ample, limitations of the pumps with respect to attainment of very low total and specific partial pressures. Valves, seals, motion-transfer mechanisms and mass spectrometers that have been applied to vacuum studies are cursorily reviewed. Much of the chapter called "Residual Gases in Ultrahigh Vacuum Systems" is devoted to experimental results obtained at pressures *higher* than 10^{-8} torr. Similarly, in the chapter covering "Degassing Phenomena," the emphasis is not on ultrahigh vacuum, generally taken to imply pressures less than 10^{-9} torr. Perhaps the intended audience is the electron-tube processing engineer, a supposition based on the author's 20-year career with Mullard of England. The two most interesting chapters deal with leak detection and the flow of gases. In both cases phenomena frequently neglected in practice are considered.

The book is subject to criticism on many counts: incompleteness, inaccuracy, typographical errors, and generally poor proof reading. References in particular are poorly handled; not only are there many errors and serious omissions but some of those few, presumably selected, inclusions are to Robinson's own unpublished results.

It is difficult to find any recommending reason for inclusion of this volume as one of the publisher's "High Vacuum Series," because the material presented is much more completely and accurately dealt with in another volume entitled "The Physical Basis of Ultrahigh Vacuum."

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Handbook of Vacuum Physics, Vol. 2: Physical Electronics

A. H. Beck, *ed.*
199 pp. Pergamon, New York, 1968. $8.50

I will begin by registering a difference of opinion with A. H. Beck, the editor, about his definition of vacuum physics. He does not give one in this volume, but it may be inferred from the preface to volume 1, where he says: "Every worker who uses vacuum apparatus or works on the diverse applications of high-vacuum technology . . . has . . . experienced the need for a source in which he could find the essentials of all the many different scientific disciplines involved." Therefore, "The Handbook was . . . conceived as a set of three volumes, volume I on gases and vacua, volume II on physical electronics, and volume III on vacuum technology."

My disagreement stems from the conviction that physical electronics is not necessarily part of vacuum physics. Although physical electronics can not be done without good vacuum conditions and without adequate technology, the obverse is not automatically true. Many other branches of physics also require excellent vacuum conditions, but they are not mentioned in the handbook.

I also question the inclusion of electron optics, heavy-current electron beams and gridded valves, which are the three parts of this volume, under the heading of physical electronics. This, however, is a matter of semantics, but if I were to search for information on these subjects, it would never occur to me to look for it in a book on vacuum physics.

Although the general plan of all three parts is well conceived and executed with considerable skill, it is regrettable to see evidences of haste. The references are meager and none of the volumes have indexes. To put it mildly, I am somewhat lukewarm about this book. The presentation is too condensed to serve as a textbook and too technical for the nonspecialist.

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Dynamics and Mechanical and Electromechanical Systems

Stephen H. Crandall, *ed.*
466 pp. McGraw-Hill, New York, 1968. $13.50

S. H. Crandall and his colleagues in the mechanical-engineering department at MIT (Dean Karnopp, Edward Kurtz Jr and David Pridmore-Brown) have collaborated in a notable contribution. Their book is not just another undergraduate systems text; it uniquely presents a strong espousal of variational methods. Essentially, it is an excellent treatment of dynamics in the broadest sense.

The first half mainly concerns classical mechanics. Hamilton's principle is emphasized early, but Newton's sec-