THE USE OF SMALL COMPUTERS IN THE TREE CARE BUSINESS[1]

by Joe Massey

The computer is a very fast but very dumb machine which has been developed to aid the manager in storing, retrieving and manipulating management data. Tree care companies have a lot of such data, for both accounting and tree management. The development and application of our modern day computers stand as a monument to the scientific, engineering, and industrial management skills of our national community. This paper will present a discussion of the following:

1) a brief history of the computer,
2) applications of the small computer to the tree care business,
3) a suggested procedure for beginning or expanding computer operations, and
4) issues related to large and small computers.

A brief history. The American National Standards Institute has provided an official definition of the computer. The computer is a "device capable of performing systematic sequences of operation upon data, including numerous arithmetic and logic procedures, without intervention by a human operator during its run," (Smith 1979).

Although the computer's development began well over 2000 years ago with the development of the Chinese abacus, the current-day computer had its beginnings in the punched card. This punched card was developed in the late 1800's age of invention by an American named Hollerith. In 1880, it took seven years to process the U.S Census. Because of the population growth, it would have taken 12 years to process the 1890 data. That would have been two years too many. Hollerith used the passing of current through card holes to develop a system for which the census took five years.

Current-day computing can be separated into four logical generations, beginning in 1950, leading to the generation of microcomputers which we are not entering.

The first generation was characterized by computers with electronic tubes and was led by Univac. The machines processed 1,000 instructions per second. The second generation was characterized by the introduction of transistors into computers and was led by Burroughs. This improvement increased the speed to 1,000,000 instructions per second. The third generation was characterized by chip transistors which processed one billion instructions per second, and was led by IBM (Davis 1979).

Microcomputers are the current generation of computers. Their introduction was more or less an accidental by-product of the NASA program. In the late 1970's, the company Intel did research for another company to develop a chip transistor which would control a television display. The chip proved too slow for that second company's needs. Since the chip was already developed, Intel combined it with some memory and put it on the market. Incredible sales resulted.

The current eight-bit microcomputers process about 1,000 instructions per second and have up to their physical limit of 64,000 characters of memory. The new sixteen-bit micro's will be faster and have a much larger memory. The "chip" in a micro represents the state-of-the-art in large scale integration. It measures about $\frac{1}{2}$" by $1\frac{1}{2}$", does arithmetic problems, makes decisions, and costs less than $5.00 each in quantities.

The micro's have several advantages over their larger predecessors. Among these are:

1) They have fewer components, reducing cost and increasing reliability.
2) They are programmable by the non-computer person after a short training period.
3) They are small in size, allowing the user to place the machine in his office or home, or carry it back and forth.
4) They don't require special electrical power or air conditioning.
5) They are fun to learn, to use, and to operate.

Small computers and the arboricultural

business. In a recent survey, Vitelli found five reasons why his sample of small business firms in the Northeast were wary of both outside and in-house computer usage (Smith 1979):

1) Lack of knowledge about computers. Firm owners were unfamiliar with the computer and the computer industry.

2) Ignorance of applications. Owners couldn't see how a computer would help their business.

3) Cost of computers. Owners indicated that computers cost more than their business could afford.

4) Resistance to change. Owners indicated that the change in the business conduct required by the computer would be unwelcome to the business.

5) Personnel requirements. Owners believed that they would need to hire computer specialists if they bought a computer.

These five concerns indicate that the typical small business manager needs more information about the machine and about how it can help him conduct his business. The next few paragraphs seek to introduce the manager to some concept related to these needs.

The computer system is made up of hardware and software. Hardware refers to the physical machine. This machine often costs less than $15,000 and is made up of the following parts: the computer itself (a cost of about $8,000), a printer about ($2,500), a video display about ($500), and a data storage medium about ($2,000). By forfeiting some quality and speed, the manager can spend as little as $5,000 on a system.

Software is a term which refers to the programs in a computer system which direct the machine to do specific jobs. Most microcomputer software is designed to be "user friendly," a term meaning that the manager with very little computer knowledge will be guided in the use of the program by the program itself. Software which can help the small forest-based firm include the following:

1) Informations systems. Programs exist which allow the user to store such items as customers, locations, and service needs in large computer files. The manager can have the computer search large files and select customers by location, by need, or by any attributes recorded in the file.

2) General ledger accounting, accounts payable, and accounts receivable.

