while a few of the chapters like the ones on trajectories and orbits give a greater amount of theoretical and mathematical development. It is intended to be a handbook for engineers and in this respect it succeeds very well, since the majority of articles follow the avowed policy of being practical and informative.

To quote from the Foreword by W. von Braun: ". . . the book will help to advance the state of the art at an even faster rate, and will bring us closer to the final goal: Manned Conquest of Space."

The Theory of Probability. By B. V. Gnedenko. Transl. from Russian by B. D. Seckler. 459 pp. Chelsea Publishing Co., New York, 1962. $8.75. *Reviewed by T. Teichmann, General Atomic Division, General Dynamics Corporation.*

THE theory of probability is an outstanding example of the natural combination of mathematical ideas and scientific thought, and its content in each of these areas is so significant that any treatment necessarily concentrates on one or the other of them. Gnedenko's book is aimed at the mathematical aspects of the theory, but a number of examples discussed in the text (as well as those at the end of chapters) serve to make it a very useful introduction to the application of the theory in several important areas of physics and statistics.

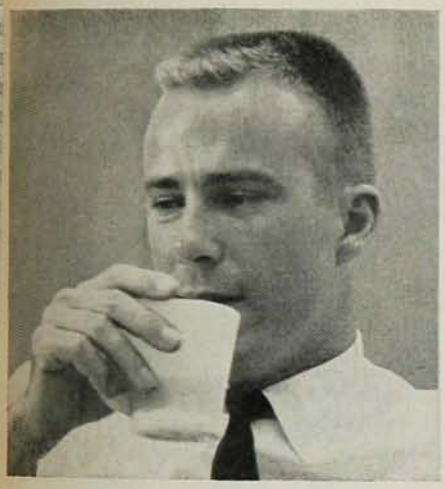
The introductory section of the book, dealing with the basic concepts and different possible approaches to the theory (including the axiomatic), is distinguished by its clarity, and a number of illuminating examples ("paradoxes"), as well as by several unnecessary dialectical interpretations ("realism" vs. "idealism"). Fortunately, there are only one or two additional irritations of this type in the rest of the book. The treatment then proceeds to sequences of independent trials, Markov chains, random variables, distribution functions, and laws of large numbers. The latter are clearly presented, but are given only in the limiting forms with no error estimates (e.g., no law of the iterated logarithm). There follows a discussion of mathematical problems related to continuous distributions, including characteristic functions, positive functions, limit theorems, and infinitely divisible distributions. The penultimate chapter on stochastic processes and the Kolmogorov equations includes an elegant and instructive discussion of Birkhoff's ergodic theory. The book concludes with a rather general description of statistical estimation with details given for normal distributions. There are some useful tables, and an extensive bibliography including an unusual number of references to non-Russian contributions! The translation is good (i.e., English, not transliterated Russian!), though it is surprising that it was not found necessary to use the words "sample" or "sample space". The printing and type are up to Western standards, unlike many other recent Russian translations.

It is worthwhile comparing this treatment with Feller's *An Introduction to Probability Theory and its*

We've got 1980 on the drawing boards.

Solar probes. Landings on Mars. Round trip trajectories. That's my field. Working on trajectories of future spacecraft with advanced propulsion systems. Ion propulsion, for example.

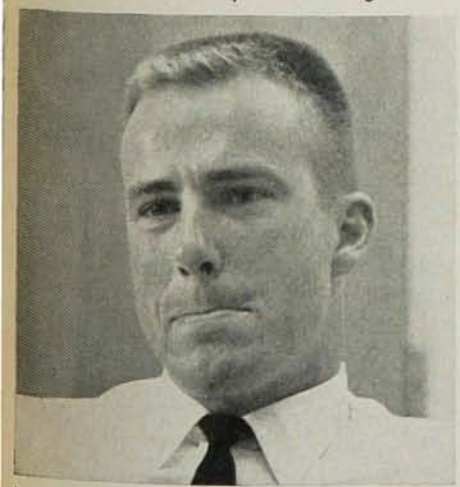
The normal chemical rocket has a high initial thrust. Everything happens all at once, when it leaves the Earth. Then it coasts the rest of the way with a small maneuver to trim things up.



Advanced propulsion-type trajectories are more efficient but have low thrust, which causes the rocket to operate over most of the trajectory. A typical mission, for example, is one where the spacecraft approaches its destination target with the same velocity as the target.

We've been working on advanced propulsion trajectories, applying optimization theory to come out with the best estimate of payload capabilities.

We managed to come up with trajectory techniques that don't involve the design parameters of existing propulsion systems. It's all in a paper I gave at an ARS meeting in San Francisco last March.



From this information we've been compiling, you can find out what payload capability an interplanetary mission will have at any date from now to 1980, how much gas it's going to cost you, and how long it takes to hit target.

The people I work with are pretty hard to beat anywhere. As far as being in the midst of things, you'd have to go some to find a place like this. All the facilities you need. And I'm only a 15-minute bike-ride to work.

You've just been talking with Dr. William Melbourne of Jet Propulsion Laboratory. He's been at JPL for six years. And he's here to stay. Do you feel that way about where you are now? If not, why not write to JPL today.

jpl "Research and development for America's lunar, planetary and interplanetary exploration programs."

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Applications which has a comparable level and, to some extent, attitude. Feller is much more precise and detailed and delves deeper in the more limited field of discrete sample spaces. Gnedenko, on the other hand, ranges (in general) over a wider class of topics (including continuous distributions and purely mathematical aspects of distribution functions), and perhaps, because of the lesser detail, is smoother and easier to read. While there is some overlap, these two books are mainly complementary, and a student of either will find it helpful to read the other.

Computer Handbook. Harry D. Huskey and Granino A. Korn, eds. 1248 pp. McGraw-Hill Book Co., Inc., New York, 1962. $25.00. *Reviewed by Peter L. Balise, University of Washington.*

COMPUTERS have become so important that one might expect this book to have appeared sooner, except for the desirability of its publication awaiting some stabilization in the explosive growth of computer technology. Although continued development will rapidly make some parts obsolete, especially since it emphasizes equipment details, this volume contains much of long-range value. Appropriately for a handbook, it does not replace a basic text but contains a wealth of specific data.

Fully half is devoted to analog computers. The first sections give detailed circuits and response characteristics of many commercial amplifiers and other components. However, these sections also include some application data such as tables of RC networks and amplifier representations of transfer functions. Section 5, entitled "Significant Applications", is of most interest to the computer user. Besides a good introduction, it features many specific examples and more advanced applications such as random processes, partial differential equations, and linear programming. Scaling, often made unnecessarily complicated, is quite effectively and simply explained. Time scaling is presented in terms of integrator gain, and amplitude scaling by a voltage scale factor, although this reviewer prefers normalizing variables to use computer units of 100 volts. Time-delay methods and other important special techniques are presented in Section 6. Strangely, transistorized computers are isolated in Section 7. The last two sections discuss passive analogs such as networks for static and vibrating structures, conductive models, membrane analogies, and hydrodynamic analogies.

Equipment is even more strongly emphasized in the digital-computer half of the book, including for example particulars of symbol-display devices. Beginning with elements of vacuum tubes, several sections discuss in detail transistors, basic signal-modifying circuits, memory devices, logical and arithmetic circuits, error detection, program control, and input-output devices. Programming, illustrated by ALGOL, is introduced in a single section. The digital differential analyzer and other special-purpose machines are explained, and a few common magnetic-drum general-purpose computers