transport problems: neutrons, nonlinear radiation, fast charged particles, and percolation. The idea of self-avoiding random walks is central in two papers, on polymer statistics and on the Ising problem. Of course one great difficulty of Monte Carlo methods for problems with many degrees of freedom is that of attrition, and considerable interest attaches to the various devices for getting round it. The "enrichment" technique for studying polymer chains, as reported in this volume by Wall, Windwer, and Gans, is fairly typical of these devices; and typical also in that the validity of the sampling method still awaits justification.

It is interesting that about half of the work reported was executed on IBM 704, some on the old Illiac, and one job on Mercury. Only two of the authors used IBM 7090. This reflects the current rate of advance of the technical possibilities of computers. The time lag between research work and its appearance in a survey article can rarely be less than two years, and that is about the present duration of a stage in the development of computing equipment. However, this does not detract in any way from the value of the survey. Indeed it is a stimulating challenge to be shown how much was done with the equipment of two years ago; and the extensions and developments made possible by the latest machines rise temptingly to mind.

The book is strongly recommended as a valuable source, of ideas as well as of information, for those about to embark on the use of Monte Carlo methods or who are wondering whether or not they should do so.

Biotechnology: Concepts and Applications. By Lawrence J. Fogel. 826 pp. Prentice-Hall, Inc., Englewood Cliffs, N. J., 1963. $22.00.
Reviewed by Joseph G. Hoffman, University of Buffalo.

Biotechnology is a relatively new subject known also as Human Engineering or Industrial Psychology or Systems Engineering. It deals with the man-machine relationship. In Chapter 20 is given a schematic sketch of the structure of biotechnology in which I counted at least thirty of the major disciplines involved, such as: psychology, philology, information theory, mathematics, anthropology, biology, etc. My preference is to call it Human Engineering because the prefix bio carries the connotation of all living things, not merely man. But then, the word Biotechnology was probably made up by engineers not necessarily imbued with the classic concepts of biosciences.

Section A has two chapters on mathematical models, in which the heading called Probability and Strategy intrigued me. Yet, in its five pages of general discussion I found little satisfaction about the meaning of Strategy in the heading. Section B has six chapters on human information input channels which are visual, auditory, position and motion sensing, somatic, taste, and smell. The reader is presented with a quick sketch of the histologic structure of the sensors and mode of information they send to headquarters. This makes for a wonderfully concise description of mighty complex devices. The reader should be very cautious, however; even the author uses the word "probably" in a number of his descriptions.

Having read this overview of the input senses I was anxious to see Section B on Decision Making because in the third of its three chapters were headings on Evolution of Intellect, Residence of Intellect, and Human Memory. Here is a good description of man's brain (49 ounces in male, 44 in female) with diagrams. But there is no more than one finds in typical anatomy, or in psychology texts. There are not even references to current biophysical theories of memory.

Having followed the information from the input channels to the brain, the next step is to describe, in Section D, the Human Information Output channels. This is given in the responses of the skin's galvanism, heart, brain, muscle, and other organs. The remaining six chapters then discuss Machine and System Design. These latter chapters contain the essential materials of the book. For example, Chapter 15 on Design of the Immediate Environment tells how to protect against variable acceleration and against nuclear radiations. The appendix to this chapter gives nine unbelievable case histories of human beings who jumped out of windows at great heights. One lady sat up and wanted to get right back to the seventeenth floor whence she had jumped and broken two legs and an arm.

Although the author does not tell you more than you already know about the human intellect and its associated memory, he does give a good perspective of human engineering problems. His style is good, especially when he gives an engineer's presentation of the problems he poses. The format is good. There is a table of contents; a subject and a name index; and the figures and tables generously supplement the text.

The Scientific Papers of Sir Geoffrey Ingram Taylor. Vol. 3, Aerodynamics and the Mechanics of Projectiles and Explosions. Edited by G. K. Batchelor. 571 pp. Cambridge University Press, 1963. $17.50.
Reviewed by R. E. Street, University of Washington.