3) Inventory control. One crucial goal of the small business is to maintain a small but adequate inventory of needed parts and materials. Software exists to help the manager control inventories and to aid in parts ordering.

4) Payroll software has been in existance the longest among business applications. Such software, designed for small computers, automates wage disbursements and incorporates the costs into the accounting software.

5) Word processing is an absolute must for the small business computer application. Mailing lists, letters, and papers can all be stored on the computer's disk storage and retrieved, changed, and sorted at will. Most word processing software packages provide dictionaries to help check spelling.

Some of the software packages mentioned above can cost as little as $300. Other packages cost more, depending on the business' specific needs.

Purchasing a small computer. There are many different types of small computers and software packages. Once the manager decides to begin using microcomputers, he or she is faced with a significant hardware and software selection problem. If a machine is purchased first without regard to software, the manager will face the even larger problem of selecting software which is compatible with the machine he or she bought and which satisfies the company's computing needs. The following three-step procedure is offered as a means for reducing the selection uncertainty and increasing the likelihood of satisfaction with the installed system.

First, identify and make a list of the accounting, payroll, word processing, and information problems in the company which seem to be appropriate for computer handling. Include the volume of processing currently being done for each item in the list.

Next, identify the software which will do the tasks on the list. Several approaches for doing this are suggested. Take the list to several vendors and let them suggest the most appropriate, cost-effective software packages which they handle or

know of. Look through published catalogs such as Radio Shack's and magazines such as BYTE. Rank the software found through these sources using your own criteria of desirability. These criteria would include such considerations as cost, ease of learning the software's operation, and readability of reports which the software generates.

Last, select that hardware and software combination which best suits the company's needs. Probably there will be several satisfactory machine/software combinations to chose between. The manager needs to apply his own market sense in the final selection. Are the manufacturer and sales firms reliable? Are loaners available when the machine breaks down? Is the screen easy to read and the keyboard easy to type on? Will the system accomodate increases in business volume expected in the future? Is the investment in each given piece of software economical when compared with present methods and future business expectations?

Future applications of computers in the tree care business. The continued efficient and effective management of the tree resource will require increasing the use of the computers wherever appropriate. Given the need to expand the application of computers wherever appropriate, the small tree care based business manager needs to be aware of pros and cons and large and small computers.

Large computers provide better computer security. Access to the physical machine and the magnetic files on that machine are controlled from a single, central location. All of a company's financial and much of its resource management information needs to be protected. Information contained on the flat eight or five inch diskettes for microcomputers can be copied fairly easily and removed. Further, the units themselves are small and very vulnerable to theft. Thus, sensitive forestry information will very likely continue to be managed on the large, central computers.

Conversion of currently used programs to run on microcomputers is expensive. The machine itself is a small portion of the total computing cost. The programming labor is the most expensive part. Thus, for the company which decides to go with small computers, those applications which are small enough to run on micro's will be gradually transformed. As one program is outdated, its replacement will be written for the micro.

The new micro's have a chip which allows the memory to expand far beyond the current 64,000 character limit. As these larger micro's become available and software is developed, more and more applications will be able to be run on them.

Placing micro's around the company may result in some intial work inefficiency. Give a small boy a hammer and you will find that a lot of things need pounding. A significant amount of time can be spent in non-computer tasks. A partial solution to this potential problem is for the company to encourage the use of software already available wherever possible to analyze data. It is a potential problem which needs to be addressed when considering the placement of terminals or micro's around the company.

Maintenance and repair are issues to which arborists already assign importance with regard to tree management equipment. Computers are no different. The University of Texas uses eight micro's in its introductory computer course. From experience, it is expected that one of these units will be out for repair at any given time. The Forest Science Department at Texas A&M has 12 TRS-80 Model II micro's. One of these is typically out for repair at any given time. Thus, a company should consider what will be done during the time that a micro is out for such repair.

Applications on micro's are less expensive than the same applications on the large computers. The initial price of micro is in the neighborhood of 5,000 to 10,000 dollars. All computing done after this purchase is free. Renting computer time on a large computer can cost as much as $9.00 per computer second.

Literature Cited

Davis, William S. and A. McCormack. 1979. The Information Age. Addision-Wesley Publishing Company. Reading Massachusetts. 425 pp.

Smith, Brian R. 1981. The Small Computer in Small Business: A Guide to Selection and Use. The Stephen Greene Press. Braffleboro, Vermont. 143 pp.

Department of Forest Science
Texas A&M University
College Station, Texas