease and profit. The rest of the discussion is much more subtle and will undoubtedly provoke strong differences of opinion. We should, however, be very grateful to the author for providing this interesting and well-written resumé of his views.

Power Reactors. Vol. 3 of the Peaceful Uses of Atomic Energy; Proceedings of the International Conference in Geneva, Aug. 1955. 389 pp. (UN) Columbia U. Press, New York, 1956. $7.50. *Reviewed by L. B. Borst, New York University.*

This is an encyclopedia of reactor technology as seen in 1955. Numerous reactors (both real and imaginary) are described in almost complete detail.

Perhaps the most striking contribution is the exten-