between German texts available for a qualitative introduction to the subject and high-level treatises on theoretical nuclear physics. Portions of the text are taken from his lectures at the Darmstadt Technical Institute.

Those topics presented appear to be thoroughly treated and clearly presented. A comprehensive set of problems is also furnished.

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Computing without tears

OMNITAB: A COMPUTER PROGRAM FOR STATISTICAL AND NUMERCIAL ANALYSIS. (NBS-101). Joseph Hilsenrath, Guy G. Ziegler, Carla G. Messina, Philip J. Walsh, Robert Herbold, eds. 275 pp. National Bureau of Standards, Washington, D.C., 1968. $3.00

by DAVID JOWETT

The title of this book is deceptive, for it offers more than conventional computer programs and provides in fact a language in which to write programs. The operative phrase in the title "for statistical and numerical analysis" covers a useful and varied range of computer applications. Within this range, OMNITAB grants easy access to the computer for unsophisticated users, enabling them to carry out complex calculations of their own devising, assisted by standard routines for more conventional tasks.

The program does not replace symbolic languages such as FORTRAN, which explains the authors' reluctance to present it as "just another computer language." Rather it provides an easily mastered substitute for them in a limited range of circumstances. The limits are such that many users will rarely go further.

Joseph Hilsenrath and his colleagues at the National Bureau of Standards have taken an elementary piece of scientific equipment, a worksheet, and stored it in the computer. The scientist's worksheet characteristically consists of a sheet of paper, ruled by rows and columns, in which he enters data and operates on them in a variety of ways. OMNITAB makes it as easy to explain to the computer what is to be done, as it would be to write instructions for a computational assistant. Thus the command MULTIPLY COLUMN 1 BY COLUMN 2 AND STORE IN COLUMN 3 suffices to carry out the operation described. More complex operations with many steps, such as matrix inversion and least-squares fitting, are often initiated with a single command.

The book is well documented and contains many examples related to physics and engineering. It also contains many illustrations produced by the data-plotting routines in the program. The capacity to produce plots easily and cheaply on the line printer is perhaps the most significant feature distinguishing OMNITAB from programmable desk-top machines. Using such plots intelligently provides a powerful means whereby large sets of data can be examined without tedious labor.

The descriptions of OMNITAB commands are generally clear and concise. They are classified as input, output, manipulative and matrix and scattered throughout the book interspersed with textural material and examples. This makes it a little difficult to use for self-instruction or teaching. However, the commands are listed at the beginning, and many of them are self-explanatory.

In the section on self-teaching the authors emphasize that the program may provide the easiest resolution of questions or ambiguities. To learn how to use OMNITAB one starts with real problems, using this book as a reference to the meaning and utility of the commands. If doubt arises, the command should be used on a trial basis and the output examined. The natural progression to increasingly complex problems leads to greater competence.

David Hogben has contributed a useful essay on statistical applications of the program in an appendix. However, as Hogben readily admits, this can do no more than indicate the generality of the program, to which no manual can possibly do full justice. Any scientist or teacher should examine this book if he is not confident that both he and his students are already using the computer to the fullest possible extent. But the book should be used in conjunction with the program, which is now available for several computer systems.

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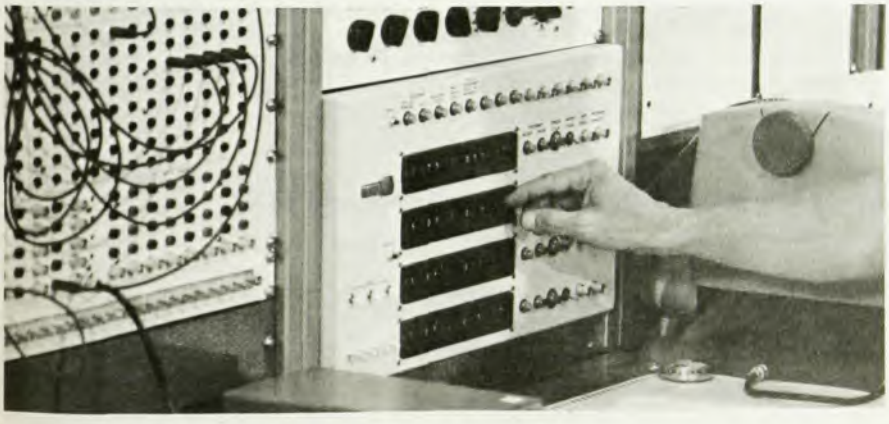
After obtaining a PhD in botany and spending six years in Uganda with the British Colonial Service, David Jowett joined the statistics laboratory, Iowa State University in 1965. He now teaches and consults in statistics, making extensive use of OMNITAB *in both these activities.*



