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The Criminal Justice Microcomputer Guide and Software Catalogue

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PART ONE

THE CRIMINAL JUSTICE MICROCOMPUTER GUIDE

INTRODUCTION

The purpose of the ***Criminal Justice Microcomputer Guide and Software Catalogue*** is to assist small- or medium-sized criminal justice agencies, unfamiliar with computer technology, in the selection of an appropriate microcomputer system. Which is the best microcomputer system for your agency? Of course, you want the one that matches your agency's data processing requirements. But how do you *know* which is the best microcomputer system? The answer to that question is the focus of this book: getting the best system (both hardware and software) for your agency is the result of an organized selection process. The ***Guide*** suggests a sequence of steps and provides enough information for you to establish your own systematic approach to acquiring a microcomputer system.

To select the best microcomputer system, you need a basic understanding of the parts of a microcomputer system and how those parts work together. This does not mean that you have to be a technical wizard or that you must understand the circuitry of a silicon chip. You do need to know what happens in the process — we put data into the computer, it undergoes a process of manipulation, and information comes out, answering the problem that we wanted to solve. The explanation of this process and the related questions surrounding microcomputer technology are based on SEARCH's many years of experience training criminal justice professionals in the basics of computer technology. The oft repeated questions posed in our national training classes, and the requests we receive from thousands of technical assistance calls, contributed greatly to the content and format of this publication.

The publication is divided into two major parts: Part One, the ***Microcomputer Guide***, defines the basic components of microcomputers and describes a process for selecting a system. Part Two, the ***Software Catalogue*** is a listing of operational criminal justice software applications.

The first chapter in Part One begins with a discussion of the basic components of a system — its hardware and software. The chapter briefly describes the computer's microprocessor and memory; input devices (keyboards, mouse and light pens); output devices (printers and monitors); and storage devices (hard and floppy disks and magnetic tape drives). Additional hardware components are discussed under communication devices and local area networks. The first chapter continues with a discussion of system software, including operating systems, utilities, languages and industry standards, and general and highly specialized application software. The chapter also includes a brief explanation of public domain software.

Once you understand the various microcomputer components, Chapter Two, **Operating System Options**, moves into a detailed review of four general types of operating systems: 1) single-user, single-tasking; 2) single-user, multitasking; 3) multiuser, single-tasking; and 4) multiuser, multitasking. Each type of operating system offers different capabilities and has specific limitations. Your choice of operating system will determine which hardware components you will be able to link together and which application programs you can operate. Putting the right parts together is the key to success.

Chapter Three, **Selecting a Microcomputer**, highlights the general steps in a systematic acquisition process. Your agency's needs determine the best system for you. Your first step in the process, therefore, must be to define those needs. What do you really want the microcomputer to do for you? How is your current system managing (or mismanaging) the defined tasks? After outlining the key points in a needs assessment, the chapter sets out a process for analyzing, evaluating and scoring software packages and hardware components that should help you navigate your way through dozens of potential systems. Chapter Three also helps you to evaluate computer vendors and the services they provide.

Throughout the text, technical jargon is kept to a minimum; we hope to provide only the amount of technical terminology you will need to be conversant in the selection process. To guide the reader whenever technical words do appear, they are in boldface type the first time they are used. All words in boldface are defined in the extensive glossary which follows Part One. There are also many additional technical words in the glossary that you may find helpful as you wind your way through the acquisition process.

Finally, with an understanding of computer basics, configuration options, and an organized selection process, you will be able to turn to the software listings in Part Two, the ***Software Catalogue*** where over 150 existing proprietary and public domain criminal justice software packages offer the promise of addressing your agency's computer needs. The variety of software available for microcomputers is extensive and growing daily. The majority of the applications found in Part Two, however, are specifically designed for use in the criminal justice community. For each application, the listing describes the product's function and major features, indicates the operating system and type of microcomputer on which it operates, and provides contact names, addresses and telephone numbers. Each entry also has a comment section where additional information about the particular product may be found. The ***Software Catalogue*** should not be considered a complete directory of available criminal justice software and the appearance of a vendor or product in no way represents an endorsement by SEARCH Group, Inc., the Bureau of Justice Statistics or the U.S. Department of Justice. The information contained in the ***Software Catalogue*** was provided on a voluntary basis and additional entries are welcome.

The records describing the software applications are followed by four indices which let you search the ***Software Catalogue*** in a variety of ways. The indices categorize the software by vendor/agency name, criminal justice discipline, type of microcomputer used and public domain. Finally, the ***Software Catalogue*** includes two appendices: Appendix A defines each of the fields used to describe software in the ***Software Catalogue.*** It is an annotated sample of the form project staff used to gather information on microcomputer application software. This form can be used in conjunction with Appendix B, a blank software application submittal form. If you have developed criminal justice application software and would like to have the product information included in the next edition of the ***Software Catalogue,*** please complete Appendix B and mail it to SEARCH Group, Inc. SEARCH intends to automate the information that we receive, making updated material available on-line to the criminal justice community.

Throughout the ***Criminal Justice Microcomputer Guide and Software Catalogue*** references are made to names of computer hardware and software. Product names are used solely as examples and the references should not be considered endorsements of any kind. Most of the hardware and software names are manufacturer's trademarks and should be treated as such.

I. *BASIC MICROCOMPUTER COMPONENTS*

Hardware
Software

I. BASIC MICROCOMPUTER COMPONENTS

Microcomputer systems are designed to solve problems. Unfortunately, all criminal justice agencies do not have the same set of problems that can be solved with the same microcomputer solution. An agency with a jail management problem requires a different type of solution than an agency that needs a better computer-aided dispatch system. The microcomputer system required in each case will be different depending on the degree of specialization in the components of the system.

The individual components that are put together, the way that they are put together, and the capabilities that they will collectively provide, determines the system ***configuration***. In this section, we will examine the basic components in a microcomputer configuration, showing how the parts work together to make a system. Knowing the parts and functions of a microcomputer is the first step toward choosing the system configuration appropriate for your agency's needs. Too many systems are chosen as the result of uninformed agency decisions or the grandiose promises of a data processing vendor.

What makes up the components of a system and how do the various components work? The two primary components of a microcomputer system are ***hardware*** and ***software***. This chapter will explain both of these major components in greater detail, but first, a general overview. Hardware is the physical, electrical and mechanical devices — the parts which you can touch. At the center of all the hardware in a microcomputer is a chip, no bigger than the fingernail on a little finger, called the ***microprocessor***. The microprocessor is composed of even smaller components which, in conjunction with the microcomputer's memory, execute software programs. Peripheral equipment, input and output devices, are attached to the microprocessor. Input devices, such as a keyboard and a mouse, enter commands and data for processing. Output devices, such as monitors and printers, display the results of the processing. Storage devices — floppy disks, hard disks and back-up tapes — are used to store programs and data. The microprocessor communicates with the input, output and storage devices through a set of wires that carries electronic impulses throughout the computer. This electronic pathway is called a ***bus***. Microcomputers can communicate with other computer systems through communications devices — such as modems and networks.

Software includes programs and instructions executed by the hardware when processing data, and is composed of electronic signals or magnetically recorded elements which you cannot touch. Software can be broken

into two basic categories — system software and application software. The system software controls the activity of the microprocessor circuitry, the functioning of the peripheral devices and controls all software application programs. System software is designed to control the activities of the microcomputer's many subsystems. Application programs — such as word processing and accounting, computer-aided dispatch and records management — are the coded instructions that direct the computer system to produce a result for a user of the microcomputer. Application software is designed to solve user problems.

We now need to examine the basic components more closely.

Hardware

•*Microprocessor or Central Processing Unit*

The ***microprocessor***, which is often called the Central Processing Unit (CPU), or processor, can be thought of as the "brain" of the microcomputer. It is the electronic device that interprets the software instructions and data entered into the computer, places the instructions and data in internal memory locations, manipulates the data and controls the sequence of operations contained in the software instructions.

The CPU processes digital data. As a digital processor, the computer calculates and processes the digits of the binary number system — one and zero — which can be represented as the "on" and "off" states of electronic circuits. A software program's instructions are actually stored and executed as a sequence of binary numbers. Software *languages* are coding schemes for instructions which can be written in a human-readable format, and then expressed to the microprocessor as binary numbers. The data to be manipulated by the microprocessor (words, graphics, sounds) can also be represented by different sequences of binary digits. The microprocessor's various functions are either arithmetical (add, subtract, multiply, divide) or logical (true-false, and, or, not, exclusive) and both functions can be carried out by the binary number system of ones and zeros. The microprocessor, then, processes the coded form of the software program's instructions into binary numbers, which physically pass through the on/off channels of the microprocessor's semiconductor components.

It is also important to know something about a microcomputer's capacity and speed for processing and storing digital data. When vendors begin talking in bits and bytes, you need to know that a ***bit*** is a single digit of a binary number, either a one or a zero, and that microcomputers store information in a ***byte***, which is the number of

bits needed to encode one character of data. Normally, a byte is composed of 8 bits. In most computers, each character on the keyboard can be stored and represented as one byte of data. The microprocessor is designed to "think" and "remember" in bytes of a minimum specific width which it moves along a ***bus*** (a hardware ***interface***) which connects the microprocessor to the system's memory and other devices.

There are three basic classes of microcomputer microprocessors, each based upon the maximum width, in bits, that the microprocessor is capable of moving and processing data. The general classes are 8-bit, 16-bit and 32-bit microprocessors.

The significance of the three classes of microprocessors resides in the number of bits they can process at one time and the speed at which they can be processed. The width in bits is an indication of how many characters of information can be accessed in memory at any given time, which is known as a memory access cycle. For example, an 8-bit microprocessor can access only one byte (or one character) in a cycle and would require four cycles to access four characters. A 32-bit microprocessor, however, can access four characters in one cycle (8 + 8 + 8 + 8 = 32 bits). Thus, the amount of work done by the 32-bit microprocessor is four times greater than an 8-bit microprocessor at any given moment.

The speed of a microcomputer's microprocessor is measured in *megahertz* (MHz, millions of cycles per second). The speed in megahertz is as critical as the width in bits of the microprocessor. The more cycles per second, the faster a microprocessor can process data, and the faster the job gets done. When selecting a microcomputer, it is important to get a microprocessor with the size and speed needed for the work you want it to perform. Usually, you try to purchase as much speed and power as you can afford.

For an idea of relative CPU processing speeds, see **Table 1.**

•*Memory*

An integral part of the microcomputer is its ***memory***. There are two major types of computer memory: RAM and ROM.

RAM (Random Access Memory). RAM is the "thinking" memory of the microcomputer; it is where the microprocessor temporarily stores programs and data. RAM is capable of both being randomly written to and read from, which means the system can use RAM like a scratch pad — storing, moving and erasing data and programs at different times as needed. RAM is also erasable and "forgets" everything upon command

Common Microprocessor Speeds

Microcomputer	Microprocessor	Speed
Apple IIc	8-Bit	1.02 Mhz
Apple II GS	8-Bit	2.8 Mhz
IBM PC	8-Bit	4.7 Mhz
IBM AT	16-Bit	6.0 Mhz
Apple Macintosh SE	16-Bit	7.8 Mhz
Tandy 1000 TX	16-Bit	8.0 Mhz
IBM PS/2 Model 80	32-Bit	16.0 Mhz
Compaq 386	32-Bit	16.0 Mhz
Tandy 4000	32-Bit	16.0 Mhz
Apple Macintosh II	32-Bit	15.7 Mhz
IBM PS/2 Model 80 Enhanced	32-Bit	20.0 Mhz
Tandon 386	32-Bit	20.0 Mhz

Table 1

or any time the power goes off (such as a power failure). RAM, in essence, is the internal working area of the computer — much like your desktop where you place documents and writing materials. When you place a floppy disk containing a word processing program into your microcomputer, a copy of the program is read into the RAM. As you begin composing your report, the data is temporarily stored in the RAM as well. Through random access of the microcomputer memory, the microprocessor can call upon any piece of data or any word processing instruction with equal speed. When you are finished with the writing session, you must save your typing to a storage device—a floppy disk or hard disk. RAM provides only temporary storage; when you quit the program, everything in the RAM is erased.

RAM is a strategic consideration in selecting a microcomputer because, as software programs become increasingly sophisticated and powerful, they require larger amounts of RAM to operate. Word processing programs, for example, now come with spelling checkers, thesauri, graphics capabilities, variable type fonts and sizes — all of which rapidly devour RAM. If you don't have enough RAM, you may not be able to run the program that you need, or you may find yourself putting floppy disks in and out of the machine dozens of time to complete a simple operation. Make sure that you have enough RAM

at the outset or that the RAM is capable of expansion later. In general, the only control you have over a system's memory is the amount of RAM you have installed. As a general rule, buy all the memory you can afford.

The other major type of computer memory is ***ROM (Read Only Memory)***. Microcomputer designers use ROM to permanently store programs, such as the startup program for the computer, which they do not want users of the system to modify. In general, the more ROM a system has, the greater variety of features are available. ROM is designed specifically for the system and installed by the manufacturer. ROM, unlike RAM, is not erasable and cannot be lost, for example, during a power failure.

One particularly important part of the ROM is the ROM ***Basic Input/ Output System (BIOS)***. This is one of the specialized parts of the ROM that is usually created either by the system manufacturer or purchased from a BIOS vendor. The ROM BIOS is the software code, contained in one or more of the ROM chips, that tells the computer how to communicate with the components of the system, such as the video display, keyboard and storage devices.

The software code contained in these chips continues to be one of the hotly-debated topics surrounding a given system's "compatibility" with the IBM Personal Computer, which, over the last few years, has been widely accepted as the basis of the "PC compatibility standard" of microcomputers. Because the courts have decided that the software code programmed into the ROM BIOS is protected under federal copyright laws, the major manufacturers of microcomputers quickly copyrighted their ROM BIOSs to make "cloning" their systems more difficult. A few software developers, however, specialize in "reverse-engineering," a process of observing the outputs of a product and designing a functional duplicate, which can produce very close imitations of other manufacturers' ROM BIOSs. Most PC-compatible manufacturers purchase their ROM BIOSs from a limited number of American companies, which have proven their capability in "reverse-engineering." Extreme care, however, must be taken when considering the acquisition of a clone or "workalike" microcomputer. It is possible that a clone ROM BIOS will not perform all of the inputs and outputs exactly as the original.

In addition to RAM and ROM, there are also other specialized forms of memory, including: ***Programmable Read Only Memory (PROM); Electronically Programmable Read-Only Memory (EPROM)***; and ***Electronically Erasable Read Only Memory (EEROM)***. In this brief overview, we need not concern ourselves with them. If you are interested, these types of memory are explained in the glossary.

•*Input Devices*

The next category of hardware components is ***input*** devices, which are used to enter data into the microcomputer. Input devices include keyboards, a mouse, light pens, bar code scanners, optical scanners and digitizers. This is by no means a complete list of the available input devices, but rather the most common devices found in an office environment.

—*Keyboard*

The ***keyboard*** is the most widely used input device. Keyboards generally look alike and perform the same basic functions. The only significant difference is the number and type of keys. Most keyboards now feature a numeric keypad on the right-hand side and usually have special "function keys" either across the top or down the left-hand side. The purpose of the function keys is to allow software programmers to write their programs so that simply by pressing a function key, the user can execute a specific instruction. For example, in a word processing program, a function key might cause the word processor to underline a word, while in a database program the same special function key might cause the database to perform a search. The exact usage of the function keys is left unassigned for the convenience of the software programs.

—*Mouse*

Another type of input device is called a ***mouse.*** A mouse is basically a pointing device. Pointing devices are designed to move the cursor—the indicator that shows where you are on the screen. A computer mouse may be a mechanical device that is able to roll on your desk; an optical device that uses a beam of light on a special pad; or a hybrid, with a combination of optical and mechanical parts. The mouse usually has one to three buttons on top which act as special function keys. These buttons are used like the special function keys on a keyboard in that a program may assign their use for different functions as needed.

—*Light Pen*

Light pens are also input pointing devices. Unlike a mouse, which moves on a desk or a pad, light pens are moved against the display screen (also called the ***Cathode Ray Tube*** or ***CRT)*** of the microcomputer. A light pen looks like a fat ballpoint pen with a wire leading into the microcomputer. Light pens work by sensing the beam of light generated by the CRT and translating the time it takes for the beam to strike the light pen into a coordinate position on the screen. Software

must usually be specially programmed to take advantage of the pointing capabilities of the light pen.

—*Bar Code Scanner*

Another type of input device is the ***bar code scanner.*** Bar codes are the patterns of black bars of varied width and spacing which represent numeric or alphanumeric sequences. Found on almost every product purchased in stores, bar codes allow the store to keep track of the number and type of items on the shelves by passing a special light pen, called a "bar code reader" or "bar code scanner," over the pattern of bars. A microcomputer translates the pattern of bars into a description of the item which the microcomputer can read as easily as if it were typed into the keyboard. Bar code scanners are desirable because they tend to reduce the human error which is normal in any data entry operation.

—*Optical Scanner*

One of the most specialized input devices is the ***optical scanner.*** An optical scanner allows a microcomputer to translate printed text or graphics into digital data. The optical scanner reads a page of text one line at a time and compares what it has read to a list of allowable shapes. If it looks like an "A" to the software which operates the scanner, then the scanner stores it in the microcomputer as an "A." Some optical scanners have problems deciphering fonts and sizes different from those that the software accepts, but the more expensive models do an excellent job. Optical scanners can make the task of converting data from a manual recordkeeping system to an automated system much easier: old documents can be quickly scanned automatically and stored in the microcomputer.

—*Digitizer*

One of the most interesting types of input devices is the ***digitizer.*** A digitizing tablet can translate whatever is written on it into digital data which it then enters into the microcomputer. The video digitizer inputs video images into the microcomputer. Both of these input devices require highly specialized software to operate.

• ***Output Devices***

Output devices transform digital data in the microcomputer into a form that is readable by humans or other machines. For example, when you input characters through the keyboard, the computer reads the keyboard characters as digital data for manipulation by the CPU. For the user to see the characters on a printed page the output device — the printer — converts the digital data to characters. Output devices include monitors, printers and plotters.

—*Monitor*

The most common output device is the ***monitor,*** the video display screen on a personal computer (also known as the Cathode Ray Tube or CRT, the display, the screen and the Video Display Tube or VDT.)

There are generally two kinds of monitors: monochromatic (one color) and color. Monochrome screens are black with white, green or amber characters. Monochrome monitors tend to be high-resolution due to their primary task of displaying text characters, although monochrome graphics are not uncommon. Color displays tend to have lower resolution than monochrome displays, although this is rapidly changing as color/graphic displays become more the norm in the industry. Monitors come in varying sizes, although 12-inch and 13-inch monitors are the most common. Standard displays show 25 lines of text in 80 columns.

The monitor is similar to a television screen, but it has a much higher resolution (there are more dots per square inch than on a TV screen). High resolution is needed because the characters on a monitor are small and people must sit closer to a monitor than to a television screen. Eyestrain and neck aches are not uncommon in people who use computers a great deal. In fact, the resolution, brightness, contrast, glare and angle of the display are subject to legislation in many countries. As a general rule, buy the highest resolution color/graphic display you can afford for general purpose computing.

A common error is to confuse a monitor with a terminal. A terminal can look like a monitor, and in fact both have a video display. A terminal, however, normally has a keyboard which enables it to function both as an input *and* an output device. Most terminals are connected to a computer by a *single* cable (the keyboard is cabled directly to the housing of the CRT), whereas most monitors and keyboards are connected by separate cables to the microcomputer. Finally, terminals usually are not capable of color or graphics unless especailly designed for that purpose.

—*Printers*

Printers are the devices that produce an output on paper or other permanent media (hard-copy). They are capable of producing text characters and graphical output and come in two major varieties: impact and non-impact. See **Table 2** for a list of the most common types of impact and non-impact microcomputer printers.

Microcomputer Printer Types	
Impact Printers	Non-Impact Printers
Dot Matrix Printers	Laser Printers
Wheel Printers	Ink Jet Printers
	Thermal Printers

Table 2

Impact printers are by far the most common type of printer and are divided into two categories: dot matrix printers and wheel printers.

Dot matrix printers have a printhead composed of multiple pins in a rectangular pattern. These pins can be used to form characters by pressing a combination of the pins against an inked ribbon in the form of the desired character. The ribbon then transfers the character in the form of tightly grouped dots on the paper. Dot matrix printers normally operate at speeds of 80 to 600 characters per second for draft copies; approximately 40 to 300 characters per second for high-quality output; and approximately 20 to 150 characters per second for graphical output. Dot matrix printers normally print bidirectionally (both forward and backwards as the printhead moves over the paper.) Dot matrix printers are popular because they are fast, inexpensive and are capable of printing both text and graphics. Some even produce colored output. Dot matrix printers can produce very high quality, or near letter-quality output, but most produce output which is clearly composed of little dots.

