without practical experience of it; and that the greatest care needs to be exercised to select programming staff with the requisite logical abilities and qualities of meticulous accuracy.

For all these reasons we grossly underestimated the time required for programming the family expenditure survey, by a factor of about 3. This is, I believe, a fairly common experience.

COSTS

I would have liked to end by giving figures of cost which would demonstrate the economic advantages of using a computer for this sort of work: but no precise figures are available. All I can say is that the estimated costs of doing the job on punched cards (so far as punched-card procedures could cope with the task) exceeded the estimated computer costs by a substantial margin. The *actual* computer costs have also exceeded the *estimated* computer costs by a sizeable margin.

What I can also say is that, once the programs were written, the computer has given us results more quickly than would be possible with punched-card methods, and given us analyses which would barely be feasible by alternative methods. These perhaps are more important considerations in favour of using a computer on a statistical job, than small savings in costs.

REFERENCE

WRIGHT, M. A. (1959). "Techniques for Analysis of a Family Expenditure Survey on a Computer," *Business Computer Symposium*. London, Pitman.

# Handbook for Automatic Computation

Preparation of a handbook for automatic computation, in five or more volumes, is now under way for publication by Springer-Verlag. It will appear in F. K. Schmidt's series, "Grundlehren der Mathematischen Wissenschaften." Editors are

F. L. Bauer, Mainz.
A. S. Householder, Oak Ridge.
F. W. J. Olver, N.P.L., Teddington.
H. Rutishauser, Zürich.
K. Samelson, Mainz.
R. Sauer, Munich.
E. Stiefel, Zürich.

The purpose of the handbook is to provide a collection of tested algorithms for mathematical computations of all sorts: the solution of finite and of functional equations, methods of approximating functions, the evaluation of special functions, etc. These algorithms are to be written in Algol, hence will be usable on any machine for which a suitable translator is available, and even without a translator can be used as a model for programming. It is evident that such a collection could have no general utility unless written in some common program language. The descriptive language will be English.

As plans now stand, the organization of the series will be as follows: Volume 1A will contain a description of the use of Algol, and Volume 1B a description of the structure of translators. These introductory volumes are the only ones that will not be made up primarily of actual algorithms. Volume 2 will be devoted to the solution of finite equations, linear and non-linear, including the determination of characteristic values and vectors of matrices. Volume 3 will be on functional equations, especially differential equations, ordinary and partial, and integral equations. Volume 4 is concerned with methods of approximation, and Volume 5 the evaluation of particular functions. It is possible that certain algorithms, such as those for solving inequalities, for mathematical programming, for statistical computations, and the like, that do not seem to fall naturally in any of these areas, may be reserved for a sixth volume. Each algorithm is to be accompanied by enough explanatory information to make it understandable, along with whatever information is available on speed, accuracy, range, or, more generally, for judging the effectiveness of the algorithm for a given type of problem. In any event, only pretested algorithms will be published.

Before the appearance of the volumes themselves, the algorithms will be prepublished in a series of supplements to the journal *Numerische Mathematik*. This is partly to make generally available each algorithm at the earliest possible time. But in addition to this, it provides the possibility for including in the handbook itself additional information, and even corrections, that might come in from users.

Contributions are earnestly solicited. For the present, at least, these must necessarily be in the form of actual algorithms, along with information as to the extent and mode of testing the algorithm, estimates of accuracy, and experience in using it. Untested algorithms will not necessarily be rejected *ipso facto*, but their use must necessarily await actual test. As algorithms are published, information relating to published algorithms also will be welcomed. Contributions may be sent to any of the editors named above.