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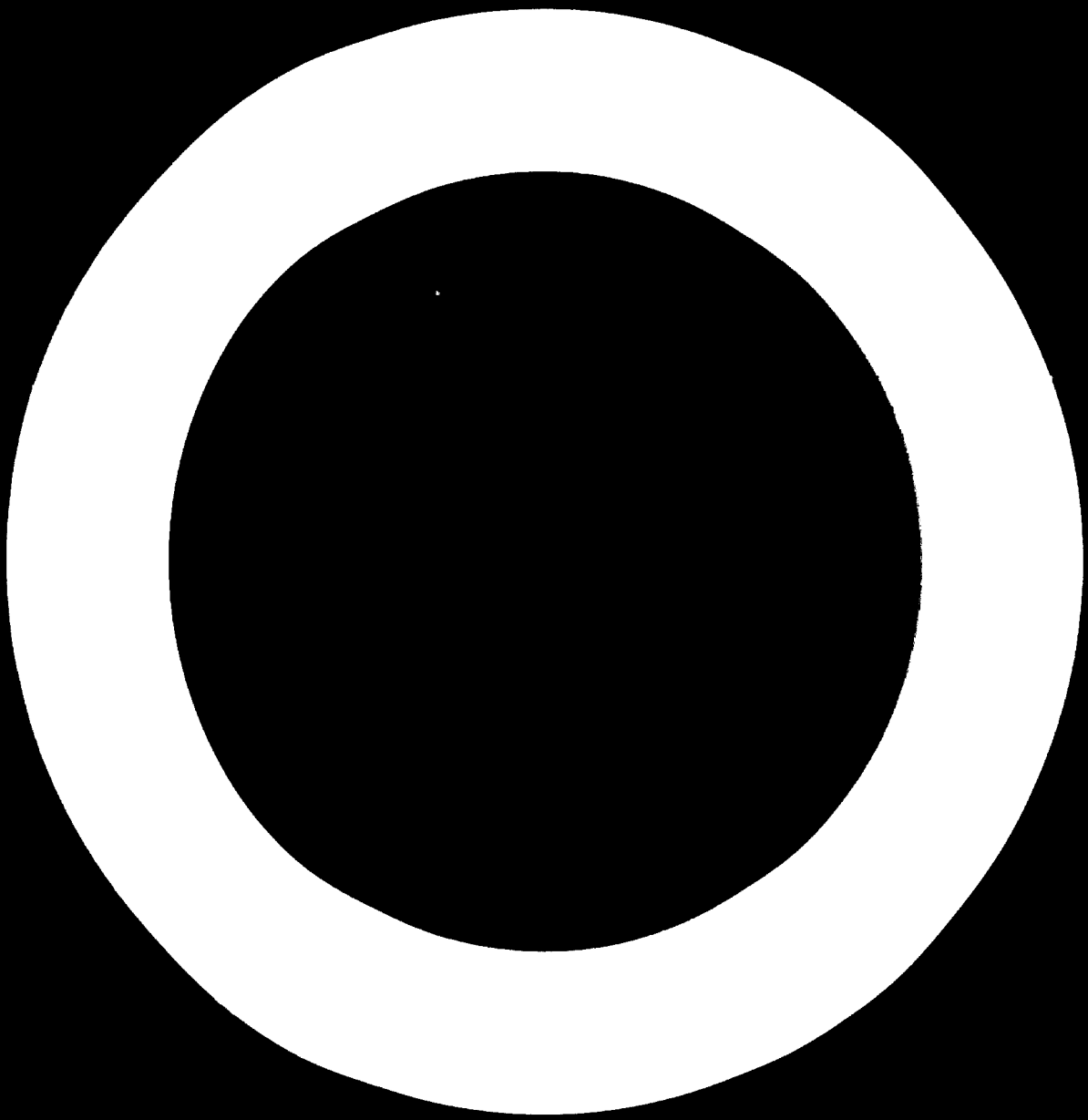
USE OF SECOND-HAND COMPUTERS IN THE DEVELOPING COUNTRIES