Wheel printers include *daisy wheel* and *thimble printers,* both of which function in the same fashion. A wheel printer uses a print element of either plastic or metal composed of individual arms with a fully formed character raised on the end of the arm. This character is then pressed against the ribbon by a single metal hammer. The wheel or thimble is rotated into position for each of the characters as needed. Daisy wheel impact printers use a wheel that is oriented vertically in the printer and is parallel to the paper. Thimble impact printers use a modified wheel that is curled into a crown shape and oriented horizontally in the printer, perpendicular to the paper. Both printers produce letter-quality output, but have limited graphics capability. Wheel printers normally print less than 100 characters per second. Most wheel printers generally produce only single-colored output.

The first group of ***non-impact printers*** are *laser printers.* Laser printers are generally thought to be the top-of-the-line for producing quality hard-copy output. Contrary to popular opinion, laser printers do not burn the characters into the paper. Actually, the laser printer is little more than a

smart photocopier. The laser printer exposes a metal drum to a low-intensity laser beam which causes the exposed section of the drum to become magnetized. This magnetized section attracts a plastic "dust," called toner, which sticks to the drum. The drum then rotates against the paper and the paper and toner are heated and pressed together. This process transfers the melted toner onto the paper, producing output which approaches typeset quality. Laser printers are fast (6 to 8 pages per minute on the average), extremely quiet and produce high-quality output.

There are two major types of laser printers: postscript-equipped and non-postscript-equipped. Postscript laser printers generally are better at producing high-resolution graphic output than non-postscript-equipped laser printers. The postscript printing protocols are compatible with a number of commercial typesetting printers, thereby allowing you to take your disk to a printer should you desire typeset quality greater than that offered by laser printers. Most laser printers are capable of emulating or "pretending" they are other types of popular printers. This is an added feature to be considered when shopping for printers. The only problems with laser printers are the high cost of consumable supplies, like toner cartridges and drums, and the lack of high-capacity paper-handling options. Laser printers presently do not produce colored output.

Inkjet printers are known for their ability to print smooth color output. Inkjet printers use a reservoir of magnetic ink which is drawn electrostatically out and sprayed against the paper. Inkjet printers are usually very slow, but produce high quality color and graphical output. Inkjet printers are used where the nature of the work mandates top high-quality colored output.

Thermal printers are a type of non-impact printer using a special paper which colors when exposed to heat. Thermal printers are rarely seen today due to the poor quality output, high cost of paper and slow printing speed.

The discussion on printers has been deliberately focused on printers found in the average office environment. Other printers, notably the high-speed line printer varieties, including the 400-page-per-minute line or band printer, are usually part of a minicomputer or mainframe computing environment.

A ***plotter*** is a specialized hard-copy output device with an arm that holds a colored ink pen and presses it against a sheet of paper as either the arm or the paper moves. This device produces the smooth-lined, multicolored graphic output normally associated with computer graphics. Plotters normally are not used for anything other than

graphic output, typically for blueprint-like designs, maps or high-resolution business graphics. Plotters normally accept a single sheet of paper which can range from standard letter size to several feet in size.

•*Storage Devices*

Microcomputers need to be able to store data and programs for an indefinite period of time. Re-entering a program from the keyboard each time the computer is started would be too time-consuming and frustrating. To provide long-term storage of programs, data and operating systems, microcomputer designers developed a category of hardware called ***storage devices.*** Storage devices provide a medium for storing programs and data which can be accessed quickly without having to keep them active in memory. Storage devices are divided into two types: *disk storage devices* or *tape storage devices.* Disk storage devices include floppy disks, hard disks and optical disk drives. Tape storage devices include magnetic tape drives.

—*Floppy Disks*

The most common storage device associated with microcomputers is the ***floppy disk,*** also known as a flexible disk or floppy diskette. Floppy disks are available in three standard sizes: 8 inches, 5-1/4 inches or 3-1/2 inches in diameter. The 5-1/4 and 3-1/2 inch disks are the most common. Floppy disks can be thought of as magnetic recording tapes produced in a disk shape (they look like a thin 45 rpm record) and encased in a protective plastic or paper cover. Floppy disks work somewhat like a stereo record in that they are logically divided into concentric rings and data is stored or accessed by an arm which moves back and forth across the surface of the media. Floppy disks are inexpensive, removable storage media which are reusable, allowing you to read and write to them many times before they wear out. Although they are adequate for backup and temporary storage of data, they are inappropriate for permanently archiving data. The disks can be formatted to one of several generally accepted storage capabilities. See **Table 3** for common disk storage formats.

Disk Storage Formats

Size	Storage	Characters	Words	Pages
IBM 5 1/4	360 KB	360,000	72,000	250
	1.2 MB	1,200,000	240,000	800
IBM 3 1/2	720 KB	720,000	144,000	480
	1.44 MB	1,440,000	288,000	960
Apple 3 1/2	400 KB	400,000	80,000	266
	800 KB	800,000	160,000	533

Table 3

—*Hard Disks*

Hard disks (also known as hard drives, fixed disks, rigid disks and Winchester disks) function like floppy disks, except that they are dramatically faster, hold much more data and are normally not removable. While floppy disks store from approximately 360 ***kilobytes*** (KB) up to about 1.5 ***megabytes*** (MB) of data, the hard disk sizes start with about 5 megabytes up to nearly a ***gigabyte*** (GB) of storage per drive. A floppy disk rotates at about 300 rpm and has about 40 tracks (concentric rings where data is stored) per side, whereas a hard disk rotates at around 3,000 rpm and can have as many as 1,024 tracks in the same physical media size. A hard disk, because of the close packing of data, is much more sensitive to vibration, shock and temperature changes than a floppy disk. With data packed closer and moving faster, it is necessary to exercise considerable care with a hard disk.

—*Optical Disk Drives*

Optical disk drives, also known as *CD-ROMs* (Cartridge Disk Read Only Memory) and *laser disk* drives, are a new and promising data storage medium. Optical disk drives store data by representing bits in reflected patterns of light on the media. Where hard disk drives are rated in megabytes of data storage, optical disks are rated in gigabytes (a gigabyte is equivalent to 1,000,000,000 characters or 200,000,000 words or 660,000 pages) of storage. Optical disks are faster than a floppy disk, but slower than a hard disk. Optical disks, like floppy disks, can be removed from the computer.

The state-of-the-art in optical disks is what is known as a "Write-Once-Read-Many" or ***WORM*** drive. After you write data to the WORM drive, you can not write to that particular section of the disk again. For example, if you revise a report that has been stored on an optical disk, the new version does not replace the former version as it normally would on a floppy or hard disk. Instead, the new version is stored at another location on the optical disk. The system now disregards the former location, but it is still there taking up memory. The reason for this is that a laser in the drive actually burns little holes in the surface of the disk. The technology is very promising for high data storage applications, especially where a full audit trail of information changes is necessary. Until there is a clearly defined set of standards, however, the optical disk should be evaluated carefully by an expert before being considered for the average criminal justice application.

—*Magnetic Tape Drives*

Magnetic tape drives (or simply tape drives) usually serve as a backup and restoration device on microcomputers. Magnetic tape can protect

your programs and data against accidental loss as a result of power failure, system errors, fatal disk errors, theft or other catastrophes, as well as provide a medium of archiving data. Because of the size difference between hard disks and floppy disks, backing up a hard disk onto floppies can take 30 or more disks and upwards of two hours to complete. Tape drives make the chore of backing up data from the hard disk much more simple. You put a tape in the drive and instruct the system to back up the hard disk. This can take anywhere from five to 45 minutes, depending on the size and speed of both the tape drive and the hard disk.

Tape drives in microcomputers generally use a quarter-inch tape in a 9-track format. The tapes come in lengths of 300, 450 and 600 feet which store approximately 30, 45 and 60 megabytes of data, respectively. Magnetic tape for microcomputers is normally stored on a cartridge, like stereo cassette tapes. The standard-size cartridge, known as the DC300 or DC600 cartridge, is about $4x6x^{5}/_{8}$ inches. This tape cartridge size is used in both microcomputers and minicomputers and is the most common model installed in microcomputers. The next size tape is what is known as a DC1000 minicartridge tape. Minicartridges measure about $2x3x^{1}/_{2}$ inches and use a tape which is only 15/1000 of an inch wide. Minicartridges look a little smaller and thicker than a stereo cassette tape cartridge. The last common type of tape drive uses a tape cartridge that looks identical to a stereo tape cassette, except that it is designed as a digital, rather than an audio, tape.

In the microcomputer industry today, the standard for recording techniques is called the Quarter-Inch Compatibility (QIC) Committee Standard. For example, the QIC-24 Standard has been in use the longest and has the greatest market share at present. The most commonly-used tape drives in microcomputers are DC300 or DC600 tape using the QIC-24 recording standard. In selecting a backup system, you are safest sticking with a standard format.

• *Communication Devices*

Communication devices are the hardware components that allow a microcomputer to communicate with other computer systems and peripheral devices. The major communication devices that will be discussed here are parallel and serial ports, modems, facsimiles and networks. Most communication devices are connected to the microcomputer by a large cable that is connected to a ***port*** on the back of the microcomputer.

—*Parallel Versus Serial Transmission*

In a microcomputer, data are moved from one component to another by either serial or parallel transmission. The terms "parallel" and "serial" refer to the means through which the data are transmitted.

In a ***parallel transmission,*** all of the bits of data (which compose a byte) are simultaneously transmitted as a group on several parallel wires (one wire per bit plus additional wires for control signals). Only one byte can be transmitted and received at a time. Parallel transmission allows large amounts of data to be transmitted quickly without complicated conversion or error detection techniques. However, parallel transmission is usually limited to short distances due to this lack of error checking. Parallel devices such as printers and internal peripherals, like disk drives, are normally located close (less than eight feet) to the microprocessor.

Serial transmission uses as few wires as possible (as little as two), and moves the bits of data in a stream by disassembling the byte into bits, and transmitting the bits one at a time — that is, they are transmitted in a series —and are reassembled at the receiving end into bytes of data. Sent in this mode, serial transmissions may be transmitted very quickly, and amplified as necessary when the signal weakens. Serial transmissions always use some form of error detection, since the bytes of data are received in a stream rather than as one complete byte (as in a parallel transmission) and must be reassembled into a complete byte. Computers in two separate geographical locations commonly employ serial communications between each other.

—*Modems*

Modem is an acronym for MODulator/DEModulator. A modem is a device for converting digital signals from a microcomputer into signals which can be transmitted over a communication medium, such as a telephone line, to a receiving modem attached to a terminal or another computer. Modems require specialized communication software which is available in varying degrees of sophistication. There are two major types of modems in use microcomputers: external and internal.

An *external modem* looks like a flat metal box (usually about 4x8x1 inches in size) with blinking lights on one end and at least three cables coming out of the other end. External modems are normally serial devices, and are attached by a cable from the modem to a serial port on the computer. Another cable, which looks like a telephone line, runs from the modem to a modular telephone jack in a wall. The third cable is normally the power supply cable to the modem. An older type of external modem, known as an acoustic modem, used an acoustic coupler which allowed you to plug the handset of the phone into rubber cups molded onto the modem which contained a microphone and a speaker. Acoustic modems are rare now, as they are very sensitive to background noise.

Internal modems are designed on a card which plugs into the internal bus (or attachment slots) of the microcomputer. Internal modems generally use less power and do not require the use of one of the microcomputer's existing serial ports. All that is needed is a telephone cable to establish a connection between the microcomputer and the telephone wall plug.

Modems generally transmit data over a phone line in one of two ways: asynchronous or synchronous. Thus, there are two corresponding types of modems: asynchronous and synchronous. ***Asynchronous*** is the most common type of micro-to-micro or micro-to-mini communications technique, mainly because it does not require complex circuitry in the microcomputer and uses relatively inexpensive communications equipment. In an asynchronous transmission, data characters are sent in logical packets, which have unique bits indicating the beginning and end of the packet. Data placed in this logical packet may be sent to another computer without worrying when the data will arrive, or whether the computers need to synchronize the speed of their transmissions. The receiving computer will also be able to identify the beginning and end of the transmission.

With a ***synchronous*** transmission, however, the transmitted data is sent at higher rates in both directions, because the two computers synchronize their clocks and send their data packets at the same speed. This requires rather complex circuitry in the microcomputer and uses relatively expensive communications equipment. Synchronous transmission is the most common technique for communicating between mainframe and minicomputers and their attached or remote devices.

Modems are rated by their speed or baud rate. ***Baud*** is a measurement of speed which roughly equates to one bit per second. Because there are 8 bits to a byte, a modem which transmits at 1200 baud is actually transmitting 150 characters per second. This equals 9,000 characters a minute or roughly 1500 words. Low-speed modems generally are rated as 300-1200-2400 baud, which means the modem can transmit and receive at any of the three speeds. Medium-speed modems generally are rated as 4800-9600 baud and high-speed modems as 9600-19,200 baud. Asynchronous modems of 2400 baud are very common, and an increasing number of 9600 baud modems are being sold. A high-speed modem makes good sense when you consider the cost of the phone call compared to the cost of the modems. Since a 9600 baud modem is eight times faster than a 1200 baud modem, it takes up to one-eighth the time to transmit the data. If you are transmitting and receiving enough data that the additional expense of a faster modem will justify itself in a year or two, consider buying the faster modem. Most modems on the market today are capable of multiple speeds.

One problem with fast — 4800 and 9600 baud — modems, however, is that the quality of telephone lines is generally poor for computer use. Modems generally transmit streams of data which sound like hissing to the human ear. Unlike human beings, computers and modems have difficulty determining what is noise on a phone line and what is information. In a long distance call accompanied by hissing, popping and crackling, a high-speed modem can develop many data transmission errors. When the communication software controlling the modem determines that the data received is in error, the general solution is to retransmit the data. If the errors continue, the modem will slow down and the process repeats until the data is transmitted cleanly, which may take quite a while. One solution to the noise problem is to purchase modems with sophisticated error-correction routines built into their ROM. Another solution is to lease from the phone company a "clean" or "conditioned" line which is specially set up for data communications and is dedicated or wired directly (point-to-point) between both communication sites. Leased lines do tend to get expensive; if you have a high amount of traffic to the remote site, you might do some comparison shopping for line costs. Though expensive, a dedicated line provides a measure of security and privacy; where data must be protected, or transmitted in high volumes, the cost may justify it.

There are modems capable of higher speeds and there are devices called "multiplexors" which can pack multiple data streams into the same telephone lines. The average user of microcomputer communication devices, however, will not require such complex hardware. If you have complex communication needs, get an independent expert to advise you. Communications is a separate data processing field which can be as technically confusing as computer science. Seek independent verification, as communication-oriented errors and problems tend to get very expensive, very quickly.

In summary, four general statements can be made about modems. First, know that a modem is only as good as the software used to control the communications. Second, fast modems are expensive, but not as expensive as daily one- or two-hour long distance telephone calls. Third, every two years the most common speed of modems tends to get faster. And finally, you should always buy the fastest modem you can afford.

—*Facsimile*

One of the more interesting recent developments has been the ***facsimile*** add-in card for the microcomputer. This card gives the microcomputer the capability of sending and receiving handwritten text, pic-

tures or any other image which can be transmitted by a facsimile device. When the card is used with a high-quality scanner, you are able to have all the functions of a facsimile unit within your microcomputer.

•*Networks: Local Area Networks*

A ***network*** is a telecommunications and data communications system which allows a number of independent devices to communicate with each other. We will be discussing two types of networks, the ***Local Area Network*** or ***LAN*** and the ***Wide Area Network*** or ***WAN***. A LAN is a collection of devices (usually computers and peripherals) which are connected in a limited geographic area in such a way as to allow communications and the sharing of peripheral devices. A WAN is a network that uses a common ***protocol*** or procedure to interconnect different types of computing facilities or networks over a large geographical area.

In a network, microcomputers can share not only software programs and a common database, but also common resources such as high-capacity hard disks and laser printers — peripherals that would be far too expensive to buy for each microcomputer. Moreover, networks can establish pathways to communicate with other computer systems in remote locations: electronic mail, electronic bulletin boards and commercial networks such as Compuserve and The Source, for example. Let's look more closely at Local Area Networks, including their basic components, protocols, signaling methods and configuration varieties (or topologies). We will also look briefly at Wide Area Networks.

Local Area Networks (LANs), as the name implies, are systems for linking inexpensive microcomputers to share programs, data and peripheral resources, such as high-capacity hard disks, laser printers and electronic mail in a limited geographic area, such as a building or office. Understanding LANs requires that you understand three basic concepts: a *packet* of information, a *node* and a *server*. A *packet* is simply a piece of data or program of a specific size with additional information called a header and a trailer attached to the beginning and rear of the packet. The header tells where the packet is going, and the trailer tells the size of the data in the packet. A *node* is a device which has access to the network resources. A node can be a *workstation* (a microcomputer or a terminal) or a special device called a server. A *server* is a specialized microcomputer which offers some service to the network, such as storing or printing files or providing communication capabilities. Servers may be either specialized microcomputers made by the manufacturer of the LAN hardware or a standard microcomputer running a specialized software application. In some cases, standard microcomputers which are being used as servers may simultaneously be used as workstations, although this is seldom recommended due to performance losses.

—*Token Passing Versus CSMA/CD Protocol*

Microcomputer LANs generally follow one of two standard protocols or procedures for formatting and transmitting data: *Token Passing* and ***Carrier-Sense Multiple-Access/Collision Detection (CSMA/CD).***

Token passing networks work like a game of "hot potato." Every node on the network is allowed to hold the token, the "hot potato," for a limited time. The token is a specially marked packet which regulates the use of network resources. During the time the node possesses the token, it can send or receive packets of information to and from the network. When the node's time runs out, the node has to pass the token on to the next node in line, even if it has more packets of data to transmit. The node has to wait until the token returns to finish the transmission. Essentially, each node is granted a limited, equal turn to use the resources on the network.

A Carrier-Sense Multiple-Access/Collision Detection (CSMA/CD) network works like a party-line telephone system in that every node listens all the time to detect if someone else is using the LAN. If the LAN is idle, the node wishing to transmit will begin sending its packets. As the node transmits its packets, it constantly receives packets and compares them to what it is sending. If they don't match, the node assumes that another node was transmitting (collision detection), and will stop its transmission and wait a random period before attempting to transmit again. Each node, then, keeps automatically checking to see if another node is attempting to gain access to the resources of the network.

Both LANs have their strengths and weaknesses. In general, a network with a large number of nodes which has a processing load composed of a number of short, intermittent data transmissions, will function with less delay in a token passing network. An example is an automated records management system, a typical database function in a criminal justice environment. There is less delay usually because a large volume of small data packets from a large number of nodes will be transmitted back and forth from the server. Each individual node only transmits a small amount of data in each packet and only intermittently needs to send or receive a packet, e.g., while making an inquiry or update of the database. Since each node is allowed to hold the token for a set period of time, the token passing LAN is very good at sharing the processing load evenly among its users. Token passing LANs, however, tend not to be as efficient at passing large amounts of data as the CSMA/CD protocol, because the transmitting node has to wait several turns to complete the transfer of a large file, rather than transmitting it all at once.

CSMA/CD networks generally tend to work best in environments where there are infrequent transfers of large files. For example, a word processing user will load the word processor from the LAN, work on a document for an hour, then save and print the document. In the period of time the user was creating the document, the node did not use the services of the LAN because everything was being done in the memory and microprocessor of the workstation. During the hour the node was not using the LAN, the other network nodes are free to transmit without waiting for the node which is working on its local processor.

—*Baseband Versus Broadband Networks*

Another important consideration in the selection of a LAN is its signaling method, of which there are two types: baseband and broadband.

In a ***baseband*** network, a carrier signal with a specified voltage is present on the wires all the time. Nodes on the LAN transmit data either by reversing the voltage or by raising and lowering the voltage, either of which causes a different type of signal composed of a stream of bits to flow down the wire. Baseband transmissions take place millions of times a second and are extremely sensitive to things like cable lengths (which must be installed exactly as specified) and electrical interference.

Broadband networks use a system of oscillating signals like radio or TV signals which can be transmitted on different frequencies. Broadband networks allow other data like television signals or radio signals to be included in the same cable (but on a different frequency). Nodes on a broadband network transmit data on one frequency. The data is converted to oscillating signals and retransmitted by a sophisticated transmitter. Broadband requires hardware which is very sophisticated and is generally much more expensive to implement than a baseband network.

Because it is inexpensive, reliable, easy to upgrade and quick enough for most applications, baseband is generally the signaling method of choice. Although broadband is desirable due to its potential capabilities and the amount of data that can be transmitted, it is not cost-effective in most criminal justice applications.