In a past context

PRACTICAL PHYSICS. By G. L. Squires. 244 pp. McGraw-Hill, New York, 1968. $6.50

by ERNEST C. POLLARD

I read this book with the wisdom (or burden) of teaching laboratory physics for three full generations. I can well remember in the first generation the predecessor to this same course at Cambridge, where G. F. C. Searle sharply, nervously and shrewdly ran the laboratory. I can hear him now telling students *never* to call him "sir," watch him getting out his "lady elevators" to help the girl students reach over the bench to read instruments and producing from his knapsack a thermos flask of tea that was shared with various embarrassed students each time. The next generation is represented by John Strong with *Pro-*

cedures in Experimental Physics, a superb classic that is totally different from Searle's *Experimental Elasticity* or *Experimental Optics.* The third generation is now, and it is this generation for which G. L. Squires's book is presumably written.

This book would be useful for the reference library in a course on laboratory physics for junior and senior undergraduates. The chapters deal with the object of practical physics, errors, treatment of a single variable, common sense in errors, laboratory instruments and methods, experimental logic, arithmetic and writing a paper. It is well written and addressed directly to the student in a somewhat familiar style that is restrained, and shows that Squires is a skilled and sympathetic teacher. The context and idiom are for the British educational system, and outside that system its direct utility will sharply drop; yet it should be available to every one who teaches the more advanced college laboratory.

Strong included for the second generation the work done by the cyclotron builders and spectroscopists of the 1930's: Searle recorded the diversity of careful measurement in classical-physical areas and, unfortunately, confused his own superb experimental skill with dry and deadly mathematics, something Strong was willing to avoid. Squires is closer to Searle: One can not really feel the apparatus as one can in Strong's work. But most importantly this is not a third-generation book.

Then what is? What should "experimental physics" comprise today? First it should meet the challenge of the problems of physics as of the moment. To quote the author, how do we work in the "messy, complicated natural world," which he concedes is often difficult. How can you measure the surface tension of a living cell, the length of DNA in a virus, the age of a paper and the local variation in magnetic field? What is the trained physicist's point of view in approaching these problems? Second, it should admit that in addition to "apparatus" there is "equipment." How do you assemble a series of electronic units to make a measurement? It is done every day in every physics research outfit. Third, it should teach some skills.

I'm not unkind to the author. I am not young and I suddenly heard a voice from my distant past. I seemed to recognize it over the years, and so much has changed that I should *never* have been able to do so. It is a good book, but it is in a past context.

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Not for undergraduates

PLASMA SPECTROSCOPY. By Geoffrey V. Marr. 316 pp. American Elsevier, New York, 1969. $21.50

by ROLF LANDSHOFF

Spectroscopy is one of the most sensitive diagnostic tools of plasma research. This was first demonstrated in 1920 when Megh Nad Saha was able to estimate the surface temperature of stars from the presence or absence of certain calcium lines in their spectra. Plasma spectroscopy has recently made significant progress especially with interest in plasmas stimulated enormously by thermonuclear and space problems. Geoffrey V. Marr, who is with the J. J. Thomson Physical Laboratory in Reading, England, is one of those who have actively contributed to this progress. He is also the author of a recently published volume on the related subject, *Photoionization Processes in Gases.*

This book is intended as an undergraduate text, and the choice and arrangement of the topics suit this purpose well. There is introductory material on plasmas and quantum theory, followed by discussions on basic optical-transition processes, line shapes and finally a description of various types of experimental procedures.

Unfortunately the author and publishers have not paid sufficient attention to the accuracy of details. There is a host of minor but glaring mistakes, and if this book were to be placed in the hands of an undergraduate student he would get hopelessly confused. For example, the equation of motion for a charged particle in an electromagnetic field uses a weird vector notation, where vector quantities are cross multiplied with, and added to, components. The ac conductivity in a plasma is evaluated by using a macroscopic model, incorrectly called the Lorentz-plasma model. The signs get all mixed up, partly because of