G. I. Taylor needs no introduction to students of fluid mechanics, who must have read one or more of his papers at some time in their careers. In this volume we have 58 of these papers, published over the period from 1910 to 1957; there were 45 papers in Volume 2 and more are promised in Volume 4. While Volume 2 contained the papers on turbulence together with the more or less related ones on meteorology and oceanography, Volume 3 contains the papers on aerodynamics, especially compressible flow. The first paper in this volume is on the propagation of a shock wave, followed by many more on compressibility, in particular the two, published jointly with J. W. Maccoll, on the supersonic flow around a cone and the papers on blast waves due to very intense explosions. Actually, starting in 1939 and continuing on to 1950, Taylor published 18 papers on explosions, their associated shock waves and pressure effects, which indicate his principal interest during the war. During this same time period he was also publishing papers on other problems in aerodynamics, which are included here, as only a man of Taylor's genius could do.

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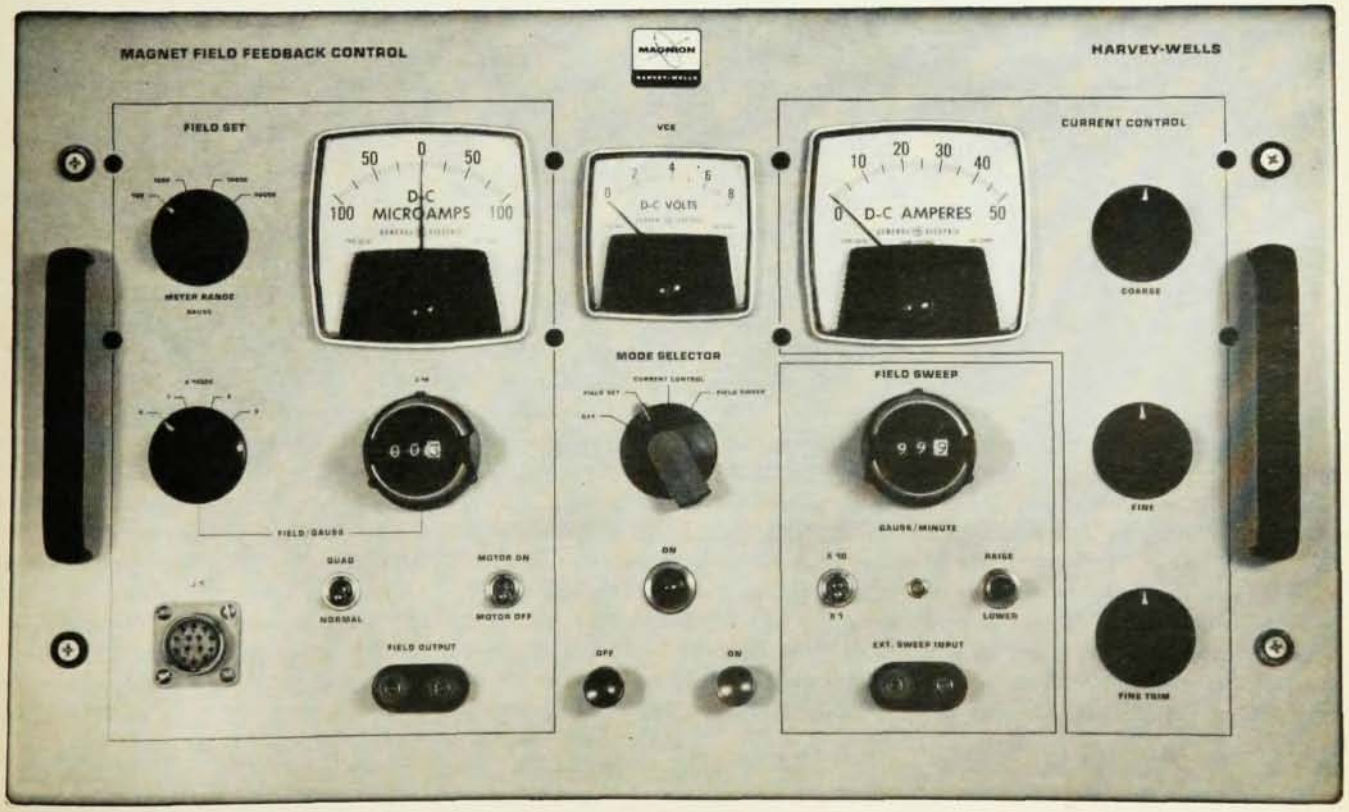

and all show his wonderful style which is a pleasure to read. He has the knack of reducing a difficult problem to its essentials by physical insight and then proceeding to a clear and elegant solution. He quite often devises simple experiments or else uses the experiments of others to check his theoretical work. Consequently, each paper usually ends with tables of numerical values and a clear physical interpretation.