The above explanations are extremely simplified. A systems analyst must consider literally hundreds of other items when determining the effectiveness and capabilities of a particular LAN. Although CSMA/CD and Token Passing are the most common protocols, others are also available, such as ***Carrier-Sense Multiple-Access/Collision Avoidance (CSMA/CA)***.

—*Topologies*

Simply put, the *topology* of a LAN is its actual physical layout. There are three major LAN topologies: bus topology, star topology, and ring topology. Each of these topologies are explained in the following paragraphs and are illustrated in **Figure 1** and **Figure 2.**

In a ***bus topology*** network, a single master cable forms the bus (backbone) of the network. All nodes are attached by a short length of cable to the bus or are directly interconnected by the bus itself. The latter variation is called a ***daisy chain topology***. Each end of the bus must have a "terminator" device connected to it which reflects the signals. Bus topology networks are simple to wire, but if the cable is damaged or a connection broken, the entire network can fail. Most problems associated with bus topology networks are caused by a problem with the cable, and locating the trouble spot in the cable can be difficult.

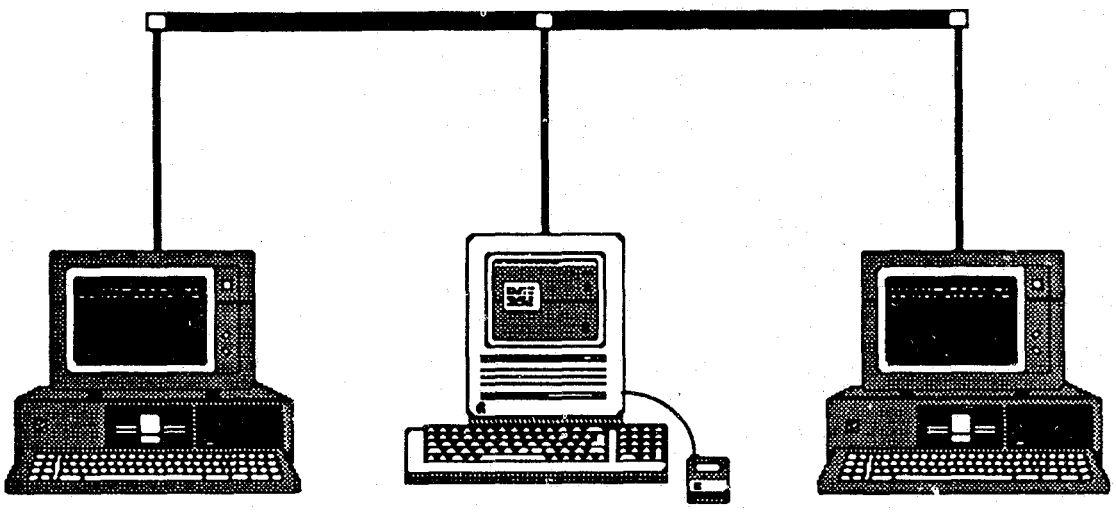
In a ***star topology*** network, all the nodes are connected by a separate and independent wire to a central computer, which is usually the network server, or to a connecting device called a hub. Because each node has a separate wire to the server, the failure of any one node does not affect the rest of the network. One disadvantage with a star topology is the large number of separate cables running to every individual node on the network. For this reason, most manufacturers have developed a "concentrator" or "access unit" that allows a number of nodes, usually less than eight, to be grouped in "clusters." These clusters are then connected to the server by a single cable which serves all the nodes attached to the cluster.

In a ***ring topology*** network, all nodes are cabled together in a ring. Every piece of data transmitted on the network flows through each node sequentially and is retransmitted by every node on the network. When a node transmits a packet, it addresses the packet to a specific node. The packet flows around the network and through each node until it reaches the destination node. The destination node then marks the packet "received," and transmits the packet back onto the network to continue around the ring. The packet eventually returns to the original node, which notices that the packet is marked "received." A broken cable in either a ring topology or bus topology will cause the network to fail.

Although simple in concept, LANs can be mixed and modified, frequently trading performance for ease of installation. You cannot determine the topology of a network simply by examining the cabling,

Figure 1

Bus Topology Network



Daisy Chain Topology Network

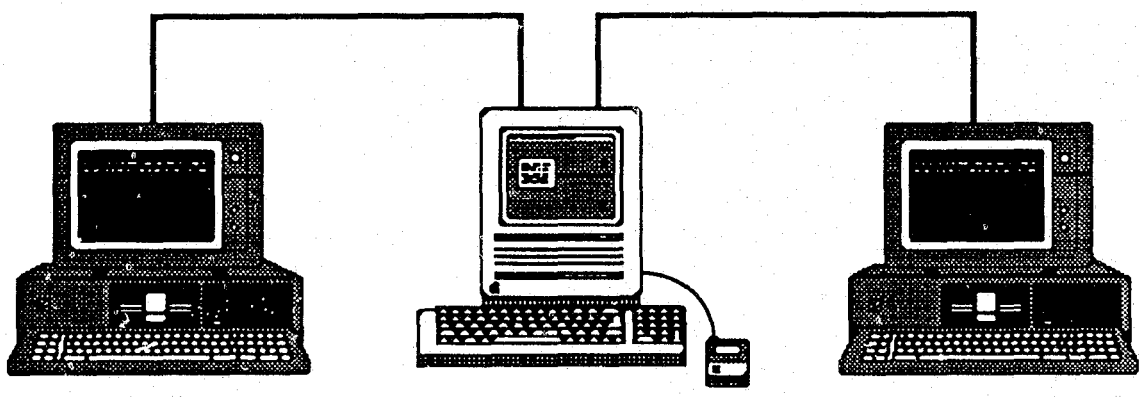
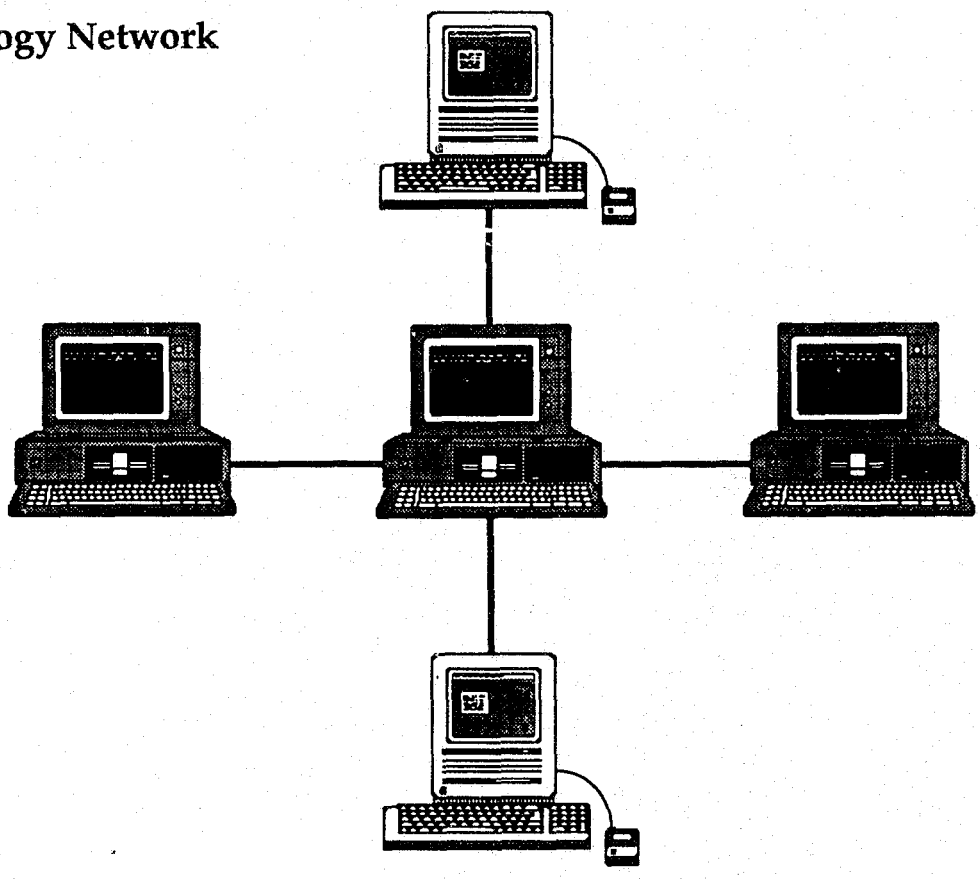
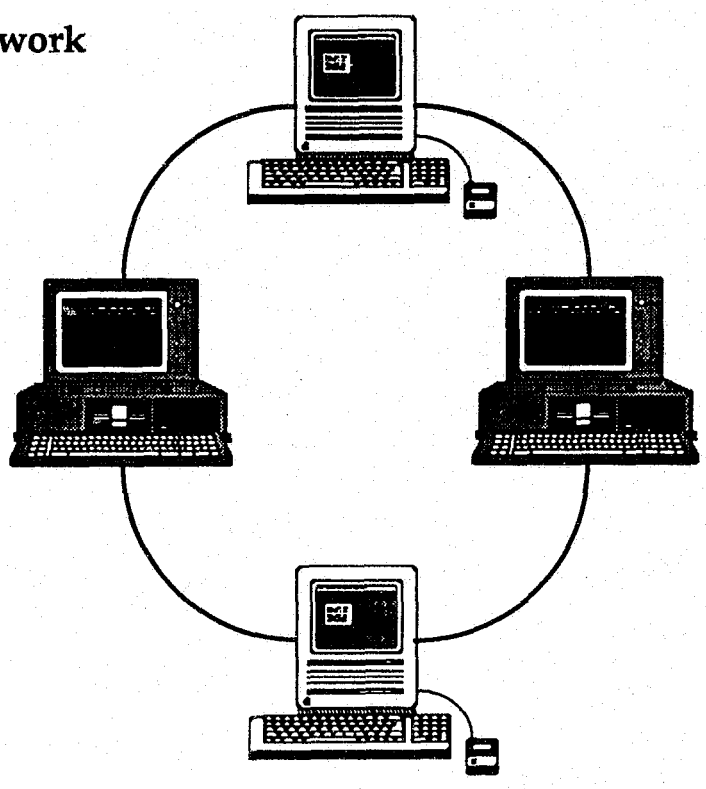


Figure 2

Star Topology Network



Ring Topology Network



as topologies may be slightly modified to aid in wiring the LAN or to extend the cabling distance. **Table 4** provides a sample of LAN configurations indicating the variety of available vendors, protocols and topologies.

Sample LAN Configurations

Vendor	Name	Protocol	Topology
AT&T	StarLan	CSMA/CD	Star/Daisy Chain
various	Ethernet	CSMA/CD	Bus
3Com	EtherLink	CSMA/CD	Bus
Corvus	Omninet	CSMA/CD	Bus
Apple	AppleTalk	CSMA/CA	Daisy Chain
IBM	PC Network	CSMA/CD	Daisy Chain
IBM	Token-Ring	Token Passing	Star and Ring
various	Arcnet	Token Passing	Star
3Com	TokenLink	Token Passing	Bus and Ring
Novell	Netware	various	various

Table 4

Each LAN has its own strengths and weaknesses, but all can provide a functional environment. In fact, hardware standards have enabled software manufacturers to concentrate on writing software which will operate across all the LAN environments.

•*Networks: Wide Area Networks*

Wide Area Networks are an outgrowth of Local Area Networks. A Wide Area Network (WAN) is a network that can interconnect different types of computers and networks over a large geographical area via telephone or a dedicated medium, such as microwave or fiber optic cable, by sharing a common protocol. To be called a WAN, a remote user must be able to share devices and services with the remote site regardless of the local topology, systems or protocols.

WANs imply a sharing or blending of resources to the point where users do not need to know the exact physical location of the resources they are using (known as "transparent" use). For example, a WAN may include a LAN in San Francisco, a minicomputer in Chicago and a PC in Boston, allowing each user to have access to the information and resources of any of the three sites. A San Francisco user may use the Boston database and

a printer in Chicago. With the use of electronic mail on a WAN, one large distributed network can be created. Moreover, with the use of satellite communications and high-speed fiber optic communications, a WAN can be set up worldwide.

Software

Software is the term for the programs or instructions computers execute. In essence, the software you use is a very precise list of instructions which a programmer has created to accomplish some specific task or operation. Obviously, you want to select the software for your specific task which performs its functions quickly, efficiently and precisely. You should always spend some time operating and evaluating a program prior to buying it Although you may not have a background in programming, you will be able tell if the program seems clumsy, difficult to use and excessively slow or if it performs all the functions you require. Don't let yourself be rushed through the evaluation as you need to check all of the functions of the software. Remember, a human being designed the software and human beings are fallible.

There are a number of different types of software, divided into the standard categories of ***system software*** and ***application software.***

System software describes any software that either controls or works closely with the hardware and application software. System software can be either the ***operating system,*** which functions as the master control program for the entire system, or *utility programs,* which are executed to perform special tasks related to the operation of the system, such as a utility program which stores the date and time. Even programming languages (which programmers use to write software) and hardware diagnostic programs (which technicians use to determine why the system is not working correctly) are classified as system software.

Application software performs some specific tasks for the user, such as word processing, accounting, database management or communications. Application software usually will not function without the operating system already loaded and running because it uses features provided by the operating system, such as storage, retrieval and printing functions. Thus, applications which function under a complex and feature-rich operating system offer much more sophistication than those written for a rudimentary system.

• *System Software*

—*Operating Systems*

Operating systems are software programs that control all of the resources and functions of the computer system. Think of the operating system as the "master control" program. We stand in relation to the microcomputer's operating system in much the same way we do to our automobile's engine. Most of us have little or no idea of how an internal combustion engine works, yet we can turn the key and drive the car. A well-written operating system should work for us in much the same manner. You should not have to think about how the operating system makes the computer work; you should just be able to use it. A good operating system does its job quietly and efficiently, in such a manner that most users never notice it is there.

Operating systems are generally the most complicated software programs, handling all the highly complex tasks, such as fetching files of information, sending information to the printer, responding to the keyboard examining everything typed and controlling the monitor. An operating system is responsible for simultaneously executing tasks, such as date- and time-stamping files; keeping track of where information and programs are stored in the memory; keeping track of where files are stored and what the files are named; keeping track of how many and what kind of storage devices are connected to the microcomputer and how to talk to them; maintaining transaction logs of user interactions with the system; compiling statistics on the use of the system's resources; and a host of other complicated tasks. Not only does an operating system have to do everything correctly, it also has to do it very quickly.

As manufacturers find better, more efficient ways of providing these services, and correct errors which may be discovered in the operating system, they will release a new version. Make sure you get the latest release when you buy a system. Moreover, look for microcomputer manufacturers that provide new releases free or at least discounted as a condition of your initial purchase. Choosing an operating system is critical to the acquisition process and for this reason, in the next chapter, **Operating System Options**, we take a much closer look at the different types of available operating systems.

—*Utilities*

Utility software is a category of software that provides programs that make using the computer easier, many of which are analogous to house-

keeping chores. Manufacturers of operating systems normally include utilities for such things as sorting, printing and editing files which are not necessary to the operation of the operating system itself. Utilities provide a standard means of performing generic file operations and a minimum set of tools for any programmer who will be working with the system. An operating system's "richness" or "fullness" is normally judged by the type and number of utilities that are included.

—Languages

As noted earlier, computers are designed to understand binary numbers coded to form instructions that allow the computer to perform its functions. That code at its most primitive level is represented by strings of ones and zeros. As such, it is difficult for most people to understand, much less write. ***Programming languages*** convert a more human-readable form into the binary code. In essence, programming languages are coding schemes that simplify the writing of program instructions for the computer. A discussion of programming languages is included as part of system software because they are used to create software programs, operating systems and utility programs. Additionally, most operating systems come with some programming language included in the standard packages.

There are several programming languages available, but today, standard programming languages include **BASIC, COBOL, FORTRAN** and **C**, each of which is best suited to particular applications. Do not worry about being able to write a program in any of the languages; you do not have to understand programming or programming languages to use a microcomputer.

Fourth generation languages (4GLs) are now the state-of-the-art programming languages. Fourth generation languages differ from the prior generations of languages in that a 4GL is normally nonprocedural; programmers answer questions and check boxes in menus, rather than write out each instruction as they would in the prior generations of programming languages. Fourth generation languages are usually based on a database programming language with a database and logical functions built in.

Most 4GLs also support some type of ad hoc query language, such as the Standard Query Language (SQL) interface. A query language is a language built into the 4GL where the user can ask questions of the database in an "English-like" language. Thus, the real power of the 4GL is that a person with very little programming experience can design and write an acceptable application.

The trade-off you make in using a 4GL is that most 4GLs execute more slowly than the prior generations of languages. Additionally, a 4GL is limited by the tools and functions that the programmer who designed the 4GL saw fit to include. If you find that the 4GL is limited in a feature or function which you require, you will most likely have to have a programmer write an additional program in a ***low-level language***. Unfortunately, you are not likely to determine the limitations of the 4GL until you have used it for a while. Because of this, it is a very good idea to "test drive" the 4GL in the environment in which you intend to use it prior to purchasing the program.

Most ***artificial intelligence*** programs (used for natural language processing, planning and problem-solving systems, programmed vision systems and expert systems) use languages such as PROLOG (a logic programming system) or LISP (a list processing language). Within artificial intelligence, *expert systems* is one field that has already produced useful results. These are systems in which the decisionmaking processes of an expert are modeled and made executable. Expert systems are used as a diagnostic tool and are in use in fields as diverse as medicine, oil exploration and criminal justice. Expert systems usually are developed through the interaction of the expert in a given field of study (called a domain), a knowledge engineer (a person who translates the expert's knowledge into rules or logical if-then statements), and a systems engineer (who, using one of the artificial intelligence programming languages, codes the rules and if-then statements for use by the computer). Pioneering criminal justice applications currently under development include the FBI Behavioral Science Unit's expert system for tracking serial murderers and rapists. The behavioral and psychological variables associated with the criminal mind, however, make expert systems a difficult challenge.

—*Standards*

It is reassuring to know that some "standards" for system software exist in the microcomputer industry. Certain operating systems were generally accepted as standards as major manufacturers began to design products that would operate on the most commonly available systems. Standard operating systems enable a range of programs and peripherals to run on different models of computers with the same microprocessor. A standard operating system generally guarantees that more software will operate on your system than on a non-standard operating system. It also means that your operating system and the application program it controls will not become obsolete too quickly. Two operating systems generally accepted as standard for microcomputers are Microsoft Corporation's Disk Operating System (MS-DOS) and AT&T's UNIX System V (UNIX). Both MS-DOS and UNIX are designed to run on a variety of manufacturers' hardware, have long track records and can work with a large number

of applications. Both operating systems create a standard "environment" on the microcomputer which has led to the development of "portable" software: application software capable of running on a number of different manufacturers' machines.

Selecting a standard operating system helps you to deal effectively with the ***compatibility*** issue — a major consideration in most agencies' acquisition of microcomputer systems. If you have systems from two different manufacturers, you will soon find reasons to move information between the systems. Standard operating systems enable you to continue operating if the hardware manufacturer or system vendor goes out of business. In the same way, standard systems allow you to upgrade to a new system without throwing away all of the work done on the last system.

•*Application Software*

Application software are the programs that contain the instructions that carry out user tasks, as opposed to system software which assists the computer in its tasks. Application software can be written by the user but most is purchased from software vendors. Generally, application software can be divided into two main categories: ***horizontal market*** and ***vertical market*** software. The distinction is based upon the size of the market and the generic or specialized nature of the software application.

—*Horizontal Market Software*

Horizontal market software ranges across disciplines and market groups to serve the needs of a variety of users. For example, a database management package might be used by a police department, an accountant, a dentist, or anyone interested in storing and retrieving information quickly. Horizontal market software applications include: accounting, word processing, spreadsheets, database management, communications, graphics and desktop publishing. Horizontal market packages tend to be the most polished and heavily advertised of software packages because the market generates millions of dollars in business each year. The largest software vendors tend to be those who sell horizontal market software. You should be aware that most horizontal software packages cannot be modified; the manufacturer will only supply you with executable code, not the source code (the human-readable and modifiable form of a program).

One of the original uses for computers was automating accounting systems. There are literally hundreds of *accounting applications* available for every type of accounting from accrual to cash-based, from

private to public sector, and from not-for-profit corporations to sole proprietorships. The best advice concerning accounting software is to shop for it with the person who will be using it — your agency's accountant.