by
Louis D. Wilson
AUERBACH Corporation



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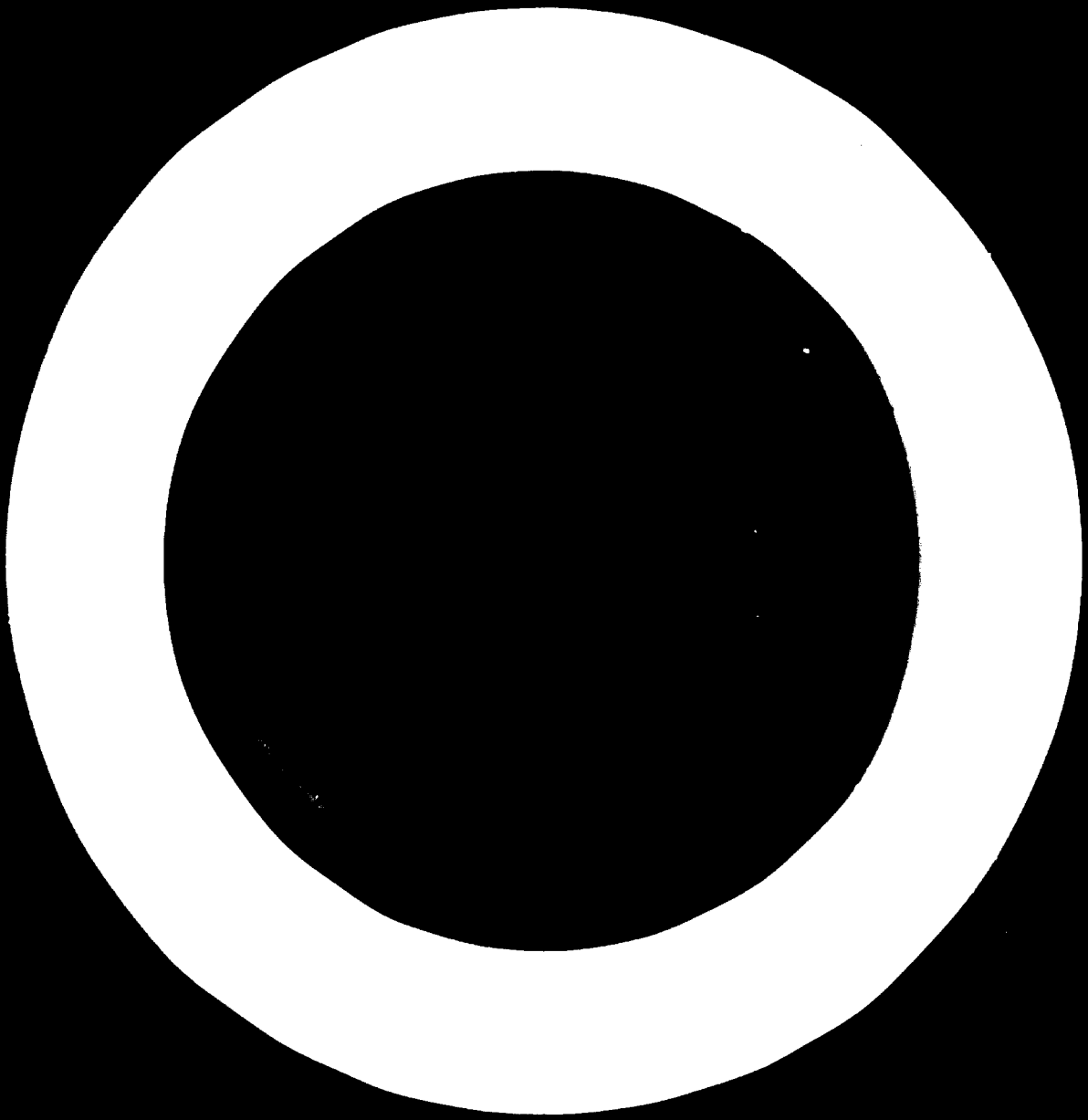


