

MICROCOMPUTERS FOR THE FARM & RANCH*

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One of the major technological developments during the past decade has been the introduction of microcomputers at a price that is affordable by a large segment of our economy. The use of computers in business, secondary schools, colleges and universities is common place. During the past few years, thousands of microcomputers have been sold to individuals and small businessmen, including farmers.

Why would a farmer want to have a microcomputer? The fact of the matter, for the time being, is that most farmers do **not** want a microcomputer, and they wouldn't make much use of it if they had one. But there is a growing number of farmers and ranchers who feel a need for keeping up-to-the-day records of both the financial and physical dimensions of their businesses and would like to have faster, more accurate means of testing their tentative management decisions. The microcomputer is a promising tool to help farmers and small businessmen accomplish those tasks.

MICROCOMPUTER TASKS

The potential list of applications is limited only by imagination! The following are some which are most commonly mentioned:

A. Records

1. Financial
 - a. Cash flows and operating statements, and bank balances.
 - b. Accounts payable and receivable, billings.
 - c. Inventories, net worth statements and depreciation schedules.
 - d. Enterprise costs and returns.
 - e. Crop and livestock budgets.

2. Physical

- a. Livestock breeding and production records.
- b. Crop and field records of practices, varieties, yields, etc.
- c. Parts and machinery inventories and storage locations.
- d. Filing systems for documents and correspondence, instruction book, etc.
- e. Mailing lists for certified seed or breeding stock customers.
- f. Calendar of events, activities, etc.

B. Decision-making Aids

1. Machinery purchase, lease-custom hire analysis.
2. Ration formulation for nutritional adequacy, performance, and/or least-cost or high profit.
3. Feed reserve strategies.
4. Analysis of various cropping sequences or combinations.
5. Investment analysis for buildings, livestock facilities.
6. Commodity price graphs or tables, hedging strategies.
7. Sprayer calibration.

COMPUTER "HARDWARE" & "SOFTWARE"

To make the acquisition and application of microcomputers easier, the definition of a few terms is helpful.

"**Hardware**" in computer language is the physical piece of equipment that one can look at, touch and

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move about. The hardware in a typical micro-computer system for farm and ranch applications includes a printer for printing the reports, a computer "central processing unit" (CPU) to manipulate the data, two floppy disk drives for storage, a typewriter keyboard and a television screen (CRT) for entering and reviewing data.

Hardware is similar to a tractor; it is useless by itself. A tractor cannot plow or plant. It is not used for transportation to and from town to purchase parts or haul grain. The tractor becomes a very useful tool, however, when an implement is attached to it. If a tillage implement is attached, the tractor can plow. If a wagon is attached, it can haul; if a cultivator is attached, it will cultivate. The computer also is useless without an implement.

"**Software**" is to the computer what implements are to a tractor. Software is a set of instructions called a program stored on a disk or tape that the CPU uses to add, subtract, multiply, divide, sort and print information the operator puts into the computer.

If you put a budget program into the computer, the computer becomes a "budgeter." Enter a program into the computer that does accounting and the computer can do accounting. If you put a program into the computer for keeping production records, it becomes a record keeper. If you put a program into the computer that plays games, the computer becomes an amusing toy.

Software is the single most important item in any computer. Without software to do the desired task, a computer is almost useless. For agricultural purposes, it is much easier to buy hardware than to buy software. Software for agricultural users is scarce at this time.

It is useless to buy one kind of combine and a header made for another kind and expect to harvest grain without any modifications. It is also unreasonable to buy a computer from one manufacturer and software from another and expect them to operate without modifications. When purchasing microcomputers for agriculture, it is important to buy a model for which software has been developed or for which the farm manager can either develop software himself or hire someone to develop the software. Having special software written can be very expensive. If large programs are required, specially written software may cost more than the hardware.

MICROCOMPUTER SIZE

Microcomputers come in a range of sizes, colors, brand names and capabilities. The following configurations for microcomputers will adequately process most farm and ranch applications.

Computers are measured by the size of the storage unit (floppy disk), size of the central process-

ing unit (CPU) and the speed of the printer. The unit of measure for computer size is the byte (pronounced bite). A byte is the amount of computer space required to store one character on the floppy disk or in the central processing unit. For ease of communications, the byte capacity of computers is expressed in kilobytes, or thousands of bytes. In "normal computer-ease," kilobyte is shortened to K and each thousand bytes are referred to as 1K.

All computer programs and data must be stored in some place when the unit is turned off. Therefore, the first item to consider in purchasing a micro-computer for agricultural applications is the type and amount of available storage. The type of storage (disk or tape) determines the speed of loading programs or data and the reliability of entering the programs and data without error. Tape storage costs less than disk storage but it is very slow and much less reliable. Because farm and ranch applications require many different programs and often large volumes of data, two floppy disks are the best storage system for farm and ranch use. The combined disk drives should store at least 600,000 bytes (600K). This amount of storage is needed primarily for recording financial data, keeping production records and storing market data for analyzing marketing alternatives.