Word processing allows the operator to create, edit and format text in a temporary format, which is held in the memory of the microcomputer until printed. This allows nearly unlimited drafts and revisions before the final product is printed. "Boilerplating" enables the user to create a prototype document as a source which can be modified rather than recreated each time a new document is needed. As state-of-the-art word processors become more sophisticated, additional capabilities such as spell-checking, thesaurus information, merging, headers and footers, indexing, automated table of contents and a host of other features are available. Word processing is extremely helpful in generating daily reports, narratives or any standard format document. Frequently, word processing is the first piece of application software acquired by an agency.

A ***spreadsheet*** application is a management tool which can be used to organize and calculate statistical and financial data. It can be thought of as an electronic worksheet, with multiple columns and rows similar to an accounting ledger. Either alphanumeric or numeric data may be entered into the cells of the worksheet. Complex mathematical and statistical functions can be performed on the numeric data, and many recent spreadsheet programs enable users to create graphic representations (pie charts, bar charts, trend lines, etc.) of the data.

A spreadsheet program is a valuable tool for manipulating empirical data to make "what-if" predictions; as you vary assumptions and calculations, you can measure the effect on the "bottom line."

An example of how a spreadsheet works is a checkbook register. In your checkbook, you add deposits and subtract debits from the running total in the right-hand column. If you were to model the checkbook into a spreadsheet, all you would have to do is enter the values of the debits and deposits; the spreadsheet can do all the addition and subtraction and automatically present you with the updated balance. Law enforcement agencies frequently use spreadsheets for crime analysis and workload distribution. Spreadsheets are also helpful in tabulating statistics, calculating overtime hours, preparing accounting or budget information or nearly any application which has some associated mathematical calculation.

Database management system software systematically stores and retrieves large amounts of information in a structured fashion, and has an organ-

ized method of inquiring about relationships in the data. Database management systems, such as DataFlex and dBase III Plus, allow you to create programs for your specific needs. Such management systems are like filing cabinets: they store information according to the categories you create, but they sort and retrieve the information almost instantaneously. For example, let's assume you have information about stolen cars, which includes make, model, year and color, the day of the week and the time of day each was stolen, and the location from which each car was stolen. Each group of information about each car is called a "record." The records are kept in related groups called "files." Taken together, all of the files become the auto theft database. Now you can make inquiries about the contents of the auto theft database, such as, "show me all the cars that were stolen on the north side of town after 10 p.m. on Fridays." The database software searches its files for each record that matches your selection criteria and displays them on the screen, and can give you a printed read-out as well. If the database manager returns 15 records from the database of stolen cars, all of which are red station wagons, you have discovered a relationship in the data.

The power of a database is not only that it stores and retrieves information, but that it allows you to examine relationships in the data. These relationships can provide you with new information. In crime analysis, a comprehensive database of information about burglaries might enable a detective to detect a pattern and predict the next likely location.

The ability to perform queries on the database in a free-form manner is known as an *ad hoc query capability*, one of the most powerful and useful functions of database programs. Most fourth generation database language programs provide this capability.

Communication software applications let microcomputers share data and information with remote systems. Most agencies now use some form of data communications system to allow them to communicate with systems such as the National Crime Information Center (NCIC), the National Law Enforcement Telecommunications System (NLETS) or state motor vehicle systems. Microcomputers are capable of communicating with nearly any other computer available. The communication software can be either a "terminal emulation" application, that is, the software allows the microcomputer to imitate a different type of system and function as a workstation on the remote system, or a "file transfer system," where data files are copied between the two separate systems. As a general rule, most computer manufacturers have software that allows microcomputers to communicate with their entire product line of systems.

Graphics application software allows data to be represented in a graphic format. There are hundreds of "presentation" graphics packages available. Presentation graphics allow you to create common business graphics such as pie, line and bar charts to visually display numerical data. A chart is a more expressive way of showing statistical results than simple columns of numbers. Graphic design software, such as computer-aided drafting or computerized "painting" programs, are also available for microcomputers and can be used by an agency to create designs of a crime scene or accident scene, rather than trying to draw them by hand. Since the graphics files are stored on the system, a case file can be stored with both the text and the graphic data.

Desktop publishing programs provide users with typesetting and design tools, allowing for a great deal of creativity in producing reports, newsletters, forms, overheads and instructional material. These programs can usually be integrated with other software, such as word processing, graphics and specific criminal justice applications; you can generally transfer data produced in another application into a desktop publishing system to create a final document. This eliminates the necessity of preparing a document in word processing and then having it typeset by a commercial vendor. Previously, only the largest agencies could afford typesetting and sophisticated design services; with desktop publishing programs agencies have in-house control of typesetting and design functions and can save both money and production time. Relatively inexpensive desktop publishing programs can greatly enhance the quality and range of communications generated within an agency.

—*Vertical Market Software*

Vertical market software, the other major category of application software, is highly specialized; it is designed to accomplish tasks specific to a particular discipline or market. Medicine, law and criminal justice, for example, are considered vertical markets. Vendors with an understanding of the particular software requirements of these markets have created customized programs to fill certain medical, legal and criminal justice needs. A computer-aided dispatch application, for example, may have some features, such as word processing, that are used in a variety of other software packages, but the primary features have been developed to meet the unique resource allocation needs of a law enforcement dispatch center. Such a product would not be appropriate for any other discipline. The software products listed in this publication in ***Part Two, the Software Catalogue,*** are vertical market applications specifically designed for use by criminal justice agencies.

Because vertical market software is tailored to the needs of specific disciplines, and thus provides the vendor with fewer sales from which to

recover development costs, it is usually more expensive than horizontal software packages, such as accounting, that can be used by the general business community.

Use common sense and be cautious when reviewing a new, highly specialized product or vendor. A successful vertical market vendor will be able to demonstrate a sizeable number of installations and a track record of satisfied users. Most vertical market vendors either will allow you to purchase the ***source code*** (the human-readable and modifiable form of a program) or will agree, as part of the purchase contract, to place the source code in escrow for you; in the event the vendor goes bankrupt or stops supporting the software, you receive the source code.

—*Public Domain Software*

Public domain software may be either horizontal or vertical market software. It is not protected under a patent or copyright and, therefore, because it cannot be licensed, its use by the public is unrestricted. A copy of the software and its source code can usually be obtained from its creator for a nominal fee: public domain software is typically much less expensive than proprietary software. If available, you should also be able to receive full documentation. Public domain software may or may not be supported (meaning technicians are available for help and advice) by the author. In using public domain software, attempt to make some arrangement for continuing support, such as training and installation assistance, if necessary, and verify your right to modify the software to suit your specific needs.

Several agencies that have written and placed criminal justice software into the public domain are represented in the ***Software Catalogue.***

II. *OPERATING SYSTEM OPTIONS*

Single-User, Single-Tasking Operating Systems
Single-User, Multitasking Operating Systems
Multiuser, Single-Tasking Operating Systems
Multiuser, Multitasking Operating Systems

II. OPERATING SYSTEM OPTIONS

At this point you should have a good idea of the basic components —the hardware and the software — that can be configured in various ways to create a microcomputer system. We will now take a closer look at operating systems, the software that functions as the master control program for the entire system. The microcomputer parts that you are able to link together to form a system will depend upon the type of operating system you choose: not all operating systems will run every type of configuration.

As we discussed earlier, operating systems are the programs that allow the computer to control its resources, execute programs and manage data. When most people are choosing a microcomputer, the type of operating system is usually not a major consideration. But an informed user may realize that there are differences in operating systems and ask their friends and associates for suggestions. They may hear that there are "thousands of programs available" for one type of operating system, and that the amount of software available is the most important consideration in acquiring a system. They may also hear that a particular microcomputer is "simple to use," and that the "ease of use" of a system is the most important factor. Or, they might have a friend who looks at them sagely and states, "You should find the software you need first, and then decide on the hardware and operating system." The unfortunate thing is that each of these comments is correct to a degree, and must be examined for your specific case.

The fact that thousands of programs are available for one specific operating system does not matter if none of those programs meet your needs. The availability of 500 different types of arcade games is not necessarily a bonus for a criminal justice agency. Ease of use for system users is a concern, but not enough to accept a system that does not meet your needs in other aspects. An easy-to-use program that does not do the job is as poor a choice as a difficult-to-use program which meets all your needs.

Choosing your software prior to choosing the hardware is generally accepted as the proper sequence when acquiring a system. The problem is, normally you have to do a bit of hardware selection first. People usually have a vague idea of the type of system for which they are looking. In general, you can exclude a number of different sizes and types of systems. For instance, you may know that your agency cannot afford an expensive mainframe computer or a large minicomputer. This will automatically exclude certain operating systems and the programs designed for those operating systems. You can waste a lot of time and effort examining

hardware and evaluating software for systems which are out of your budget. Frequently, your budget, more so than your software needs, limits your selection criteria.

If you are familiar with the types of available operating systems, you can still get a powerful system on a tight budget. Microcomputer operating systems are becoming more sophisticated every day, and in some cases operate the same programs and operating systems as the more expensive mainframe and minicomputers. By knowing your needs and the capabilities of the different types of operating systems, you can make a more informed system acquisition.

This section will explain the differences between the four major categories of operating systems: single-user, single-tasking; single-user, multitasking; multiuser, single-tasking; and multiuser, multitasking.

Microcomputer operating systems may be classified into one of four different categories, each of which has different benefits and limitations. The categories refer to whether the operating system is single-user or multiuser (one person or several people using the system) and single-tasking or multitasking (capable of processing one operation at a time or many operations being processed concurrently.) The four most common categories, a sample operating system for each of the categories, and the relative degree of complexity of each category are identified in the matrix in **Figure 2**. As you can see, operating systems become more complex and require more resources as they develop from single-user, single-tasking into multiuser, multitasking systems.

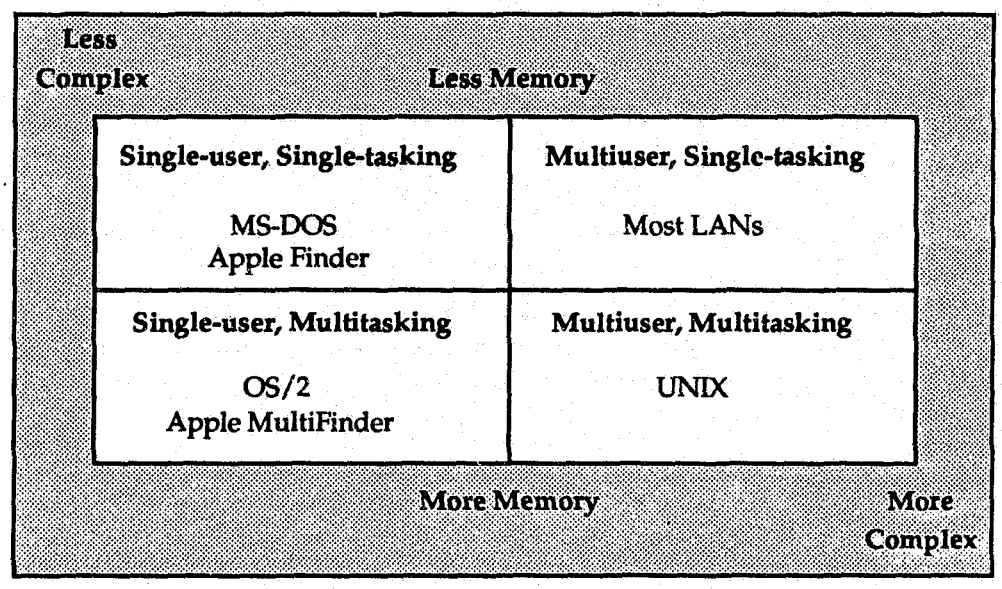


Figure 2: Sample Operating Systems

Single-User, Single-Tasking Operating Systems

A single-user, single-tasking operating system is designed to allow a single user on a single system to perform a single task at a time. Single-tasking operating systems were the first available operating systems for microcomputers: they are relatively uncomplicated and are easier to write than multitasking operating systems. Single-user, single-tasking operating systems use very little memory and require simple hardware. Such systems are inexpensive, widely available and are generally easy to learn. Single-user, single-tasking operating systems are the least complex of the four major categories, and although this makes them easy to learn, they generally cannot process large amounts of data as quickly as a more sophisticated system.

In a single-user, single-tasking system, the most mundane tasks require the full attention of the operating system. Typically, the system waits for your input and you wait for the system to provide output. A common example of this slow-down is in the printing process. After you enter the print command, the CPU must concentrate solely on printing the file before accepting additional commands. Because the single-tasking operating system can handle only one process at a time, the system seems unresponsive during this period.[1] Single-tasking systems also slow down when reading and writing files to and from disk storage. The system cannot simultaneously continue processing while reading or writing, so the operator must wait for the drives to complete the read/write operation.[2]

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[1]To compensate for the delay, programmers have developed a process called print spooling. A print spooler is a "smart" program capable of printing a file with little or no supervision by the operating system. The print spooler takes advantage of those periods when the CPU is waiting for other tasks to finish. During idle periods, the print spooler instructs the CPU to process the printing request. This allows the operator to execute a printing task and proceed to other tasks while the print spooler prints the file.

[2]Programmers have also developed a process called disk caching. When the CPU reads a piece of information from the disk drives, the disk caching software makes sure the CPU reads a much larger amount of data than it actually requested. The disk caching software is "gambling" that the next time the operating system requests another disk read, the caching software will have already placed the requested information in memory, thus saving the time used to read the sector of the disk drive. Additionally, the disk caching software saves up a number of the disk writing requests, sorts them into order and processes them in one batch. It also keeps the most active pieces of data in memory, and writes out those pieces of data which are not reused, thereby increasing the chances of the data being in memory rather than on disk.

• *The MS-DOS Operating System*

The most common single-tasking operating system used in today's microcomputers is the Microsoft Disk Operating System (MS-DOS). MS-DOS is licensed to private microcomputer manufacturers who then put their own name on the package and sell it as if they wrote the operating system. Microsoft Corporation's first customer for MS-DOS was IBM Corporation, which used it instead of the then-standard CP/M operating system, when it introduced its PC line of microcomputers.[3] IBM assigned the name "PC-DOS" to the operating system and the name has since become a general term used to describe any derivative of MS-DOS.

MS-DOS is recognized as the standard in single-tasking, single-user microcomputer operating systems. As such, it has a tremendous following of both users and application software developers. A relatively simple system, MS-DOS has approximately 40 commands for the user to learn.

The MS-DOS user ***interface***, however, is cryptic in that it is limited in the number and type of characters that can be presented in a textual format.

MS-DOS was developed in 1981 and, technologically, is old. MS-DOS was originally designed to function on the Intel 8088 and 8086 family of microprocessors found in the older 8- and 16-bit IBM PC/XT class of microcomputers. Due to the limitations of the Intel 8088 microprocessor and IBM design constraints, MS-DOS will only address 640KB of RAM, which limits the size and complexity of software that you can use. Technology has now advanced, creating the Intel 80286 and 80386 microprocessors found on the 32-bit-based AT and PS/2-class microcomputers. Although these microprocessors will support MS-DOS, they are more effective running operating systems such as OS/2 and UNIX which can effectively utilize several megabytes of RAM. Recent development work has attempted to provide MS-DOS as a subtask or capability within multiuser operating systems. In addition,

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[3]Digital Research Inc.'s CP/M (Control Program for Microcomputers) was originally based on the 8-bit Intel 8080 and later the Zilog Z80 microprocessors. It was the dominate single-user operating system for 8-bit microcomputers until the introduction of the IBM PC, at which time PC-DOS/MS-DOS became the dominant operating system. Whereas CP/M-80 was designed to support only 64KB of RAM and an 8-bit microprocessor, PC-DOS/MS-DOS could support both 8- and 16-bit processors, and up to 640KB of RAM. Digital Research did create a version of the CP/M operating system for the 16-bit microcomputers (CP/M-86 and Concurrent PC-DOS), but neither made any significant inroads into the marketplace.

there are system software utility programs that will operate with MS-DOS, allowing users to switch between several different applications. An example is Microsoft's Windows program.

- *The Macintosh Operating System with Finder*

  Apple Computer, Inc. developed The Macintosh Operating System with Finder, a single-user, single-tasking operating system for its Macintosh line of microcomputers. Unlike the MS-DOS interface, which is character-oriented (displaying only text composed of characters and numbers), the Macintosh interface is graphically-oriented (it shows icons, or pictures, representing programs or devices). A MS-DOS operator must type commands on a blank line, but with Finder, the operator need only point to the icon of the desired program or device and execute by pressing the button on top of the mouse. Finder is not limited by 640KB RAM as MS-DOS is, and can work on systems with as much as 16MB of RAM. Apple's Finder, as mentioned earlier, functions only on the Macintosh family of computers.

Single-User, Multitasking Operating Systems

A single-user, multitasking operating system is a powerful system designed to allow a single person using a single system to perform multiple tasks simultaneously. If you are writing a program, you can watch the output from that program in one ***window***, edit the program code in another window and compile a new version of the program in a third window. Or you could use the communication software to download a large file from a mainframe computer while writing a report in another window using your word processor, and at the same time be running a statistical package in another window. This capability of running different programs almost simultaneously gives a single user a great deal of processing power. Generally, the 32-bit processors are the only family of processors capable of supporting such a complex operating system.

- *The OS/2 Operating System*

  Microsoft and IBM jointly introduced Operating System/2 (OS/2) as the next generation of operating systems for MS-DOS-based microcomputers. The system is designed to interface with only a single user and yet will allow that user to perform multiple operations at the same time. The system is available in two versions, the Standard Edition, and the Extended Edition. The Standard Edition provides the user with the familiar MS-DOS interface, and a software feature called the DOS Compatibility Box. The DOS Compatibility Box creates an environment in which the user can also run some of the current MS-DOS programs. However, MS-DOS-based communications programs, network software and any software which uses non-standard capabilities of MS-DOS or ROM BIOS code will not run in OS/2.

The Extended Edition of OS/2 has a component called the Session Manager, which allows up to 16 programs to run concurrently. Another component of the Extended Edition is a graphics interface extension called the Windows Presentation Manager. This gives OS/2 a Macintosh-like interface; unlike MS-DOS, OS/2 can be icon-driven. Future enhancements of the Extended Edition may include database and mainframe communications capabilities.

Because OS/2 is a more sophisticated operating system than MS-DOS, it requires more memory. Unlike MS-DOS, which is limited to only 640KB of memory, OS/2 is capable of addressing up to 16MB of memory. Minimum memory requirements start at 1.5 MB of RAM for the Standard Edition, with 2MB required for support of the DOS Compatibility Box, and a minimum of 3MB of RAM for the Extended Edition. OS/2 also requires the 16-bit Intel 80286 microprocessor found in the AT class of microcomputer; it will support the 32-bit Intel 80386 microprocessor but it cannot utilize the 32-bit memory capability. Unlike MS-DOS, OS/2 will not operate on the older 8-bit Intel 8088 PC-class machines.

The design of OS/2 is such that any microcomputer manufacturer will be able to provide customized extensions to the operating system. Microsoft has announced a LAN Operating System extension called the OS/2 LAN Manager. IBM has announced plans to add the IBM Extended Edition with an interface similar to the Microsoft Presentation Manager, support for mainframe and LAN communications, and support for databases based on IBM's Structured Query Language (SQL).

- ***The Macintosh Operating System with MultiFinder***

In September 1987, Apple Computer, Inc. introduced The Macintosh Operating System with MultiFinder. MultiFinder allows a user to have several applications open at the same time, and to perform applications in the background, such as laser printer spooling. MultiFinder uses the same icon-driven, graphic interface as the single-user, single-tasking Macintosh Finder, and allows for easy integration of text and graphic information from one application to another. MultiFinder does not have the compatibility problems which exist between MS-DOS and OS/2. Apple Computer, Inc. has kept software developers informed of the capabilities and requirements of both the Finder and MultiFinder operating systems during their development cycle. With this knowledge, developers were able to specifically tailor MultiFinder to run solely on the Macintosh line of computers, and thus maximize the potential of the operating system. Additionally, Apple Computer, Inc. has announced that the MultiFinder will continue to

be enhanced, and will evolve into a full multiuser, multitasking operating system.

Both OS/2 and MultiFinder allow the user to concentrate more upon the applications which the user is executing than upon the operating system. Both require at least 1MB of RAM, and function much more efficiently when given more than 4MB.

Other single-user, multitasking operating systems are available; however, most are derivatives of a single-user version of the UNIX multiuser, multitasking operating system, which will be discussed in the following pages. There are additional single-user, multitasking operating systems available which are either add-ons to MS-DOS or Finder, or are proprietary systems, that is, available from only one manufacturer.