USE OF SECONDHAND COMPUTERS IN THE DEVELOPING COUNTRIES

The digital electronic computer will have an effect on the life of mankind equalled by very few developments of man's ingenuity. The depth and breadth of the changes that will eventually result from the use of computers is only beginning to become apparent to those directly involved. To the layman, the computer is still an exotic device that seems remote from his life. The varied applications of these devices can have a great impact on the rate and direction of development in those countries which are in the throes of new and rapid application of advanced technology amid the problems of expanding economy and social change. One of the important problems tending to limit the rate of development in a newly emerging country is the lack of skilled, trained manpower. This lack is often the most severe impediment experienced. The computer can help to alleviate this problem. The computer can enable skilled personnel to carry out tasks which would otherwise take many more such people, but in order to use this ability, a highly skilled staff must learn to plan, programme, and operate the computer.

In those countries where computers are widely used, the applications fall into a few general categories.

The most basic division separates the scientific and engineering applications from data processing. In the hands of scientists and engineers, the computers are powerful tools to extend the investigative problem-solving and design capabilities of their users. However, this area requires, in addition to the computer, a cadre of trained scientists and engineers and an organized programme of using these talents with computer assistance to accelerate the development

of the available resources of the country. In a developing country, such people are most likely to be associated with government or with the institutions of higher education in the country. (1) (2) The financial resources to make use of these people can only be expected to be available from or through the national government. The planning for the proper use of these resources would seem to be the responsibility of the national government as well. Thus the scientific and engineering uses of computers are likely to be government supported and to be concentrated around existing institutes of higher education. By proper planning, these institutes can serve as centres for propagation of the needed skills and training. (1)

The data-processing applications tend to divide into those of government and industry. Both are basically similar recordkeeping functions; they would include many accounting functions and such tasks as inventory control and the many recordkeeping functions of government. It is also important to realize that the facilities for gathering the needed data for input to the computer need also exist before the computer can make any contribution. The development of the procedures and training of personnel for this function should also be considered.

If the programme for computer utilization is properly developed and based on the needs of the country, there can, without doubt, be a highly beneficial acceleration of the ability to solve both the engineering problems of developing industry, transportation and communication, as well as the

accounting and recordkeeping problems of new governments and industries. However, planning and implementation of such a programme will require the availability of staffs of trained personnel as well as a continuing programme of training additional people.

The availability of equipment is, of itself, not sufficient to develop wide usage of computers. Many skilled people must be trained.

In countries where the universities and technical institutes have been training many people in sciences, engineering, accounting, business administration, and other needed skills for many years there is still a shortage of personnel to staff computer installations. In newly developing countries where the demands on the services of the leaders in government and technology are proportionately higher, the staffing problems will be still more serious. Unless this is considered from the start and active training instituted, any rapid growth in the use of computers may be prevented by lack of personnel.

However, proper planning of use of available people and training of additional personnel can make it possible for the available trained people to extend their effectiveness by judicious use of computers.

It is most important to realize that many computer applications in (more) developed countries have been unsuccessful because of poor planning and inadequate understanding of the problems involved. The superimposition

of these problems on those already present in a developing country can, if not carefully planned and managed, lead to chaos.

Apart from these considerations of planning and implementation, the developing country has the problem of obtaining the computer. Outright rental or purchase of a new computer from its manufacturer is the simplest of the alternatives. However, the developing country may not have funds for such purposes. The country may attempt to acquire the computer through a philanthropic organization, the Agency for International Development, or through a special programme offered by the manufacturer. There is another possibility, in some situations most attractive of all -- the acquisition of a used computer at substantially reduced cost.

Sometimes used computers are available from the manufacturers, or from users who own them. Recently some new firms have emerged which make a business of acquiring, refurbishing, and marketing used computers. There are also brokers who bring together the buyer and the seller. A number of these companies exist in both the United States and England.

In view of this situation, what are the advantages and disadvantages of the used computer as compared to new equipment for the developing country? Some advantages are:

(1) The most obvious advantage of the used computer over its new counterpart is the lower cost of the equipment. Since much or all of the development and manufacturing costs of the used equipment are already paid, the purchase price of the machine is nominal. However, there will usually be considerable costs for transportation and installation.