The writings of G. I. Taylor place him in the ranks of Britain's great classicists in applied physical science, and any one of the three volumes can serve as an example of significant research and its lucid presentation to students and researchers in all of the physical sciences. The worker in the field of aerodynamics will find this volume of particular value, for it contains almost all of Taylor's aeronautical papers.

Crystallization of Polymers. by Leo Mandelkern. 359 pp. McGraw-Hill, New York, 1964. $13.50.
Reviewed by H. D. Keith, Bell Telephone Laboratories.

Despite its title, this book is concerned more with phase equilibria in crystalline polymers than with questions as to how crystalline phases are formed in these materials. Indeed it deals only peripherally with crystallization as a dynamic process involving molecular mechanisms and depending vitally upon structural considerations. The viewpoint is strictly thermodynamic and is also intensely personal. Material too has been selected in accordance with personal tastes and, all in all, the book qualifies not as a textbook or a review (it would be seriously deficient as either) but as a commentary.

Roughly the first half is devoted either to processes of fusion (in homopolymers, polymer-diluent systems, copolymers, and in cross-linked polymers) or to the evaluation of thermodynamic quantities associated with these transitions. To the author, as he adheres to a rigidly thermodynamic standpoint, these early chapters afford an opportunity to establish the existence of stable crystalline phases in polymers. There can be few instances, however, in which there are greater difficulties to the application of equilibrium thermodynamics than in the crystallization of polymers where kinetic limitations pose almost insuperable barriers to the attainment of true thermodynamic equilibrium. Physicists would probably be quicker to take cognizance of diffraction and other evidence and may tend to lose patience at this point. The author gives an excellent account of what can, nevertheless, be accomplished by his approach, and in doing so he also provides us with a detailed survey of experimental evidence relating to the influence of molecular weight, diluents and copolymerization etc., on transition temperatures. The value of the book lies largely in the skill with which this evidence has been marshalled.

The remaining chapters are variable in quality. The author is on home ground with "Oriented Crystallization and Contractility" and this is perhaps the outstanding chapter of the book. The review of crystallization kinetics and mechanisms is confined to considerations of a general nature, and recent advances are omitted almost entirely in favor of older and less controversial, but at the same time less informative and less specific, material. The last chapter on morphology is a major weakness and only partly because the author disregards much of the extensive literature of the past few years. The importance of molecular chain folding in polymer crystallization and the kinetic theories advanced to account for this phenomenon, are certainly deserving of a fairer and more accurate treatment. Perhaps one should not visit what are probably the sins of the publisher upon the author, but the claim on the jacket that "recent developments and discoveries in the morphology of crystalline polymers are covered and integrated with the other subject matter" is ridiculous; nothing could be further from the truth.

The approach adopted throughout will probably appeal more to the physical chemist than to the physicist. As a commentary for the specialist the book will be found provocative and stimulating, and it will also serve as a mine of information carefully documented and clearly presented. To the nonspecialist, however, and particularly to the student, it can be recommended only with the attendant caution that it does not represent the whole story.

Introductory Topics in Theoretical Physics: Relativity, Thermodynamics, Kinetic Theory, and Statistical Mechanics. By Roald K. Wangsness. 315 pp. Wiley, New York, 1963. $8.50.
Reviewed by Robert L. Weber, The Pennsylvania State University.

Special relativity and thermodynamics are here presented in such a way as to elucidate the basic physical concepts and also to show how these have become broadened in scope to encompass a diversity of phenomena. The level is that of a senior or beginning graduate text for physics majors. The author assumes a background such as might be obtained in his earlier *Introduction to Theoretical Physics: Classical Mechanics and Electrodynamics.*

Relativity is developed from the consideration of electromagnetic phenomena in moving systems. Mechanics and electromagnetic theory are developed in 4-vector tensor form. Thermodynamics is presented as an empirical and macroscopic subject. The laws are presented in a positive form of definite statements about the existence and properties of state functions rather than in a negative form, describing the impossibility of certain mechanisms.

In each of the four major parts, not only are the basic ideas nicely presented, but they are also developed enough to show their utility. For example, statistical mechanics is applied to para- and ferromagnetism, the free-electron theory of metals, and problems of fluctuation and noise. Some 120 exercises, mostly non-numerical, enable the reader to check his understanding by extending the treatment presented in the text. The fact that the book is set without white-space breaks between chapters and with relatively few line drawings gives it a not unpleasant solid appearance in keeping with its terse but clear style. A student of physics should find *Introductory Topics* a valuable reference work.