Multiuser, Single-Tasking Operating Systems

Earlier, we reviewed Local Area Networks (LANs). LANs connect multiple microcomputers to share peripherals and software programs and frequently, a common database. LANs are the most common example of multiuser, single-tasking operating systems. This multiuser, single-tasking operating system controls, or overrides, the operating systems of the connected microcomputers. The microcomputers still retain their single-user, single-tasking operating system, but when linked to the LAN, the net effect is a multiuser, single-tasking system. In addition, the user still retains all of the advantages of a standard single-user, single-tasking operating system when the user chooses to disconnect from the LAN operating system. This popular arrangement enables agencies with several single-user, single-tasking systems to share peripherals and data among many users and to take advantage of the additional capabilities of the LAN, most notably file-sharing, electronic mail and enhanced security.

The widespread use of MS-DOS software (single-user, single-tasking) in a LAN environment has caused MS-DOS software developers to design multiuser versions of their products for use on LANs. Because of the various types of LANs available and the myriad ways software can be designed to use the multiuser capability, developers have tailored their multiuser software products to operate only in specific LAN environments. You want to be certain that the application software you purchase runs on your specific LAN operating system.

Two of the most common and widely used MS-DOS-based microcomputer LAN operating systems are 3Com Corporation's 3Plus and Novell Incorporated's Netware. For its Macintosh computers, Apple created the AppleShare LAN operating system.

- *Netware*

  Novell Netware is a MS-DOS-based LAN operating system which is best known for the wide variety of LAN hardware and media upon which it will function. Netware is well known for its system ***fault tolerance*** option and its audit trail/user statistics features. A number of software manufacturers produce add-on products which enhance the system administration capabilities of the Netware line of products. Netware is acknowledged as the LAN operating system manufacturer with the largest base of installed users.

- *3Plus*

  3Com Corporation produces the 3Plus operating system which functions in both a MS-DOS and an Apple Macintosh environment. Unlike Novell, which supports a number of LAN media, 3Com has specialized in the Ethernet bus and token passing ring environments. 3Com is widely recognized for its communications capabilities, electronic mail and a simplified user interface based upon a menu system.

- *AppleShare*

  Apple Computer, Inc. designed and created the AppleShare file server software, which functions on the Apple LocalTalk Local Area Network. AppleTalk capability is built into every Apple Macintosh, and allows the interconnection of computers, printers and file servers. Apple also manufactures hardware and software to connect MS-DOS-based systems into an LocalTalk LAN.

  In summary, a multiuser, single-tasking operating system still limits users to a single operation at a time. Microsoft Corporation, however, has announced a LAN manager subsystem: a networking environment tied to the OS/2 operating system. This would provide each LAN user with multitasking capabilities and would create, in effect, a distributed multiuser, multitasking environment.

Multiuser, Multitasking Operating Systems

The multiuser, multitasking operating system is the powerhouse of operating systems and was formerly available only on minicomputers and mainframes. Today, due to the increased popularity of microcomputers and tremendous advances in technology, multiuser, multitasking operating systems such as UNIX have been developed for the microcomputer. A multiuser, multitasking operating system for microcomputers allows several persons on a single system to perform multiple tasks simultaneously. For example, a large multiuser, multitasking system could simultaneously support one person who is updating a records management program while another person is per-

forming inquiries against the records, and yet a third person is working with a jail management program and a word processor. In general, multiuser, multitasking operating systems such as UNIX and XENIX require a minimum of 20MB of hard disk and as much RAM as is economically feasible beyond a minimum of 1MB. The additional RAM is needed because operating systems allocate separate areas of memory and storage for each user, and complex operating systems have a consumptive appetite for memory and disk storage.

- ***UNIX and XENIX Operating Systems***

The most common multiuser, multitasking operating systems for microcomputers are the AT&T UNIX operating system and its XENIX derivative from Microsoft. UNIX and XENIX provide a rich operating system environment consisting of the *kernel* (the smallest part of executable program code in the operating system), utilities (upwards of 100, depending on the version), programming languages (usually FORTRAN and C), communication software (both terminal emulation and system-to-system file transfer) and on-line help.

AT&T licenses UNIX to most manufacturers, who in turn modify the UNIX code to better fit their own particular hardware. UNIX is thus available on many types of computers, from microcomputers to mainframes.

Oftentimes software developed on one UNIX system can be moved or "ported" to another UNIX system. The ease of portability varies, depending on the version of UNIX. The portability lets you benefit from the power of minicomputer and mainframe software on a microcomputer system. Similarly, you may purchase a microcomputer system and retain the same software and/or data, even as your hardware requirements expand to include a minicomputer or mainframe. UNIX also has very good security, configuration and resource-sharing capabilities, all of which make administering the system and handling a large number of users a relatively easy process for a trained system administrator.

One great strength that multiuser, multitasking operating systems such as UNIX have over single-user, single-tasking operating systems is communications. UNIX easily communicates with character-oriented devices such as terminals, modems and printers. Most UNIX systems can handle as many printers as you want to attach (up to the maximum number of ports). Unlike a MS-DOS-based microcomputer, which allows a maximum of five ports (three of which may be printers), UNIX allows as many terminals as the software license specifies and as many printers as the hardware design allows. Also as part of the standard utilities, UNIX includes telecommunications packages for transferring

files and electronic mail between UNIX systems and a terminal emulator for asynchronous communications.

UNIX also does well handling huge hard disk drives (gigabytes of hard disk storage on a UNIX system are not uncommon), handling audit trails and administering resources to large numbers of users. UNIX works very well with database languages and most programming languages.

What is gained in capability, however, is lost in ease of use. UNIX and XENIX are relatively more difficult to learn and use than the operating systems previously discussed in this section. In fact, most agencies with a UNIX-based system find that they have to hire a full-time system administrator to maintain the system.

In making UNIX as portable as possible (that is, able to work on many different machines), the developers of UNIX designed the system to support the most common variety of terminals and printers. As such, the programs may not be able to take advantage of any hardware features specific to a given computer system, terminal or printer. What this means is in the process of moving an application from one system to a dissimilar system, it is necessary to modify the application software to match the new hardware environment. Although you may move your applications to a larger machine as your needs grow, you may have to modify your source code.

Another design compromise with UNIX and XENIX was the decision to make the output on the video screen character-based rather than graphic-based. UNIX systems normally use serial terminals for workstations rather than microcomputers, because when UNIX was first marketed, microcomputers were prohibitively expensive. A serial terminal has a limit on the amount of data it can receive in a given second. Graphics and color require either a very high transmission rate (to transmit all the required color and graphical information) or considerable local memory and processing capability in the workstation. UNIX software, therefore, normally does not provide either color output or bit-addressable graphics, unless specifically modified and operating with high-quality color terminals.

III. *SELECTING A MICROCOMPUTER SYSTEM*

Conducting a Needs Assessment
Investigating Software
Investigating Hardware
Selecting a Vendor
Installing the System

III. SELECTING A MICROCOMPUTER SYSTEM

You now have a general understanding of a microcomputer's basic components and how those components work together to form a system configuration. From the previous section you understand the general differences between single-user and multiuser and single-tasking and multitasking operating systems; and you know that your decision to select a computer system will be guided to a great extent by the capabilities and limitations of the operating system. This, however, is only the beginning. In this section, we provide a rational, systematic approach to guide you in the acquisition process. You may at times be frustrated with all of the technical considerations and be tempted to "just pick a system and work out the minor problems as you go." That's a shortcut to disaster. You need to be extremely thorough in your evaluation and selection of a system. With some solid homework and an intelligent approach, you will end up with a system appropriate to your agency's needs, one that will be worth all of the research and planning. So, what do we do to put the acquisition process in motion?

Conducting a Needs Assessment

Too often agencies start the acquisition process by visiting a computer store and selecting a system on the assurances of a salesperson that a particular system will satisfy all of the agency's requirements. Frequently, however, neither the salesperson nor the agency was in a position to fully understand the agency's information needs and problems.

- ***Define the Problem***

The crucial first step in selecting an appropriate microcomputer is to define precisely what you want a microcomputer system to do for you — that is, what problems you want it to solve. If you have a problem in jail administration and management, be specific about the nature of the problem. A problem statement does not have to be more than a few sentences; the more concisely you can define it, the better. Perhaps the jail is always behind schedule in getting reports out; simply state, then, that late reporting is a major problem. After determining the problems, consider what your agency needs to solve the problem. Do you need a computer-aided dispatch system or do you need a more efficient method of recording calls? To make this decision, you need to know what functions your current system includes, as well as what it is missing.

- *Examine the Existing System*

  Your present manual system is probably the model or reference point for the automated system to come, so you will want to examine your present system carefully. To determine your system needs, talk to the people in each area of your operation, asking what problems they encounter and what they think would improve the process. You may be surprised to find that the people working in each section know exactly what disrupts the flow of information in the agency. Be as thorough as possible in this stage; make sure you talk to as many people as you can who may have knowledge of how your manual system operates. These are the same front-line people who can determine the success or failure of a new automated system. People often resist automation simply because it represents a change in the way they do things. If you make your people part of the process, however, by asking them to identify both the problems and the potential solutions, it will give them an emotional investment in the system and generate the cooperation necessary for the system to function effectively.

— *Define the Information Flow*

When conducting your needs assessment, look for the flow of information: where information enters the existing system, where and how it is modified as it travels through the system, and what comes out of the system. Make a simple flowchart of the process. Try to define the information flow as a group of separate, interacting tasks or functions. A task normally either adds information, modifies existing information or generates output from the information in the system. A good way to create a flowchart of the information is to walk through the process. That is, have one or more of the key operational personnel physically walk you through the path of the information, following forms and documents as they move through the system. Identify every place the form or the flow of information stops to be manipulated in any way — from the point of entry into your agency, through every person and place the information travels, to the final destination of the information. At each point, verify exactly how the process works. Ask the key person at each point to identify problems he or she is having and to suggest solutions that might improve the process.

It is possible that a simple change in the paper flow or condensing the number of forms may be all that is needed. If you find that your manual system works well, if it is getting a day's work done in a day's time, and if you know that a computer will not get it done faster or more effectively,

then perhaps automating this function is unnecessary. When a computer changes only the mode in which you accomplish a task, it often does not justify the expense. Assuming that is not the case, let us examine the next step in the process.

— *Define the Output*

For each task, begin by identifying the output generated in each step of the process. Starting with the outputs allows you to better understand what it is that you are trying to produce. For instance, a jail inmate tracking system would probably need to *inquire* about the status of an inmate, *list* all of the inmates housed in each cell block, and *produce* summary reports on booking and releases by category for a selected time period. When defining outputs, do not assume that every piece of information in your current system should become part of the computerized system. As systems mature and the information needs of administration change, information that was once useful may no longer be relevant. Creating and processing useless information is a waste of resources and money and, moreover, it distracts attention from useful information.

Automating a manual process provides the opportunity to rid your system of useless data and to streamline the data collection process. Gather examples of the system output — that is, samples of the physical documents generated. Go over the outputs item-by-item with the people who receive them and note any unnecessary items. What you are looking for are the different forms the information takes as it flows through the system. Once you have a good idea of the output requirements of the system, you will gain insight into the input requirements.

— *Define the Input*

Identify where and how information enters your system. How many people look at or modify the documentation created when you book a suspect? One? Five? Fifteen? Do they use the information as is or do they add to it? If they add to it, find the source of the new information. If they use the information, track where the information goes next. Be aware of information which is "created" in the process and be certain where it originates. One of the problems in analyzing a system is finding where and how information is modified or changed. As you did in the output section, get examples of the forms and documents used to enter or modify the information. A comparison of the information items on the input forms with the information on the output forms will clarify the ways in which the information is modified, manipulated or changed.

—Look for Bottlenecks

Eventually, you will begin to see several "streams" of information flowing through the system. Once you have a feel for where the information flows, look for any obvious bottlenecks or redundancies. For example, does a form normally spend a day or two in someone's in-box before being processed?

Look for the number of times a document or form is duplicated. Duplicated forms may mean the information flow is branching. Is it flowing somewhere for no apparent use? Organizations do have a tendency to generate more paperwork than is needed. Watch for duplicated forms or documents that have no real purpose other than tradition. It is not uncommon to discover an entire file system in some obscure office that has been updated on a daily basis for years, without any justifiable reason.

Multiple-copy forms frequently are separated for what appear to be good reasons, with an expectation or hope that the individual pages will come back together at the end of the process. Quite often, copies of a form are forwarded and then casually discarded by the recipient as unnecessary. Carefully examine the purpose of any "blind carbon copies" in the system. Normally, duplicating a form is an indication that the flow of information is not following a single path through the agency. The point to be emphasized here is that you do not want to automate a flawed manual system. At best, it will only do a bad job faster; at worst, the computer system will be rendered ineffective. Planning for a computer system is the ideal time to clean up an existing manual system.

—Define the Minimum Contents of Files

From your work defining inputs and outputs, you should have a clear idea of the kinds of information your present system processes. This knowledge is necessary to determine if the files of the automated system will be able to accommodate the kinds of information you need to process. If your needs assessment shows, for example, that your jail management records include four different trust fund accounts, you may want to seek a jail management software package capable of handling multiple trust accounts. Make a list of each input data item in your system from the various forms you have collected. The blank spaces on the forms represent the basic data elements which must be entered into, or calculated by, an automated system.

—Define the Minimum Size of Files

In addition to the *kinds* of information to be processed, file definition includes the *amount* of information that you will store in the computer

system. You will not know the exact amount of storage required by your system, as this is a function of the software and operating system which you will eventually acquire. At this time, however, you will need to estimate the average number of transactions, bookings or actions that your system handles daily, monthly and annually. In calculating your data processing needs, you should allow for growth, which can be estimated by examining your workload statistics for the past several years. At the same time you are allowing for growth, you should take the opportunity to determine the type and quality of information you intend to keep and establish a reasonable purge schedule and criteria. Such a schedule will prevent the accumulation of unnecessary, useless or dated information.

- ***Define the Security Required***

  You must also assess the security level required for the system, evaluate the sensitivity of the information you are handling and protect it to the same degree you would paper files. If the information is governed by federal or state security and privacy provisions, be certain you understand those provisions and that your security plans comply. Most multiuser operating systems have some sort of security built into the software, such as password protection for programs and data. Passwords, however, are only one alternative and may not provide sufficient protection. You might also consider purchasing removable disks that can be locked up separately from the system or systems that require keys to be activated. Depending on the size of your system and the level of security necessary, you may want to house the system in a separate, secure area. When assessing security needs, you should also consider the practicality of the plan and guard against unnecessary precautions that only cause users to ignore or circumvent the security procedures.

Investigating Software

Armed with the results of your needs assessment, you can now begin the search for a microcomputer system. When seeking an appropriate system, you will need to investigate application and operating system software and the computer hardware at virtually the same time because they are dependent upon one another. For our purposes here, however, we will first examine software because it contains the problem-solving procedures and then proceed to computer hardware which provides the power and flexibility necessary to execute the chosen software.

We recommend that you start with a systematic three-step process: 1) develop a list of the full range of available packages for the kinds of applications and the corresponding operating system you need; 2) perform a detailed analysis of the systems which seem to hold the most

potential; and 3) score those packages against your required specifications. How to find those packages, how to analyze them, and how to score them is the focus of this section of the ***Microcomputer Guide***.

• *Assemble a List of Software Products*

In compiling a list of appropriate software packages, you may want to start by reviewing the systems listed in the *Software Catalogue* in Part II of this *Guide*. Also, spend time on the phone talking to your contacts in other criminal justice agencies to see what kinds of hardware and software they are using. Reserve judgment as you listen to their reports; many users fall victim to the subjective and fallacious logic that says, "It's the best. It's the one we chose." You need to ask them for the positive and negative aspects of their system, make notes on their responses and compare the responses of all of your contacts. You may start to see a pattern develop. Even if your contacts do not have a system, they very often know someone who does. Those phone calls generate other contacts and at the end of the trail you are often surprised to find someone who has grappled with similar problems and has found an excellent solution.

Next, compile a list of software vendors, contact them, and ask for information on their products, including copies of the documentation, if available. Ask for a list of users of the kinds of systems you are investigating.

• *Analyze Software Packages*

Once you have assembled a list of the software packages available for a particular application, you are ready to begin analyzing individual packages. Remember from our earlier discussion of operating system options that the kind of system configuration you desire is dependent on a specific operating system. This is the first criterion by which will you narrow the field of available packages. At this point, however, you will narrow the field only to the extent of determining whether you need a single-user or multiuser, single-tasking or multitasking operating system. In other words, if you want to operate a multiuser system, then you will limit the software packages you investigate to those that can be supported by a multiuser operating system. The particular *brand* of multiuser operating system you select will depend on the particular multiuser software packages that you choose.
At a minimum, evaluate the software packages according to the following five criteria:

1) *Does the software meet all or most of the needs identified in your needs assessment?* Conduct a point-by-point comparison of the require-

ments in your needs assessment with the capabilities of the software. This will further narrow the field, helping you to identify the software packages with the greatest potential. It is possible that during the comparison process, you will discover that the software includes important functions that you did not consider or include in your list of desired capabilities. Feel free to update your requirements based on the standard capabilities offered by the different systems. You may want to set up a comparison chart that matches your work requirements with the software's functions or modules to serve as a basis for comparison and final selection.

2) *Does the software have complete documentation?* Review the documentation carefully. Complete and well-written documentation is an accurate gauge of a vendor's professionalism and commitment to the product. Documentation should be written in understandable English, free of jargon. The documentation should include, at a minimum, an index and table of contents and printed representations of the display screen as it would appear during operation of the software. Normally, software documentation is organized into administration, reference and user manuals. Carefully examine each manual. The administration manual should show you every function required to administer or maintain the software. Reference manuals usually contain a comprehensive list of available commands, modification procedures, file structures and other items of technical importance.

Pay particular attention to the user manuals. These manuals should be clearly written, enabling a novice to easily follow directions and quickly locate any reference material required for operating the system. Make certain that the software manuals you are reviewing are the same release version as the software being evaluated. If it does not match or if the vendor claims that this documentation is "basically the same" as the soon-to-be released version, insist on receiving the new documentation prior to considering the product in your evaluation process.

3) *Get a complete demonstration of the package.* Do not accept the claims in the promotional literature or the vendor's interpretation of a software package. Sit down and work with it as thoroughly as possible. If you are looking for a word processing package, take your best typist along and get his or her reaction. If it is a jail records management package, take the appropriate person along for the "test drive." Include both supervisory and line personnel who will be using the software in the evaluation process. Take your time and thoroughly examine each operation that the software performs. Examine all of the printed output and reports from the package and compare each to your needs. Examine the input requirements of the software and compare them to the inputs in your

present system. Make sure that your procedures collect all the data which the program requires.

In addition to routine operations, ask to see a demonstration of the program's ability to recover from such things as users' mistakes and power failures. The software should be able to either automatically correct simple errors or warn the user of their occurrence and prevent the program from continuing until the error is resolved. Not only should you have a demonstration at the vendor's site, but you should ask to see the package demonstrated in a user's agency under real-life conditions. If your needs analysis indicates that you should be examining multiuser software, try to make arrangements to evaluate the software with the same number of active users using the software simultaneously as you anticipate at your agency.

4) *Talk to users of the software package.* With the lists of users obtained from the vendor and your own contacts, ask people to evaluate the software in terms of the specifications they required, the expectations they had and how the system has actually performed. Try to get a sense of their satisfaction with the software. Ask their opinions on the level of vendor support, the quality of training and the average response time when software problems occur. Listen carefully to common complaints from different references. If everyone reports that the system does not generate reports well, perhaps there is a problem with the report module which you should discuss with the vendor. It is also a good idea to ask if they know any other users of the system. Valuable information will often turn up by following leads.

5) *What level of support is provided with the software?* Software vendors usually provide some level of technical support for their products, which typically includes telephone support, a limited warranty or more extensive support under a separate maintenance contract. Telephone support is generally a toll-free phone number with a software technician available during normal business hours. The software support person should be able to answer many of your questions on the operation of, or problems with, the software. Many vendors have an ongoing support contract or an extended software warranty available for an annual fee. This type of contract usually provides for any and all revisions or upgrades made during the term of the contract, along with either unlimited support calls or a base number of calls at a given fee. It is important that you determine how the vendor handles revisions and upgrades, whether new documentation is included and whether the software warranty extends to cover any new versions of the software.

- *Establish a Scoring System*

  By the time you have examined a number of packages and have talked to users, the field of potential software packages should have narrowed considerably. If you have a chart comparing the various packages on the richness of their capabilities and their ability to meet your requirements, you should have all the information necessary to create a scoring system to determine the package best suited to your needs. You might be able to use a ranking in terms of quality, such as excellent, very good, good, fair, and poor for each of the five criteria above. In addition, you should consider the cost of each package and the amount of training necessary to learn and use the software. Perhaps one system will win easily. If they are more closely matched, you may want to assign a point system for each of the criteria above, such as a rating scale of one-to-10. That way, you can take the total number of points for each of the criteria to determine the winner. If a couple of the packages are evenly matched, do not discount the human factor — ask the people in your agency if they have a favorite system among the highest-ranking two or three. If all of the competing packages will accomplish the task, you might be wise to go with the one your people like best.