(2) Of great importance to the user is the existence of a wide variety of well-tested programmes to handle applications of all kinds. Many of these programmes will be directly usable in the developing country and most others will require only limited modification. This vast library of programmes available for the used machines will save much time and money and will reduce the need for trained programmers and application specialists.

These programmes are available from two prime sources: the manufacturer of the computer and the particular users associations.

The users associations are composed of users of a particular computer, or line of computers, and membership is, in general, open to any group which has purchased or leased the pertinent computer. These associations serve as information and programme exchanges, and, in general, all programmes developed by the computer manufacturer or by other users are available, on request, to all members.

(3) Another plus for the used system is the availability of good, tested support literature, programming manuals, maintenance manuals, training literature and a

multitude of published articles, and technical papers offering descriptions of applications, maintenance experience and other useful information. These materials are usually available from the manufacturer, gratis if the equipment has been obtained from the manufacturers, otherwise at cost.

(4) Also of great value is the large group of people trained in the use and maintenance of the system, which has been in wide use for a number of years. Although these people may not be in the country in question, their very number will simplify the acquisition of adequate teachers as well as a nucleus of programming, operating, and maintenance personnel to get the developing country started in an effective programme smoothly and as quickly as reasonable. Some computer manufacturers will arrange maintenance contracts anywhere within reason and for any maintainable piece of equipment.

All of the factors to be considered are not on the positive side. There are definite disadvantages, both tangible and intangible, to the use of the secondhand system. These disadvantages include:

(1) Used equipment may be less reliable than it was when new. Components that have failed will have been replaced, but all components will have aged, and the average expected life will be less than that to be expected when the machine was new. However, this effect should be small and of no great importance.

(2) Used equipment will be older models and will not be the equal in performance of current equipment. However, a realistic appraisal should be based on the overall cost of doing the jobs to be done. On this basis either the old or the new computer may be more advantageous depending on the work to be done and the total costs including equipment, programming aids (computer software), programmes, and operating costs.

(3) Replacement components may become difficult or even impossible to obtain through normal channels. This could greatly increase cost of maintenance and therefore operating costs. It is safe to say, however, that parts will be available as long as there are in operation enough computers of the kind contemplated.

(4) Training courses provided by the manufacturer to train programming, maintenance, and operating personnel may no longer be provided for older systems. It may therefore be more difficult and expensive to train the needed staff. However, some manufacturers will provide instruction anywhere for a reasonable fee.

(5) Programming aids such as compiler and assembly programmes may not use newest techniques and may therefore be less efficient and effective than the aids offered on newer systems.

(6) Programming languages used may be obsolete and provide less facility to the programmer. There may be less opportunity to exchange programmes with other users.

To evaluate the factors listed, it is desirable to consider in somewhat more detail the present state of computer development as well as some of the very practical logistic problems of operating a computer in a developing country.

Computing equipment has changed rapidly in the brief time that computers have been available. First-generation computers used vast numbers of vacuum tubes whose life was limited. Early computers used internal stores of limited reliability and life. Early input and output devices were not very refined.

These first-generation machines should not be considered for acquisition as useful computing devices. Only computers that use solid-state circuit elements, whose life is quite long, should be considered for new installation.

It is equally important that consideration be limited to systems which have proved to be successful and which have been produced and used in large numbers. It is only by this limitation that the advantages of available programmes, training material, and experienced users can be realized. Examples of machines that can be considered are the IBM 1401 and 1620, the Honeywell 200, the RCA 301.