Considering the present state of microcomputer technology, the computer (CPU) should have at least 48K bytes of memory to process farm and ranch records and for most agricultural applications. Microcomputer memory comes in various capacities, from the smallest of 2K to 4K to more than 64K. Few commercially written programs require the CPU to have more than 48K.

For reference purposes, a printer is required. Printers come in several types and speeds. For typewriter quality printing, a "daisy wheel" printer is required. It prints about 55 characters per second (CPS). If typewriter quality is not necessary, a faster, less expensive "dot matrix" printer can be used.

A modem or acoustic coupler is not necessary for the operation of a microcomputer, but it will allow a user to access other computers and computer systems by telephone. Systems such as AGNET, with large numbers of programs, market news services and informational services, will be available via the telephone connection.

MICROCOMPUTER PURCHASE

Before buying a microcomputer, decide what you want it to do for you. List functions needed, such as preparation of enterprise budgets, cash flow projections, capital budgets, inventory control, farm and ranch accounting, physical records, estimates of machinery and irrigation costs, herd management records, market information and others you may need. It may be difficult to define the need for an item you have never used.

Shop for software that will do all or most things you want done. This may take you to several software and computer manufacturers. Request detailed demonstrations and references of satisfied users before buying software. Above all else, you need good software.

The third step in acquiring a microcomputer is to decide on the required computer configuration. One configuration that should handle most farm and ranch applications is:

- 48K of CPU memory.
- 600K on two floppy disks.
- 160 CPS (characters per second) printer with the ability for 132 characters per line. If the printer also is to be used for typewriter quality printing, it will print about 55 CPS. The printer should be a tractor feed (with holes on the side of the paper) rather than friction feed.
- 24 × 80 character display screen (CRT).
- A typewriter keyboard with 10-key pad as a part of the keyboard.
- Necessary software (without this, hardware is nearly useless).
- Modem or acoustic coupler.

Deal only with a reliable computer store with a dependable service center. Computers are an electronic/mechanical device that will require some home repair and maintenance. The store's reputation and service to other customers should assure that they both can and will maintain and repair your equipment as the need arises. Microcomputers are more dependable than previous large computers and require less costly maintenance. However, when maintenance is required, you need assurance that it will be available and timely.

Your computer store/service center may provide equipment with four separate manufacturers' labels. This is an acceptable alternative if you buy them as an operating unit. Very few microcomputer companies make their own disk drives, processing units and printers. Disk drives and processing chips for most microcomputer configurations are purchased from three or four major sources. Printers come in three or four major brands and are put together under different manufacturers' names and sold in various combinations. Your major concern should be that the store/service center sells and represents the system as a unit and will provide adequate software, service and maintenance.

MICROCOMPUTER TERMINOLOGY

1. Computer hardware — is the physical equipment that makes up the computer system. It in-

cludes the computer plus **peripheral devices** including floppy disk drives, video display terminals for entering and reviewing data, printers, etc.

2. CPU — central processing unit describes where all the arithmetic, logical and control functions of the computer are carried out. It is the center of the computer.
3. Random access memory (RAM) — is the main memory in a computer where programs and data are stored for the purpose of execution or to perform the task specified by the instructions. It is erased when the power to the system is turned off.
4. Read only memory (ROM) — is permanent memory in the computer that cannot be erased or altered in any way even if the power is cut off.
5. Byte — (pronounced bite) is the amount of computer space required to store one character (letter or number) on the floppy disk or CPU. Capacity is expressed in terms of kilobyte or one thousand bytes, referred to as 1K. Most of the "business computers" presently being purchased by farmers now have a 48K to 64K memory.
6. Floppy disk — (a diskette is a flat square package with a circular disk used to store programs and information that is readable by the computer.) A "disk drive" is the equipment used to record data onto the diskette or used to copy it from the diskette into the computer memory.
7. Operating systems — are system programs used by the computer to manage the memory and data. The operating system does take up RAM memory. One of the more common operating systems is CP/M.
8. Modem — is a piece of equipment capable of connecting the computer to the phone line for data transfer purposes. It is necessary to use the microcomputer as a phone connecting terminal.
9. Computer language — is the language consisting of letters, names, numbers, and symbols that are used to instruct the computer.
10. Basic — is a popular programming language used in most microcomputers. It stands for Beginner's All-Purpose Symbolic Instruction Code.
11. Software or computer program — is the programmed instructions that tell the computer what to do. It has to be in a computer language the computer can read and understand. The statements which make up the program are called code.