- *Identify the Operating System Requirements*

  As part of your search for appropriate application software, you are limited to those packages that can be supported by the kind of operating system you need. At the same time you are evaluating software packages, you need to determine which operating systems will run which applications. Be sure to evaluate software on a variety of operating systems. Some packages, theoretically designed for both single- and multiuser operating systems, function very well on one but perform poorly on the other. The selection of the appropriate operating system is, obviously, critical to system performance. Does the software you desire run on an industrywide, standardized operating system? Is the operating system the most current version available? Generally speaking, avoid the non-standard operating system that makes you dependent on both the manufacturer of the system and the vendor —if either goes out of business or changes marketing direction, you may quickly find yourself with an obsolete system.

  If you require a multiuser operating system, make sure it will support the number of users and the type of environment (single-tasking or multitasking) you need. Be wary if the number of users in your agency places it near the maximum capacity of a multiuser operating system. Remember that an operating system's rated capacity and its functional capacity

are seldom, if ever, the same. As a general rule, make sure that a multiuser operating system has the capacity for approximately 50 percent more users than you require.

If, on the other hand, a multiuser, single-tasking operating system is sufficient for your needs and you will be using a LAN, get assurance from the vendor that he has configured such a system with your specific LAN operating system. Most LAN operating systems are very complex and a reputable multiuser systems vendor should have a staff of reliable experts knowledgeable in the intricacies of the operating system. If you are uneasy about the vendor's level of expertise, ask a technically qualified third party to talk to the vendor's support personnel. This will help determine if the operating system under which the vendor's software operates is capable of doing the job and that the vendor's personnel can adequately support the system.

Investigating Hardware

In the selection of hardware, you should follow the same criteria as you would for selecting software: 1) develop a list of the full range of available hardware for the kinds of software applications and operating system you need; 2) perform a detailed analysis of the systems which seem to hold the most potential; and 3) score those systems against the requirements in your needs assessment, including their compatibility with the software you have chosen. Your evaluation criteria are also the same as those for software, including 1) comparing the capabilities of the hardware point-by-point with the requirements in your needs assessment, 2) reviewing documentation, 3) getting a complete demonstration, 4) talking to users, and 5) ensuring that support for the system is available.

While the process of selecting hardware is similar to that of software, there are specific hardware and environmental considerations that must be addressed to ensure the selection of the best system.

- ***Identify the System Configuration***

  Knowing which operating systems will run the software you desire, you can now begin to investigate appropriate hardware. Remember that the careful blending of hardware components constitutes a system configuration. High-tech hardware is very seductive. There is a tendency for some agencies to catch the vendor's enthusiasm for a product and suddenly find themselves buying a much larger system than they had originally planned. There is also the opposite problem of an agency trying to save money and purchasing a system so small

that they quickly outgrow its capacity. You need to compare equivalent systems in performance with the number of users you expect to have on the system and the mixture of jobs you expect to be running. Contact all of the references from the vendor, and explore your own contacts for evaluations of the proposed system. Pay particular attention to comments about speed, storage capacity and ease of use. Ask other agencies how the original sizing of their system measured up under actual working conditions. Find out what changes people would make to their system's configuration if they were to start over again. Most will be happy to share their hindsight.

Based on your needs assessment, you should know generally how many people need to access the system, what information needs to be shared, and what are the current inputs and outputs. You now should examine the input, processing and output requirements for the proposed system.

— *Input Requirements*

Examine the input requirements first. What type of keyboard, mouse or scanner do you need? Will the software support optical scanners for input, and if so, what kind? What type of video display will the software and operating system support? Do you require graphics and/or color capability? Does the display screen and keyboard create a comfortable work environment? Involve personnel in the evaluation of the ergonomics of the system. Details as seemingly insignificant as the display not tilting and swiveling or having too much glare can cause a great deal of discomfort to those using the system on a daily basis.

— *Processing Requirements*

Decide upon your processing requirements. Can the microcomputer support the amount of processing that you anticipate? Obtain the specifications and all of the available documentation on the microcomputer from the vendor. If you do not understand a particular item discussed in the documentation, ask the vendor or discuss it with a third-party technical expert. Most computer magazines evaluate hardware systems, contrasting their performance with comparable microcomputers; review back issues of these magazines. Contact the list of references provided by the vendor and discuss their hardware choices in the same manner that you discussed the software.

— *Output Requirements*

Examine your output requirements. Do you require the high speed output of a dot matrix printer or the print quality of a laser or letter-quality printer? Compare the number and type of printers you require to the number and type of printers both the software and hardware can support.

Carefully compare the software and hardware documentation noting any incompatibilities that may exist between your choice of printers and the system. Note that although the operating system may support a specific type of printer, the application software or hardware may not. It is important that your choice in printers is specifically supported by both the hardware and software.

- *Develop a Site Plan*

An area commonly overlooked during the hardware evaluation process is the relationship between the agency's physical environment and the proposed hardware. Too often an agency forgets to examine the work area's physical characteristics and suddenly finds itself in need of additional space, power, cabling and cooling facilities. A detailed site plan can be of tremendous assistance when choosing the appropriate hardware.

An important preliminary step, then, is to obtain a copy of the floor plans of the area in question and mark to scale the proposed locations of the computer system, workstations and the proposed routing of cables. In addition to the general floor plans, locate the electrical and heating/cooling plans of the proposed installation area and include them in your site plan. With your site plan, walk through the area in which you plan to install the system and look for potential problems, such as insufficient power outlets, insufficient cooling, water sprinklers and overloaded electrical circuits. Try to determine if the noise level from the new system's cooling fans or printers will disturb the normal function of the work space. Examine the potential route of cables; if necessary, modify the routes to avoid areas of high traffic where cables may be stepped on or tripped over. Incorporate this information into your proposed site plan.

If you have a building engineer, ask him or her to review the site plan to identify any potential problems. You should also show your site plan to prospective vendors and ask to have a technical staff person physically inspect the site.

- *Try to Select Standard Hardware*

Many different manufacturers develop hardware peripherals such as printers, modems, terminals and memory. When selecting a microcomputer, you want to ensure that you have many choices in peripherals and a great deal of flexibility. Your agency's best interests are served when you purchase a microcomputer that will connect with the largest number of peripherals that meet your needs and budget. If your system will run peripherals from a variety of manufacturers,

then you know that in the future you will be able to confidently expand that system.

The computer industry recognizes the value of having many choices and has developed standards to allow for greater connectivity between different microcomputers and peripheral devices such as monitors, printers and storage media. There are both official standards, created by professional organizations such as the Institute of Electrical and Electronic Engineers (I.E.E.E.) and the International Standards Organization (I.S.O.), and informal, commercial standards that may have no legal force but, because they are set by major manufacturers, do enjoy general industry support.

As we briefly discussed earlier in **Basic Components of a Microcomputer**, a bus is an electronic pathway inside a computer, that links the microprocessor to the computer's memory and other devices. Physically, the bus is a circuit board with a series of sockets into which additional circuit boards may be plugged. These additional circuit boards enable most systems to expand; circuit boards can control peripherals, allow the addition of memory and provide the computer with additional functions. Because of their critical role, specific buses have been designed to meet certain standards. Circuit cards designed to function with a specific standard bus will usually function in any computer with that bus.[4]

In addition to bus standards, communication standards for connecting peripheral devices have also been established. Device interconnection standards allow peripheral manufacturers to design devices, such as hard disk drives with common ***interfaces***. Common device interfaces help to ensure that system manufacturers include the peripherals in a wide variety of computer systems.[5]

Of course, there are quality systems available that may not use one of the industry's standard hardware buses or interfaces. If you are interested in such a system, discuss your concerns with the vendor and ask for an explanation of why the product is not listed as standard. You may also

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[4]Hardware bus standards such as Multibus, Multibus II, VMEbus, Unibus and Q-bus in super micro/minicomputers, or the PC/AT bus, Micro Channel Bus and NuBus standards in microcomputers should ensure connectivity with a range of hardware upgrades from third-party manufacturers.

[5]Peripheral interconnection standards such as Small Computer Systems Interface (SCSI) or Enhanced Small Device Interface (ESDI) ensure the ability to obtain additional or larger storage devices at a later date and at a competitive price.

want to request a list of third-party companies that manufacture components that are compatible with the system.

- *Review System Documentation*

  Ask the vendor for complete system documentation for both the microcomputer system and all peripheral devices. All documentation should be clearly written in understandable English. The documentation will help you assess the system's specifications, capabilities and performance. Be certain that the documentation matches the system and peripherals you are evaluating. Review the documentation thoroughly and ask for an explanation of anything you do not understand. If you have difficulty getting a clear, objective response, consider hiring a technical consultant to explain any functions or features you do not understand. As you review the documentation, determine if the system will function with all of the peripheral devices and software you require. Above all, you want a system that matches your requirements.

- *Ask for System Demonstrations*

  It is essential to get a live demonstration of a system. This should not be a "demo system," but a working one, configured identically to the system you are considering and operated by people with no vested interest in the vendor. Preferably, the demonstration should be conducted at a user site where the system has been operating for some time. Take the personnel from your agency who will be responsible for the system with you to the demonstration. Have your personnel talk to their counterparts at the user's site about any concerns or problems with the system and how the vendor reacted to their requests for assistance. Do not be afraid to ask the vendor to allow you to talk privately with the users. Determine whether the vendor's support staff provided prompt and competent service. What was the user's estimate of the quality of the documentation, training and installation? Get names and phone numbers of key personnel at the site and call them a few days after the demonstration if you have follow-up questions. Discuss with your personnel any problems, concerns or questions about the system.

- *Confirm the System Version*

  The version of the system you purchase is critical to the amount of support you can expect and the flexibility you will have if you want to expand the system in the future. Reviewing recent advertisements in computer magazines can help you determine if the manufacturer is still advertising the hardware model the vendor wants you to purchase. Knowing that a manufacturer is about to release a new microcomputer system into its line of products — often one that renders the

existing system obsolete — a vendor will be anxious to offer a good deal on the existing system. Problems arise if the new system uses a different operating system or is in other ways incompatible with the existing system and its components. A manufacturer or vendor may stop supporting an existing product line after introducing a new system.

Selecting a Vendor

Before you begin knocking on vendors' doors, carefully review all that you have learned from the needs assessment and your examination of available hardware and software. This knowledge will guide you as you begin to narrow down your system choices. Generally, all systems fall into one of the following three broad categories:

1) a stand-alone, self-contained microcomputer supporting a single user;
2) a microcomputer processing data for several attached ***dumb terminals***; or
3) an arrangement of several connected microcomputers, each using its own microprocessor; i.e., a LAN.

By making some basic assumptions about your processing needs in relation to the desired physical configuration, you can direct the vendor to those systems that best meet your requirements. Each type of microcomputer system requires a different operating system and is therefore able to support different application software. As you have already discovered, microcomputer applications and systems differ greatly in benefits, cost and in physical size and structure. You need to carefully weigh the benefits and capabilities of each against your own system requirements and budget. Only after you have made these assessments should you seek out a vendor.

• *Check Vendor Credibility*

Your system will function only as well as the vendor that supports it. As such, the selection of a vendor is a critical decision in the system acquisition process. This person, or company, will be your *prime vendor*, responsible for orchestrating all the fine points of an acquisition, including arrangements with subcontractors for modifications required by your site, computer system or software.

A preliminary step in selecting a vendor is to investigate the company's credibility. It makes no sense to expend all of the research and time to find a good system if the vendor has a poor reputation. You want to find a vendor with an established reputation for assisting users in matching their requirements with an appropriate system. Your contacts within

other agencies who have worked with the vendor will help you assess whether the product actually lives up to the vendor's claims.

As part of your evaluation, you should ask the vendor for information on the company, including financial and annual reports, and for the names of agencies with which they have worked. Contact those agencies and ask them the same kinds of questions you asked users of hardware and software—that is, for the positive and negative aspects of the vendor. The purpose of this information is to check the vendor's promotion of products and services against a track record with clients. If you have any doubts about a vendor's credibility, you should continue searching elsewhere.

If at any stage in the investigation you find your conversations with the vendor ladened with technical jargon, sometimes called "techno-speak," remember that the pressure is on the vendor: it is the vendor's job to help you understand. If the vendor cannot communicate in simple English, perhaps he is intentionally engaging in technical obfuscation because he knows he does not have an honest answer to your questions. Or perhaps he just cannot communicate in plain English. If so, how can he possibly understand your needs? Do not buy anything until you are completely satisfied that you understand everything you need to know. If necessary, get assistance and advice from an impartial technical consultant.

- *Identify Optional Systems Costs*

Aside from the purchase price of the system or the cost of the lease, there are several purchasing costs that you may not expect. Many of these are negotiable and some vendors will have more to offer than others. Consider discussing at least the following items with a prospective vendor.

—*Maintenance Agreements*

Most microcomputer systems only have a 90-day warranty. It is becoming more common for systems to have a one-year warranty, but 90 days is the industry standard. After 90 days, you are responsible for paying for repairs and service, which can be a considerable expense. It is a good idea, therefore, to keep the system under a maintenance agreement, which acts as an insurance policy against repairs and service. In general, if you purchase the maintenance agreement at the same time as the system, you can frequently negotiate a discount. Read the manufacturer's warranty prior to signing a maintenance agreement to ensure that the coverage you need is in writing.

When purchasing a multiuser microcomputer system or a configuration with several stand-alone microcomputers, you can protect

against high maintenance costs by purchasing an additional machine or two as "floating spares." The floating spare is used in place of any system that fails. You can then take advantage of the vendor's normally lower maintenance fees for the failed equipment by taking it to the vendor's repair shop rather than paying for on-site service. In an environment with a large number of microcomputers, this can be a dramatic cost savings. The floating spare is usually a very cost effective alternative to keeping a large number of systems under an expensive, on-site maintenance contract.

— *Maintenance Response Times*

When you do have system problems, it is obviously important to keep system down-time to a minimum. A four-hour response time is an industry standard and your agency should not be charged a premium for a response time of more than four hours during normal business hours. If, however, you want 24-hour service or a response time of less than four hours, expect to pay more. When you pay a premium for such immediate response, you may want to insert a penalty clause (usually a monetary charge against the vendor) if the agreement is not met. In other words, if the system is not fixed in the time frame specified in the maintenance agreement, then the vendor must fix the system at little or no cost. Also, it is good to have a clause in the agreement that mandates the use of loaner or replacement equipment if the vendor cannot get the needed parts or make the repair in a reasonable time as stipulated in the maintenance agreement.

—*Additional Training Costs*

A substantial added cost is training. Nevertheless, adequate training on a system is imperative. Make sure that you have written confirmation of exactly how much training comes with the purchase of the system. Contact other users about the quantity and quality of the training they received from your vendor. If the general consensus was that the training was either insufficient or poorly handled, bring it to the vendor's attention and strongly request additional training at no charge. Make sure that you are able to keep all training materials and have the right to reproduce the materials to train your own in-house staff.

Once you have expended the training included in the system purchase, you may need to purchase additional training. Most large vendors have a highly competent, full-time training staff and an ongoing schedule of training classes. You should be offered separate training for people who will be using the system on a regular basis and training for personnel responsible for administering and maintaining the system. Remember that it could save money to have the vendor train a small number of your personnel and have them in turn train others in the agency. These classes are normally more intense than typical user training classes, and therefore

should be attended by those personnel in your agency who have some prior understanding of microcomputers. Finding software and hardware with on-line tutorials can also help to reduce training costs. It is important at the outset to designate someone in your agency to stay informed about the system. This usually means sending that person to additional training classes and allocating time to master the operation of the system and to stay current with new developments.

— *Upgrades and Enhancements*

Ask about the costs of upgrades and enhancements before signing any contract or purchase agreement. If you do not have an agreement for free or discounted enhancements, each upgrade could possibly equal or exceed the initial purchase price.

— *Customizing Services*

Most vendors provide software customizing services. Customizing software is *very expensive*. After you pay for all the modifications, make sure that the vendor will continue to provide a warranty on the software. Always ask the vendor to supply you with the language the program is written in, the source code to the program, and any customized additions to the source code. This will allow a systems expert to provide maintenance for the software if for some reason the vendor goes out of business or stops marketing the software. Some vendors will not provide you with the source code, but will place the source code and all modifications in a trust account. Your agency can be made beneficiary to the trust and receive the source code in event of a default by the vendor. Always make sure you have some recourse to obtain the source code for a customized program in case it becomes necessary for your agency, or a new vendor, to support the software.

Installing the System

Installing the system is the part of the cycle where you start to lose contact with the salesperson and start to meet the support personnel. This is also the point where you find out how well the vendor's personnel communicate with one another. Frequently, the vendor's sales staff does not tell the support staff the details of a sale until the day before delivery. Save yourself and your agency a lot of headaches and make arrangements to meet the vendor's support personnel early in the evaluation process to ensure that they are aware of all the details of your installation. The object is to make sure that there are no hidden problems. This is where any weak spots in a needs assessment are revealed.

Prior to the installation, be sure you have a clear understanding of the following issues with the vendor.

- *Verify Prime Vendor Responsibilities*

  The prime vendor should be responsible for all details, including the installation of the operating system, any communication software and all application software. In addition, the prime vendor is responsible for making arrangements with subcontractors and obtaining required permits or licenses. As mentioned earlier, present your vendor with your site plan and make sure both of you agree upon your requirements and the expenses that may be incurred due to the need for additional power, stand-by power, phone lines, cooling, fire equipment or cabling. Do not let any of these catch you, or the vendor, by surprise.

- *Ensure Technical Support Availability*

  The quality of technical support is probably the most important single item in a successful installation. Make sure you understand what the vendor means by support. The purchase of a reputable system usually includes a set amount of telephone support. Does support mean having a toll-free telephone support number and the services of a technician on call during normal business hours? Does support mean having a technician on-site during the installation and the first 30 days of operation at no additional cost? Beyond the standard warranty, most support is offered under a separate maintenance contract. Note that usually, hardware, software and training support are also under separate contracts. Expect to pay an annual support fee ranging from about 10 to 20 percent of the retail cost of the hardware for hardware maintenance. Operating system support is normally included in the cost of the hardware maintenance contract. Application software support usually can be purchased at an hourly rate as needed, or for an annual fee, which generally ranges from 15 to 25 percent of the cost of the application software.

- *Specify Delivery Acceptability*

  At a minimum, the vendor should deliver the system to your site, set it up and run diagnostics on it to ensure the operation of all components. Normally, the vendor is responsible for installing the operating system, any communication software and all the application software on the system. In some cases, you may need to contract with the vendor to do any required data conversion or data entry.

  As part of the installation requirements, you should require a detailed description of the procedures necessary to install and test the system. Be absolutely certain that the vendor's technician tests each component and assures in writing that the system is completely functional, including all communication devices, printers, terminals, disk drives and peripherals. If you have a remote site, have the vendor document a successful connection and transmission of data to and from the site. It is a good idea to appoint one person as the liaison with the vendor, who is responsible

for scheduling deliveries and installation times. This also prevents someone from signing an incomplete delivery receipt or accepting a partial shipment. Do not let any of your personnel sign any document accepting the delivery of the system until you are assured in writing that all system components are installed, tested and functional.

You should request an *acceptance test* of the system when the vendor has installed it and confirmed that it is functional. The purpose of an acceptance test is to confirm that the system will perform to its advertised and documented capabilities. Based upon your discussions with the vendor, you should develop a set of requirements for the system. A 30-day in-use performance/acceptance test, moreover, is not an unreasonable demand. Such a test often requires that the system maintain a performance ratio of 98 percent up-time during the first 30 days or the agency will not accept or pay for the system until it meets the requirement.

A Final Word

Selecting a microcomputer system for your agency is not an easy process. If approached in a systematic, rational way, however, it can return many dividends. If you are careful, if you do your homework and if you keep asking the right questions, you can walk out of the maze of high technology with a computer system that is right for your agency. Armed with the information in the ***Criminal Justice Microcomputer Guide and Software Catalogue***, you should feel confident that when you select a microcomputer configuration for your agency, it is an informed decision based on an understanding of computer basics and configuration options, a thorough needs analysis, and a clear-headed choice of software and hardware. Using the process outlined in the ***Microcomputer Guide***, you can avoid headaches, costly problems and disaster. Your agency will get the best system for its needs — the first time around.