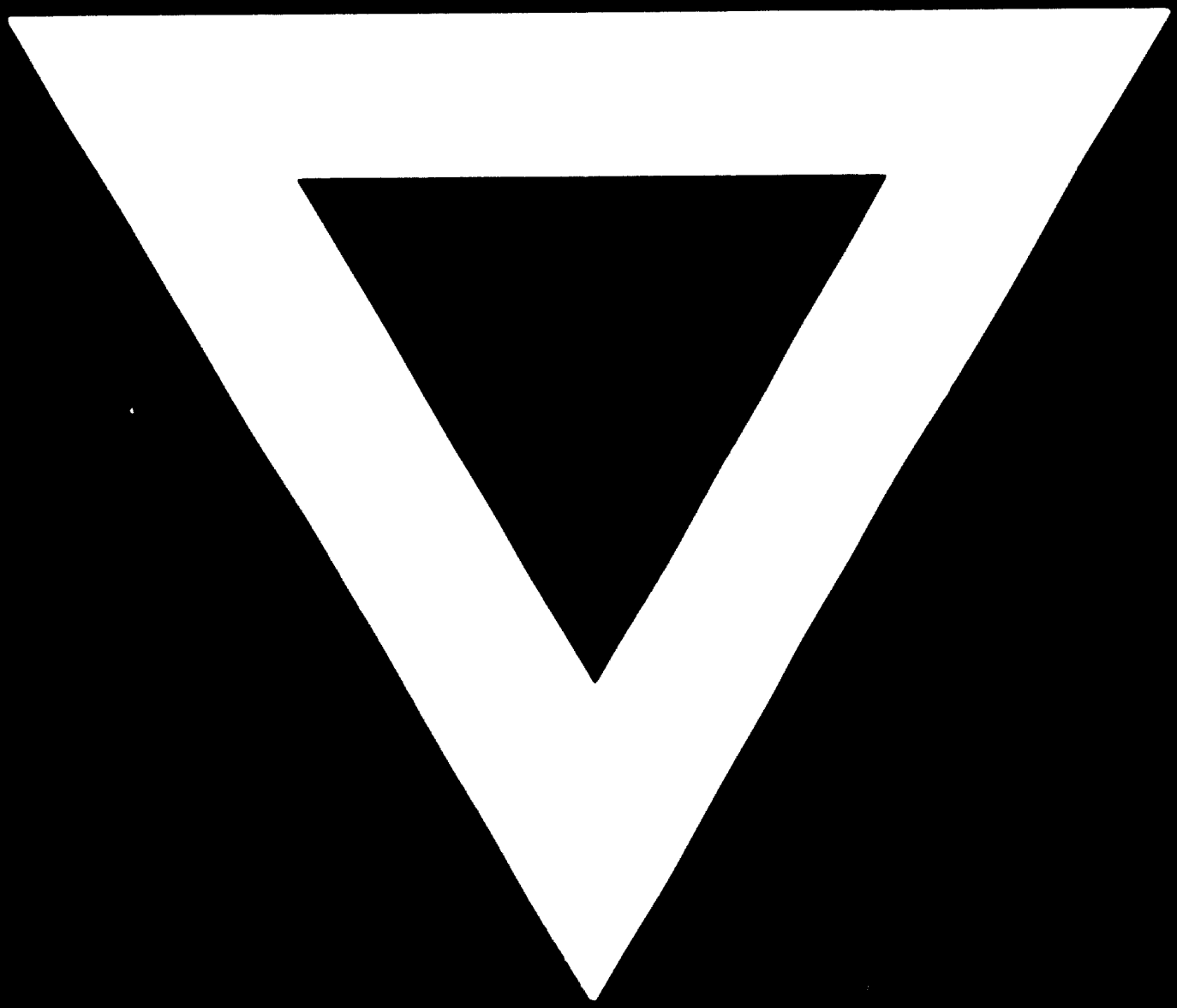
In considering the apparent advantages and disadvantages previously mentioned, it would be well to be very practical and face some of the problems to be encountered.

Unfortunately in many developing countries, the computer manufacturer will not have adequately large or adequately trained staffs. This will mean that the user will find it necessary to handle problems with limited or no help from the manufacturer.

In these circumstances there is a definite advantage in using well proven, solid-state equipment since all the advantages due to the accumulated experience and information as well as the probable greater ease of obtaining parts will become more important. (1)

(1) Computing in Latin America - Sergio F. Beltran
Datamation, Vol. 11, Number 5, Page 36, May 1965

(2) Kanpur Report - Ned Kelly
Datamation, Vol. 11, Number 3, Page 46, May 1965



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