is the extraordinarily large proportion of logic, mathematical theory, and purely descriptive matter to the material dealing peripherally with electronic design problems and their solutions.

Such might include the many input-output synchronization problems, the numerous problems of cross-talk and pick-up, the signal-to-noise ratio of input devices, the power requirements, the transmission of pulses over relatively long lines, failure localization, ground loops, and so forth, which every computer design engineer must face. Special circuitry, such as sense amplifiers, clock pulse generators, and magnetic-core switching-current pulse-generators are not mentioned, and, of course, may be found elsewhere. The point is, however, that these are the problems likely to haunt the engineer long after his Boolean expressions have been mechanized on paper. That is why this is a difficult book to evaluate. It is at once an extremely broad survey of the "state of the art," reflecting a familiarity with a good deal of the current literature and at the same time a thorough exposition of many of the basic principles and practices underlying the digital computer technology. As a textbook, it should prove valuable, for it is written to and for students, with illustrations and clarifications used profusely. This volume may also prove to be of value to those whose experience in the computer field, while long, may have been rather narrow—technicians, circuit designers, programmers, etc. One may question, however, whether this admirable work actually belongs in the publisher's Electrical and Electronic Engineering Series. For all its strong points, and they are many, the book's weakest area is precisely that of electronic or electrical engineering. It contains numerous excellent presentations of basic principles, and contributes greatly to the diffusion of knowledge in logical design methodology. These are valuable for the engineer's background and understanding, but are more likely to be used by mathematicians or logical designers. As a text in electrical and electronic engineering this otherwise remarkable book can hardly be placed alongside the books of Millman & Traub, Millman & Seely, Terman, and Skilling. It is a book that can stand on its own merits, and needs not to lean on an Electrical and Electronic Engineering Series, achieved by a title with the word Engineering in it. An alternative name for the book, such as "Elements of Digital Computer Programming and Logical Design," would not raise false hopes nor be misleading. This is perhaps a criticism of the publisher and editors and not properly of the book, but must be made, nevertheless.

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46 [Q].—DIRK BROUWER & GERALD M. CLEMENCE, *Methods of Celestial Mechanics*, Academic Press, New York, 1961, xii + 598 p., 24 cm. Price $15.50.

The title of this book appears to represent a compromise with an aspiration that must have had its origin more than a quarter of a century ago. In 1943 this reviewer overheard Bart Bok say, "I told Dirk the best thing he can do for Astronomy is to finish his book." Nearly ten years ago Brouwer was joined by the second author, with the same objective still in view. Both authors have been close collaborators in numerous astronomical endeavors since the end of World

War II. Both have also been amongst the most active research workers in celestial mechanics. This book is unequivocably the finest volume to appear in its field in the English language in the present century. The compromise referred to above is simply that it is not an exhaustive treatise. Nor is it a volume which could have appeared two decades ago. It sets forth the combined wisdom of the authors, based on their extensive experience up to the present, and includes some material (dealing with artificial satellites) not in existence two or three years ago.

The early chapters cover the usual introductory material: elliptic motion, expansions, and attraction of finite bodies. Then follow a few "practical" chapters on finite differences, numerical integration, aberration, precession, nutation, least squares, etc. The meat of the volume is in the chapters entitled General Integrals, Variation of Arbitrary Constants, Lunar Theory, Perturbations of the Coordinates, Hansen's Method, Disturbing Function, Secular Perturbations, and Canonical Variables. While the material is the same, there is nothing of the stereotyped presentation of classical treatises. It is here that the authors have given their own distinctive flavor to the work. Many features could be cited; for example, a deliberate effort to present Hansen's method in its most favorable light, and a correction method for deriving trigonometric series for the negative powers of the distance.

Whether this will prove to be a good textbook in an advanced graduate course is not easy to say without having tried it. That it will prove to be a valuable reference volume for a wide variety of workers both inside and outside this field of specialization is indubitable. For the long-term good of Celestial Mechanics this reviewer is of the opinion that an advanced text is needed which presents the material in the terminology that is familiar to present-day graduates in mathematics and physics; that is, vectors, matrices, gradients, dyadics, tensors, etc. But this is a different objective from that which the authors have set for themselves.

The volume has been meticulously prepared, both by the authors and the publisher, and competently proofread by G. Hori. If errors exist, it would be a shame, but reviewers delight in spotting what they can. To set the record straight, we note that Cowell's method (p. 186) had the incentive of its origin in the discovery of the eighth satellite of Jupiter (*Monthly Notices of the Roy. Astr. Soc.*, v. 68, p. 576). The calculations for Halley's comet came later. But such items cannot detract from the permanent value of this monumental volume.

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47 [S].—A. N. ZAIDEL', V. K. PROKOF'EV & S. M. RAISKII, *Tables of Spectrum Lines*, Pergamon Press Ltd., Oxford, 1961, xliii + 554 p., 24 cm. Price $14.00.

These tables, compiled largely from the M. I. T. Wavelength Tables, were first published in Moscow in 1952. In 1955 the tables were reprinted in Berlin as an International Edition, with introductory text in German, English, and French. The new edition appears to be identical with the Berlin edition except for rearrangement of the introductory sections.

The tables are in three parts. Part I lists the spectral wavelengths of 32 of the more common elements in order of decreasing wavelength between 8000 and 2000A. Intensities in arc, spark, and discharge tube are given, and air lines are included.