GLOSSARY OF MICROCOMPUTER TERMS

GLOSSARY

access: 1. The manner in which files or data sets are referred to by the system. Examples are serial, random or indexed access methods. 2. The ability to read and write files from disk storage.

access time: The time interval, usually in milliseconds, between the instant a request for data is made to the controller of a direct access storage device, such as a hard disk, and the instant the transfer of the data begins.

address: An identification (a label, number or name) corresponding to a particular location in storage or any other data destination or source.

address space: The complete range of addresses available to a central processing unit (CPU) or user.

algorithm: An established, finite set of well-defined, rules or processes guaranteed to solve a specific problem.

allocation: The process of reserving storage space for programs or data.

alphanumeric: A set of characters which includes both uppercase and lowercase letters, digits and some special characters (-, /, *, $, (,), +, =, etc.).

ALU: Arithmetic-Logic Unit. The section of a central processing unit (CPU) where arithmetical and logical operations are performed.

analog data: A physical representation of data that bears an exact relationship to the original data; for example, the electrical voltages of signals on a telephone wire are analog data representations of the original spoken voice.

analyst: A person who is skilled in the identification, definition and development of techniques for the systematic solution of problems.

ANSI: American National Standards Institute. An organization which sets voluntary standards for industry in the United States.

application: A specific task or set of tasks to be performed by a computer program or system.

application software: The programs used by users of a system to perform some task or job. Contrast with "system software."

architecture: The physical structure, design and interconnection of the internal components of a hardware/software system.

archive: To back up or store data. Archiving preserves copies of files; if the original files are damaged or destroyed by some unusual circumstance — power failure, accidental erasure, system failure — important data is not lost.

argument: A variable to which either a logical or alphanumeric value may be assigned.

array: An ordered arrangement of items or numbers such as a matrix, vector or table.

artificial intelligence: The capability of a device to perform functions that are normally associated with human intelligence, such as reasoning, learning and self-improvement.

ASCII: American Standard Code for Information Interchange. The standard code used to represent letters, numbers and special functions as a series of zeros and ones. This seven-bit standard code was adopted to ease the interchange of data among various types of data processing and data communications equipment.

assembler: A computer program which takes a symbolic non-machine language instruction prepared by a user and converts it to a binary machine-executable form.

assembly language: A primitive, although precise, low-level language which is specific to each processor. Assembly language is made up of brief symbolic statements, instead of binary instructions, which directly affect the internal components of the processor. Assembly language is noted for its obscure style and lack of required structure.

asynchronous: A method of operation in which processes begin in response to events external to themselves. Contrast with synchronous.

asynchronous transmission: A technique of data transmission between two computer systems that operate completely independent of each other and do not share any timing information. Each system sends data in packets which have uniquely marked start and stop bits. Contrast with "synchronous transmission."

attenuation: The tendency of a signal to decrease in strength as it passes through a medium or control system.

back up: To copy files onto a second storage device so that they may be retrieved if the data on the original source is accidentally destroyed.

backup: A stored copy of a file, to be used in case of a malfunction that causes a loss of the data in the original file.

background: In multiprocessing, the environment in which low-priority jobs are executed.

background processing: In a multiprogramming environment, refers to the execution of lower priority programs when higher priority programs are not requiring system resources.

band: A range of frequencies between two specified limits.

bandwidth: The difference, in hertz, between the highest and lowest frequencies in a band.

bar code scanner: A scanner designed to read bar coded information by scanning the bar code with a beam of light (usually either laser or infra-red light).

baseband: Denoting communications facilities with a narrow bandwith (which is less than voice grade), and is combined with a carrier signal (a fixed signal which is mixed with the information signals to produce a signal capable of transmission)

BASIC: Beginner's All-purpose Symbolic Instruction Code. A high-level, second generation algebraic programming language designed for ease of use and ease

of learning. BASIC has a small number of commands and simple syntax. BASIC has been implemented on most computers.

batch processing: A data processing technique wherein a program with all the required and associated data are processed during a single machine run without user interaction or intervention. Contrast to "interactive" and "conversational."

baud: A unit of signaling speed generally equal to one bit per second. Thus, 8 baud equals 1 character per second.

bells-and-whistles: Slang for special features and extras in a system or program, such as color, sound, graphics, etc.

benchmark: A point of reference from which comparisons between systems can be made, such as a program to evaluate disk performance.

binary code: A coding system in which the encoding of any data is done through the use of bits.

BIOS: Basic Input/Output System. The part of the operating system that handles the input and output to devices such as monitors, disks and printers.

bit: A BInary digiT, either 0 or 1, indicating one of two states: off (0) or on (1).

bomb: A spectacular failure of a system or program.

boot: To load a computer's operating system into the random access memory of the computer. To start up.

bootstrap: Also known as bootstrap loader. A small program that starts a "cold" computer. Generally, the bootstrap program tells the computer where to start so that it can clear the machine memory, load the operating system and set up the machine to begin working.

BPI: Bits Per Inch or Bytes Per Inch. A measurement of recording density; the number of bits or bytes that can be recorded in one inch of magnetic tape.

bridge: A combination of hardware and software which allows either like or unlike networks to communicate with each other. Contrast to "gateway" and "router."

broadband: Denoting communications facilities with a bandwidth which is capable of handling frequencies greater than those associated with normal voice range transmission facilities, e.g., cable TV signals.

broadcast: A message which is sent simultaneously to all the workstations of a multiuser system. Contrast with "multicast."

brute force: A slang term denoting a programming technique which relies on the raw power of a computer to arrive at a non-elegant solution to a problem.

buffer: A software routine that controls a data flow or storage area in random access memory (RAM) which is used to temporarily store data that is being transferred at different speeds from one process or device to another (usually during input/output operations).

bug: Slang for a defect in either hardware, software or firmware.

bus: 1. Commonly used as the hardware interface in a computer through which additional central processing unit (CPU) components, options and peripherals are attached. Buses are normally manufactured to either an industrywide interconnection standard or are proprietary. 2. A channel or path through which electrical or digital signals flow.

bus topology: A network topology in which there is a single master cable that forms the bus (backbone) of the network. All nodes are either attached by a short length of cable to the bus or are interconnected by the bus itself. See "daisy chain topology."

byte: A group of adjacent binary digits operated on as a unit by the computer. Normally, the eight bits that represent a character or number in binary code.

C: A general purpose, third generation, high-level programming language which features a highly efficient code, brief expressions, low-level hardware control and a rich set of features.

cache: A method for reducing the time it takes to access data stored in a large, slow device, by retaining the most often accessed data in a smaller, faster device. Normally, cache is used in reference to a combination of random access memory (RAM) and software for decreasing disk access times. Since memory access is much faster than disk access, accessing data from cache rather than disk increases performance.

canned programs: Pre-written programs prepared by the publisher and made available to the user in a machine-readable form, usually on disk or tape.

chip: Slang for a semiconductor-based integrated circuit. May apply to anything from microprocessors to memory arrays.

CMOS: Complementary Metallic Oxide Semiconductor. A method of making MOS chips which use less power and work faster than MOS chips.

coaxial cable: Cable composed of one wire, called a conductor, surrounded by a stranded shield that acts as a ground. The conductor and the ground are separated by a thick insulating material and the entire cable is protected by an insulating jacket. Coaxial cable is usually used in broadband or high-speed applications.

COBOL: Common Business Oriented Language. An "English-like" second generation high-level programming language designed by the U.S. Navy in the 1950s.

code: Slang for a program or parts of a program.

cold boot: Reloading a computer's operating system by turning the electricity to the computer off and back on. Contrast with "warm boot."

command: A user-entered instruction which specifies a computer operation to be performed.

communication device: Hardware components that allow a microcomputer to communicate with other computer systems and peripheral devices, such as ports, modems and facsimiles.

communication software: Software that enables microcomputers to share data and information with remote systems.

compatible: A quality possessed by a computer which allows it to utilize both software and hardware designed for use in some other type of computer system.

compile: To prepare a machine language program from a program written in a higher level program language, such as COBOL, FORTRAN, C or PASCAL.

compiler: A computer program which converts an entire high-level language program into a machine language program from a source program. The compiler is capable of replacing single program statements with a series of machine language instructions or with a subroutine.

concatenate: To link together or join two or more items into another.

concurrent processing: Performing two or more data processing tasks within a specified time interval, but not at the same exact time. Contrast with "simultaneous processing."

configuration: 1. In hardware, the equipment to be used and the way it is to be interconnected. 2. In software, a procedure performed to prepare a software program for operation or to define a system's resources to the software program.

console: The primary (or master) display screen and keyboard from which the user controls the computer system.

constant: A value that does not change during the execution of a program.

controller: A device required by the central processing unit (CPU) to operate and control peripheral components such as disk drives.

convention: A standard or accepted procedure in programming or systems design.

conversational processing: An application where an input or inquiry by a user causes an immediate response from the system. Conversational systems give the appearance of conducting a dialogue with a user. Contrast to "batch" and "interactive."

CPU: Central Processing Unit. The component of a computer which includes the circuitry controlling the interpretation and execution of all instructions.

crash(ed): A slang term indicating that the hardware and/or software has stopped functioning properly.

CRC: Cyclic Redundancy Check. An error detection method whereby a value is calculated based upon a specific block of data and stored. The CRC value is then compared to the value which is recalculated when the data is reread or transmitted. If the CRC numbers match, the data is free of errors.

CRT: Cathode Ray Tube. The picture tube on a terminal or workstation used to display text and graphic images.

CSMA/CA: Carrier-Sense Multiple Access/Collision Avoidance. A multi-access transmission protocol that uses carrier detection and collision avoidance to ensure reliable data transfer. A typical CSMA/CA system is Apple Computer's AppleTalk network.

CSMA/CD: Carrier-Sense Multiple Access/Collision Detection. A multi-access transmission protocol that uses carrier detection and collision detection to ensure reliable data transfer. Typical CSMA/CD systems are Ethernet and Starlan.

cursor: A block, an underline, a blinking character or a reverse video image, which indicates, on a video terminal, where the next character will appear on the screen.

cylinder: A vertical column of tracks on multiple magnetic disks treated as a unit by the hard disk.

daisy chain topology: A type of bus network topology in which all nodes are directly interconnected by the bus. See "bus topology."

data: The basic units of facts, concepts or instructions represented by numeric, alphabetic, graphic or special characters that are used for communication, interpretation or processing by human or automatic means.

database: Information stored in a computer for subsequent retrieval. A set or collection of interrelated data (with limited duplication) designed to serve one or more applications, and stored in such a fashion that the data are independent of the programs that use them. Thus, a common, controlled approach can be used for adding, modifying and retrieving data.

data processing: The process of converting data into information and the manipulation, storage and retrieval of that information.

data transfer rate: The speed at which a computer reads or writes data to a storage medium.

DBMS: Data Base Management System. The collection of software used to create files, maintain data and generate reports stored in a database.

deadlock: An unresolved contention for the use of a resource. Normally associated with two users attempting to open a file simultaneously. Also know as a "deadly embrace."

debug: To detect, correct and eliminate mistakes and logical flaws in computer systems and programs.

dedicated: Hardware, software or procedures which are designed for a specific use.

default: A value or option assumed by the computer or program when no other value or option is specified.

default drive: The drive currently in use by a workstation. In disk operating systems (DOS), the drive prompt (A>, C>, etc.) that identifies the default drive letter.

delete: To remove or eliminate.

demand paging: In virtual storage systems, the transfer of a page from external page storage to real storage at the time it is needed for execution.

device driver: A data structure that allows an operating system and its applications to access low-level hardware or non-operating system services.

digital data: Data represented in a discrete, discontinuous form as contrasted with analog data, which is represented in a continuous form.

digitizer: A device which converts visual images into digital data and inputs those images into the computer.

DIP: Dual In-Line Package. The most common form for an integrated circuit which has two rows of pins for connectors.

direct access: Also known as random access. The technique of obtaining and retrieving data from a storage device in such a manner that the time required for such access is independent of the location of the data most recently accessed. In effect, the device "goes directly" to the data. An example would be a hard disk drive subsystem. Contrast with "sequential access."

directory: 1. A logical portion of disk space which is named by a user when it is created. A directory is used to hold a list of logically related files. A directory may be part of another directory (a subdirectory) or it may contain several other directories and files. A directory is analogous to a drawer in a file cabinet in which the user stores files. 2. The list of files displayed when a listing command is entered at any directory level of the file structure.

disable: To deny access, remove, inhibit or turn off a normal capability.

disk: See also floppy disk, hard disk, microfloppy, minifloppy, Winchester disk. A flat, circular, rotating magnetic media upon which magnetic pulse coded data can be written and read.

disk cache buffer: An area in the memory of a system into which large portions of disk files are read prior to an actual request to read the entire section. This increases the chance that the next disk read request can be read from memory rather than from the disk. Since memory is much faster than the disk, performance is greatly improved.

disk caching: A process of reading large portions of a file or disk into a special buffer thereby decreasing the number of disk reads required for the rest of the data and improving performance.

DMA: Direct Memory Access. A technique in which data can be transferred between peripheral devices and random access memory (RAM) without a required intervention by the central processing unit (CPU).

DOS: Disk Operating System. A generic term for the operating system for IBM and IBM-compatible personal computers. DOS is based on MS-DOS, the Microsoft operating system.

download: The transfer of information from a remote computer to a local host computer.

downtime: That period of time in which is system is inoperable. It is normally used to denote time in which the system is down due to a fault.

driver: Software which provides the computer with a series of instructions for the reformatting of data to enable transfers with a particular peripheral device.

dumb terminal: A video display terminal with minimal capabilities.

dump: Copying all or part of the contents of a storage unit, usually from random access memory (RAM), into an auxiliary storage device (usually a disk) or onto a printer.

duplex: Deals with the capability of a communications channel to handle two signals headed in opposite directions at the same time. Full duplex modems can transmit and receive data at the same time. Half duplex modems alternately transmit and receive data.

EAROM: Electronically Alterable ROM. Read-only memory that can be selectively altered without destroying all the stored data.

edit: 1. To check the correctness of data. 2. To modify or change a program or data. 3. To prepare data for further manipulation, such as format changes or code conversions, by a subsequent process.

EEROM: Electronically Erasable ROM. A read-only memory which can be electronically erased, as opposed to an EAROM.

electronic mail: The transmission and storage of messages through use of computers and telecommunications.

emulate: To imitate one system with another so that the host system accepts the same data, executes the same programs and maintains the same functionality as the imitated system.

emulator: A type of program or device that allows programs written for one system to operate on another. Emulators make a system "look like" the emulated system to the programs.

enable: To turn on, allow access to or place in a state which will allow operation of a computer or peripheral.

environment: In a computing context, normally refers to the mode of operation (e.g., conversational, stand-alone environment).

EOF: End-Of-File. The termination or end point of a file or quantity of data. End-of-file marks are used to designate this point on magnetic files.

EPROM: Electronically Programmable ROM. A special programmable read-only memory (PROM) which can be erased under ultraviolet light and reprogrammed repeatedly. EPROMs are normally manufactured unprogrammed.

erase: To remove data from storage without replacing it.

EROM: Erasable ROM. See EPROM.

error: Any deviation of a computed or measured quantity from the theoretically correct or true value.

error-correcting code: A coding system in which transmission errors are automatically detected and corrected.

error-detecting code: A coding system where errors in transmission are automatically detected as forbidden combinations of bits and are reported, but not corrected.

error file: A file generated during processing to capture error messages or as a "catch-all" for bad data.

error message: A printed or displayed statement signifying that the computer has detected an error condition.

ESDI: Enhanced Small Device Interface. A peripheral device interface standard which allows for high data transfer rates.

executable: A program statement that gives an instruction (as opposed to labels or comments) for some operation to be performed.

executable code: Programming code which is immediately executable by the computer. See "machine code."

execute: To run a program or carry out an instruction.

expression: A source code combination of one or more operations.

facsimile: A device which will allow the telephonic transmission of hardcopy graphic images to another facsimile device. The images may be hand-written text, typed pages, pictures or any black and white image which can be digitized by the facsimile device.

fault: A physical state or condition that may cause the failure of a functional system.

fault tolerance: The capability of some systems which are designed to continue to function satisfactorily in the presence of faults. Some systems achieve this with multiple processors and/or by duplicating data on different storage devices; if one storage device fails, all data is available from the other device.

fiber optic cable: A cable made of glass or plastic fibers which transmits large amounts of data by light pulses.

field: In a record, a group of related characters treated as a unit.

file: A collection of related information or data sets stored and manipulated as a single unit. Files can be stored on disks, in memory, on tape or can be sent to a printer.

finite: To have limits or an end. For example, a terminating number or sequence.

firmware: Software that resides in read-only memory. Refers to the execution of programs from read-only memory (ROM) or programmable forms of ROM, so that the programs seem to be as much a function of hardware as of software.

fixed-length record: A record which always has the same number of characters. Contrast with "variable-length record."

fixed point arithmetic: A type of arithmetic where the computer does not keep track of the radix point and all operands and results must be between certain fixed values (e.g., integers between -65536 and +65536).

floating point arithmetic: A method of calculation that automatically accounts for the location of the radix point.

floating point routine: A set of subroutines which perform simulated floating point math on a computer system which does not have built-in floating point hardware.

floppy disk: Also known as floppy diskette and flexible diskette. A removable magnetic storage medium composed of a thin mylar plastic coated with a magnetic oxide material and enclosed in a semi-rigid protective plastic jacket. Floppy disks come in three sizes; standard 8 inches, minifloppy 5-1/4 inches, and microfloppy 3-1/2 inches.

flowchart: A diagram that uses symbols and interconnecting lines to show the logic and sequence of a specific set of operations. Flowcharts are used to break a complex problem into smaller, more manageable pieces.

font: A complete assortment of type of one size and style (e.g., Courier 10 point).

footer: In word processing, refers to the text which appears in the bottom margin of each page of a document.

foreground processing: In a multiprogramming environment, refers to the automatic execution of programs which have been designed to have pre-emptive use of the system resources.

foreground program: In a multiprocessing environment, a program that has a high priority and therefore takes precedence over other concurrently operating programs.

format: 1. The logical and/or physical arrangement of tracks and sectors on a floppy diskette or hard disk drive. To be usable, a disk must be formatted so that the tracks and sectors are laid out in a manner compatible with the operating system in use. 2. To prepare a disk or diskette to accept data.

FORTRAN: Formula Translation. A second generation high-level programming language designed for mathematical and scientific use. It is generally considered obsolete, although it is still in limited use.

fourth generation language: A programming language, usually based on a database management system, which uses a non-procedural (menus) interface for programming rather than a procedural (source code) interface.

frequency: The number of recurrences of a periodic phenomenon in a unit of time. Electrical frequency is specified in "hertz."

front end processor: A dedicated communications computer connected to a host at the entry point for communications to the host computer. It may perform communications line assignment, data conversion, message handling or other data communications functions.

garbage: A slang term for unwanted or meaningless output resulting from equipment malfunction or a mistake in software.

gateway: A device which interconnects two dissimilar networks or a network and a host system. Contrast to "bridge" and "router."

GB: Gigabyte. One billion bytes or one thousand megabytes.

generator: A program that constructs other programs to perform a specific task, such as a report generator.

graphics: Pictures or diagrams as opposed to alphanumeric characters.

handshake: The initial exchange between two data communication systems prior to data transmission. The first device sends a predetermined signal, then waits for a predetermined response from the other device. A handshake method (such as XON/XOFF) is part of a complete transmission protocol.

hard copy: A paper printout. The term "hard" is used because it actually can be held, as opposed to a screen display, which cannot.

hard disks: A high-capacity, high-speed, rigid, rotating magnetic media random access storage device. Hard disks may contain multiple read/write heads and multiple disks and allow users to read, write and erase data and files.

hardware: The physical equipment of a computer system. The electrical and mechanical components. Contrast with "software."

hard-wired: Physically connected to a computer, usually by electrical wiring.

head: 1. A device that reads, writes or erases data on a storage medium. 2. A special data item pointing to the beginning of a list or set.

header: 1. In communications, refers to the first part of a message containing all the necessary information or directing or decoding the rest of the message. 2. In word processing, refers to the text which appears in the top margin of each page of a document.

hertz: Cycles per second, abbreviated as Hz.

heuristic: A rule-of-thumb procedure for attempting to solve a problem. Heuristic approaches do not guarantee solutions to specific problems.

hex: Hexadecimal. A number system with a radix of 16 in which the digits greater than 9 are represented by the letters A through F of the alphabet.

hierarchical: Organized according to levels.

high-level language: A programming language which is oriented towards the problem to be solved or the procedures to be used. In a high-level language the instructions more closely resemble English.

high order: Pertaining to the digit or digits of a number which have the greatest weight or significance. In computer memory, the most significant portion of the word.

horizontal market: Pertains to horizontal market software packages such as word processing, spreadsheets, database management, communications, graphics, and accounting which are generic in nature and can be used by most business with little to no modification

housekeeping: Computer operations or programs which do not contribute directly to the desired results; in general, initialization, set-up and clean-up operations.

IC: Integrated Circuit. A microscopically-sized electronic circuit containing multiple electronic components (which replace thousands of transistors) bonded on or within a single non-conductive ceramic or plastic carrier, usually a Dual In-line Package (DIP).

icon: A simple graphic image used to represent a physical device, program or activity.

impact printer: A hard copy device which forms output by the momentary pressure of a raised element or pins against paper, using ink or a ribbon. Dot matrix printers and wheel printers are two types of impact printers.

implementation: 1. The process of installing a computer system, including choosing the equipment and software, installation, training, establishment of procedures and policies. 2. The act of installing a program.

initialize: To preset a variable to proper starting values prior to execution.

input: Pertaining to the introduction of data, information or instructions from an external device into a system.

inquiry: A request for data from storage.

instruction: In a programming language, a meaningful command or formula which defines one operation with its parameters, if any.

intelligent terminal: A terminal which has a number of computer processing capabilities built into, or attached to, the terminal unit.

interactive: An application where an input or inquiry by a user causes an immediate action by the system in response to the input. Contrast to "batch" and "conversational."

interface: 1. A common boundary between two systems or devices. 2. A specific hardware or software connection or a connection between systems or devices. 3. The combination of hardware and software which is used to present the operating system and programs to the user. Example: the keyboard, mouse, and icon-driven display on an Apple Macintosh. 4. To make two devices or components capable of communicating.

internetwork: To connect two or more networks together by means of special bridge hardware and software in order to pass data and share resources as if they were a single network.

interpreter: A program which translates and executes each source code expression before translating and executing the next, without first translating the entire source program into executable code. Interpreters are slow, but provide greater interaction than a compiler.

interrupt: A signal that causes the computer to interrupt the normal flow of a program to perform some other function and then return to the program after the operation has been completed.

I/O: Input/Output. The process of moving data or information. For example, the process of transmitting data from disk to a printer for printing or out of disk storage for display on a workstation screen.

IRQ: An Interrupt Request. One of a group of signals normally associated with the request of an interrupt.

ISAM: Indexed Sequential Access Method. A method of high-speed data access in which one or more index files are used to point to data in a data file. The data file is organized based on a key field (a field or combination of fields which creates a unique identifier) and is usually not sorted. The index file contains a sorted list of copies of the keys from the data file and a pointer (a number) representing the position of the record from the beginning of the data file. This procedure allows the use of a simplistic sequential data file and yet gives high-speed reads by allowing a program to quickly find the exact record requested.

JCL: Job Control Language. The language used in batch control cards. JCL cards are used at the head and tail of a batch job to identify the owner of job, required system resources, etc.

job: A collection of tasks which compose a unit of work for a computer.

justification: The process of aligning, adjusting or shifting digits or text to the right or left to fit a prescribed pattern (e.g., aligning a column of numbers by decimal point).

justify: To align the characters of a field to one extreme or the other. In right justification, the rightmost character of the item is written into the last or rightmost position of the field. To left justify, the first character is written in the leftmost position in a field.

KB: Kilobyte. A unit of measure for memory or disk storage capacity. Two to the tenth power or 1024 in decimal.

kernel: The set of programs which make up the most basic or fundamental functional elements of an operating system.

key: 1. The field or combination of fields which uniquely identify a record. 2. The field which designates the position of a record in sorted sequence. 3. A button on a machine such as VDT keyboards.

keyboard: A device composed of marked levers operated manually for the entry of characters onto a recording medium.

key data entry device: The equipment used to edit and prepare data for storage, such as key-to-disk or key-to-tape units.

key-to-disk: A data entry system where data is typed directly into a disk storage device from a keyboard, usually in a high data volume environment.

key-to-tape: A data entry system where data is typed directly onto a tape storage device from a keyboard, usually in a high data volume environment.

kludge: Slang for a collection of mismatched or makeshift pieces which have been patched together into a system or program.

label: A name or identifier used in a program which is associated with a particular instruction, statement, message, value, field, record or file.

LAN: Local Area Network. A collection of computers which are connected so that they may communicate and share peripheral devices (such as hard disks and printers) and possibly access remote hosts or other networks.

light pen: A hand-held pointing device designed to be pressed against the CRT, which senses the beam of light generated by the CRT and translates the time it takes for the beam to strike the sensor in the light pen into a coordinate position on the screen.

line printer: Prints one line at a time.

link: To connect one location with another for the transfer of data. To give access to a directory or device.

linker: A utility program which assembles the separately coded prices of a program into one executable piece.

list: 1. To print every applicable item of input data. 2. To print out all the statements of a program. 3. A collection of ordered items. 4. The arrangement of data using index and pointers to allow for nonsequential retrieval.

listing: Any report produced on a printer.

load: 1. To move a program or data into memory prior to execution or modification. 2. A ratio of the amount of processing capacity of a system to the actual levels of processing utilization. 3. To initially install software onto a system.

loader: A utility program which reads programs into memory in preparation of execution.

log on: The process of establishing a connection with and confirming authorization to use a conversationally programmed computer.

logical file: One or more logical records.

logical instruction: An instruction which executes a symbolic logic operation such as AND, NOT, OR or NOR.

logical operator: Any of the Boolean operators such as AND, NAND, OR, NOR, EXCLUSIVE OR and NOT. (Boolean math deals with logical operators in a binary format.)

logical record: The structure of a record as designed by the programmer.

logical value: A value which is either "true" or "false" depending on the results of a logical operation.

looping: Executing the same instruction or routine over and over again.

low-level language: A machine-dependant programming language which is translated into instructions by an assembler. As contrasted to a high-level language, which is machine-independent.

LSI: Large Scale Integration. The process of placing a large number (usually greater than 100) of integrated circuit elements on one chip.

machine code: Binary code which is directly executable by the processor. Normally created by an assembler or compiler. Commonly known as "executable code."

machine-independent: The ability of a program to run on a number of different computers made by various manufacturers or upon the assorted models made by a single manufacturer.

machine language: The binary code that the language computer understands. Machine language programs require no modification to run on a computer. Also known as "executable code."

macro: A single symbolic statement that, when translated, results in a series of executable statements.

macro assembler: An assembler which allows the user to create and define new computer instructions which are composed of existing instructions.

macro instruction: A source code instruction that is the equivalent of a specific number of machine language statements.

magnetic tape: Plastic tape with a magnetic surface layer on which data can be stored. Data is magnetically stored in an eight-bit or six-bit coding format. Magnetic tape is normally one-half-inch in width, with 9 recording tracks and a recording density of 1600 bits per inch (bpi) or 6250 bpi.

magnetic tape cassette: A cartridge tape containing magnetic tape (normally one-eighth-inch wide tape) in such a fashion that the tape is inseparable from the container. It is similar to a stereo cassette tape cartridge.

magnetic tape reel: A reel used to store magnetic tape. The tape is usually one-half-inch wide and 2400 feet long.

mainframe: A large scale multiuser computing system and associated peripheral equipment. A mainframe typically has a 32-bit bus or greater, a performance greater than 12 MIPS, and a serving capability of more than 256 users. Mainframe computers typically require a dedicated support staff of multiple personnel for operation and programming.

main memory: Obsolete term, see RAM.

mass storage: Long-term storage of very high capacity, normally rigid disk storage, which is kept on-line to the central processing unit (CPU).

master file: A relatively large file of information which is updated on a periodic basis and is used as a primary source of reference.

matrix: A group of numbers, characters or symbols treated as a group and arranged in a rectangular, grid-like pattern. Individual elements can be referenced by their row and column locations.

matrix printer: Also known as dot matrix printer. A printer with a printhead composed of multiple pins which strike an inked ribbon to form characters on paper.

MB: Megabyte. A unit of measure for memory or disk storage capacity two to the 20th power or 1,048,576 in decimal.

memory: One of the essential components of a computer's central processing unit. Information and programs are actively processed in memory, which includes both read-only memory (ROM) and random access memory (RAM).

menu: A list of the options available at a particular place in a computer program. Menus allow users with little computer knowledge to utilize powerful systems.

merge: To combine the items of two or more sets that are each in the same given order into one set in the same order.

message: A group of characters with a specific meaning which is always treated as a unit.

message packet: The basic unit of information in a network environment.

micro: Slang for a microcomputer-based system.

microcomputer: A small scale single-user or multiuser computing system and associated peripheral equipment. A microcomputer typically has a 32-bit bus or less, performance less than 5 MIPS and serves less than 32 users. Microcomputers typically do not require a dedicated support staff for operation or programming.

microfloppy: Refers to a floppy disk of the 3 1/2-inch category.

microprocessor: An integrated circuit containing the arithmetic, logic and control units of a central processor.

microsecond: One-millionth of a second.

millisecond: One-thousandth of a second.

minicomputer: A medium scale multiuser computing system and associated peripheral equipment. A minicomputer typically has a 32-bit bus or greater, performance greater than 5 MIPS (but less than 10 MIPS) and is capable of serving more than 32 users (but less than 256 users). Minicomputers typically require a dedicated support staff of one or two personnel for operation and programming.

minifloppy: Refers to a floppy disk of the 5 1/4-inch category.

MIPS: Millions of Instructions Per Second. A method of measuring processing power.

MIS: Management Information System. The specific type of data processing system which is designed to furnish management with information to aid in the performance of management functions and decisionmaking.

modem: MODulator/DEModulator. A hardware device that transforms digital data from a computer into analog format to transmit or receive data by telephone lines. There are both internal and external modems.

module: One logically separate piece of a program that is identifiable when combined with other modules and independently performs a unique function. Modules may be written and tested separately, then combined together to form one complete program. A module is usually composed of multiple subroutines.

monitor: The video display unit on a personal computer. See VDT, CRT.

monitor program: A computer program that observes, regulates, controls or verifies the operations of a data processing system.

MOS: Metallic oxide semiconductor. A transistor or capacitor in which a semiconductor material forms one part of the component and a metallic oxide forms the other.

motherboard: The circuitry and mechanical assemblies which are used to connect printed circuit cards, boards or modules. Main logic board.

mouse: A hand-held pointing device designed to move on a flat, horizontal surface, which creates a digital signal indicating its position which can be used by the computer to position the cursor in an analogous position on a display screen.

MTBF: Mean Time Between Failure. The average time a component or system is supposed to work without a failure.

MTTF: Mean Time To Failure. The average length of time a component or system works without a fault.

MTTR: Mean Time To Repair. The average time expected to find and fix a fault in a component or system.

multicast: A message sent to a specific group of workstations on a system. Contrast with broadcast.

multiplexer: A device which allows simultaneous or interleaved transmission of multiple signals over a single transmission medium.

multiprocessing: The parallel execution of multiple series of instructions by multiple central processing units (CPUs) under a unified control.

multiprogramming: The apparent execution of two or more programs at the same time on a single computer. Each program has individual memory space and peripherals, but shares the central processor.

multitasking: The ability of an operating system to allow separate processes to run at the same time.

multiuser: The ability of an operating system to allow many users (at separate workstations) to share a system's processing power and perhaps to also share data and peripherals.

narrowband: Used to describe transmission media which can only transmit low volumes of data. Contrast with "wideband."

native language: A computer language specific to one model of processor, for example, an assembly language.

NETBIOS (Network Basic Input/Output System): An interface designed by IBM to facilitate communication between their network architecture and the higher level application programs.

network: A system of interconnected computers which send and receive data and messages via cable or some other such communication medium.

network communication: Data transmission between network stations. Requests for services and data are passed from one network station to another through a communications medium.

node: Any computer, terminal, workstation or communications controller in a computer network.

non-impact printer: A hard copy device which forms output without making an impression on the page. Typical examples are laser, ink jet and thermal printers.

null: The empty set, literally nothing, as contrasted with a zero, which implies a lack of numeric value, or a blank, which implies a lack of alphanumeric value. A null is the "black hole" of data.

number crunching: Slang for a program or system which is used to process or perform calculations on large volumes of numeric data.

object code: Also known as an object program. Output from an assembler or compiler which is itself executable machine code or is suitable for processing to produce machine code. See "source code."

Octal: A numeric system with a radix of eight.

OEM: Original Equipment Manufacturer. A manufacturer who purchases components or equipment from other manufacturers and integrates them to produce a complete system for resale.

office automation: The application of computer and communications technology to assist the productivity of office environments.

offline: Pertaining to equipment or persons not under direct control of, or in direct communications with, the central processor. Sometimes used to indicate batch processing.

online: Pertaining to equipment or persons under the direct control of, or in direct communications with, the central processing unit (CPU).

operating system: The resident master control program of a computer system. It controls the overall operations of the system and execution of all other programs.

optical scanner: A scanner designed to read text and/or graphic information from a printed page.

output: 1. Pertaining to a device, process or program which allows data, information or instructions to exit a system, including monitors and printers. 2. Data which has completed processing by the computer.

overlay: A technique where multiple segments of a program are swapped in and out of the same auxiliary storage space at different times as needed by the execution of the program. Overlays allow the execution of a program much larger than physical memory.

page: A segment of a program or data of fixed length (usually 2K or 4K words) which has a constant virtual address, but can exist in any region of the computer's memory. See "virtual memory."

page frame: A location in the computer which is designed to hold a page of commands or data.

paging: A technique for moving programs and data from virtual memory to real memory.

paging rate: The number of page-ins and page-outs per unit measurement of time in a virtual memory system.

parallel processing: Pertains to the execution of multiple processes simultaneously or concurrently on multiple processors or channels. Contrast with "serial processing."

parallel transmission: A means of data transfer in which each bit of data has its own wire. All the bits in one byte are transmitted simultaneously rather than serially. Contrast with "serial transmission."

parameter: 1. A variable which can assume the properties of a constant. 2. A modifier to a command which causes a modification of the command's default action.

parity bit: Used in an error-checking technique known as parity checking. An extra bit added to a memory word, whose state is changed to force the number of bits in the word to an odd or even number. Allows an error to be detected by checking the parity of the word.

Pascal: A third generation, high-level language noted for its logical constructs and embedded modularity. Pascal is popular in schools and universities due to its syntax which facilitates the teaching of structured programming.

patch: A small section of code which is inserted into a program to fix a problem or modify the program.

peripheral equipment (or device): In a computer system, any equipment distinct from the central processing unit (CPU) that may provide the system with outside communication, such as a modem, cathode ray tube (CRT), printer or additional facilities, such as an external hard disk or tape drive.

physical record: A record whose characteristics depend on the manner or form in which it is stored, retrieved or moved. A physical record may consist of partial, entire or multiple logical records.

pixel: The individual dots on a computer screen. A picture cell. The smallest addressable dot on a CRT (cathode ray tube) or VDT (video display terminal). Letter, numbers and symbols consist of pixels arranged in a matrix.

plotter: A hard copy output device which uses movable colored pens to graph data.

pointer: An address or memory location which indicates the address or location of a data element.

polling: A serial interrogation of devices for such purposes as to avoid contention, to determine operational status or to determine readiness to send or receive data.

port: 1. In hardware, connectors which allow two devices to be cabled together to allow communications. 2. In software, a memory address which is used for purposes of transferring information. 3. To rewrite a program in order to enable execution on a

different type of computer other than the computer upon which the program was originally written.

post: To enter information into a record.

print spooler/despooler: A print spooler is a program that controls the way in which print files are stored to disk or memory. The despooler is a separate process which controls how print files are taken off the disk or out of memory and sent to the correct printer.

process: A systematic sequence of operations or thread of execution that is initiated in response to a specific request or instruction.

process manager: A software module that allows processes to run in an orderly fashion. Normally, process managers are a multitasking kernel which controls multiple processes, passing control back and forth so that each process executes according to some established prioritization.

program: The smallest set of computer instructions that can be executed as a stand-alone unit.

programming language: A language used to express computer languages. See BASIC, C, COBOL, FORTRAN and Pascal.

programmer: A person who designs, writes, tests and debugs computer programs.

PROM: Programmable Read-Only Memory. A memory chip which can be programmed by electrical pulses. Once programmed, the PROM is read-only. PROMs are purchased blank and programmed on a device called a PROM Burner or PROM Programmer.

prompt: A character or message from the software which appears on the display screen and requires a user response.

protocol: A set of specified procedures or conventions used routinely for determining how and when to format and send data between devices.

query: An operation which invokes a response from a computer system.

query language: A language built into a database management system wherein the user can ask questions of the database in an "English-like" language.

queue: A temporary buffer in which the computer keeps a list of data in the order in which it was received (as in a waiting line).

radix: The base number in a numerical system; for example, the decimal system has a radix of 10.

radix point: The dot or symbol in a numerical system which separates the integral part of the number from the fractional part.

RAM: Random Access Memory. A memory into which data can be placed (written) and from which data can be retrieved (read). The primary type of memory used in computer hardware. RAM is temporary storage; turning off the electricity causes all data to be erased.

random access: An access method in which specific logical records are obtained from or placed into a file in a nonsequential manner.

read: The process which takes place when one device receives data from another.

read-only: A type of data protection which allows data to be read, but not erased or modified.

realtime processing: Pertaining to the processing of data from outside a computer quickly enough to affect the process which is creating the input data. Usually applied to systems which control some physical process such as a nuclear reactor. Contrast with "batch processing" and "conversational."

record: A collection of related information that is treated as one unit within a file.

recursive: Defining an item in terms of itself. A repetitive process that is dependent upon the results of the previous repetition.

recursive procedure: A procedure that either calls itself or calls another procedure, which in turn calls it.

re-entrant: The attribute of a program or routine that allows the same copy of the program to be used concurrently by two or more tasks (e.g., multiuser word processors).

relocatable program: The attribute of a program or part of a program which allows it to adjust its internal address references in order to allow execution after being moved from one location into another.

relocate: To move a program in and adjust its internal address references in order to allow execution after the movement.

remote: Refers to a connection which allows data to be sent and received across physical distances (normally using telephone lines or some other available means).

report: Generally, any hard copy data output; involves the grouping of information to assist the reader.

report generator: A program that converts stored data into a printed report.

reserved word: A word that holds special meaning to a language or operating system; because of this, the word cannot be used in an application program.

reset: To return the components of a system to a known default state.

restore: To copy archived data back onto a system.

RGB: Red-Green-Blue, the primary additive colors. An RGB color monitor uses three separate electron guns, one for each color, to light up the screen pixels (color dots) for additional colors. Normally a high-resolution device.

ring topology: A network in which all nodes are cabled together in a ring. Every piece of data transmitted on the network flows through each node sequentially and is retransmitted by every node on the network.

RJE: Remote Job Entry. The introduction of job through an input device that has access to a computer through a remote link.

rollback: A system which will restart the running program after a failure by taking snapshots of the data and programs at periodic intervals. At a restart, the system rolls back to start at the most recently stored snapshot.

ROM: Read-Only Memory. A special type of memory used in computer hardware that is permanently programmed with one set of instructions. ROM is not erased when the electricity is turned off.

router: The software which keeps track of, and directs packets to, other similar networks connected locally. Contrast to "bridge" and "gateway."

routine: A set of instructions for some specific purpose that has general or frequent use. Normally applied to segments of program code.

RS232C: Also RS232. A data communications standard for the interconnection of serial devices.

run: The execution of a program by a computer.

scanner: An optical input device which recognizes a specific group of visual symbols and translates the visual signals into digital signals.

scratch: An item, such as a tape or disk, or an area, such as a directory, file or volume, used as a temporary work space.

screen: See monitor.

scrolling: Moving the images of a display screen up or down.

SCSI: Small Computer Systems Interface. Standard interface for the connection of peripherals to the microprocessor. Also known as "scuzzy interface."

sector: The smallest addressable portion of a disk surface. Sectors are used as location references in disk storage.

seek time: The amount of time, usually expressed in milliseconds, needed to move the read/write heads of a disk or tape drive to a specific position.

sequential access: An access mode in which files are searched serially from beginning to end to find a record and new records are written onto the end of the file. The records must be processed one after the other based upon the order in which the records were entered into the file. Contrast with "direct access."

sequential processing: The computer technique of performing actions one at a time in sequence.

serial: Pertains to the handling of data or processes in a sequential fashion.

serial processing: Pertains to the sequential execution of multiple single processes or instructions (in the order in which the processes or jobs are stored or requested). Contrast with "parallel processing."

serial transmission: A means of data transmission in which all the bits are sent a bit at a time over a single wire. All bits are transmitted serially rather than simultaneously. Contrast with "parallel transmission."

server: A centralized piece of software that performs some action upon request from a network workstation (usually either naming, printing, storing, transmitting or mailing a file). The term "server" is sometimes used to refer to the computer that houses the server software.

share: To give access to a file, directory or a device to more than one process or user.

simultaneous processing: The execution of two or more processes or jobs at the same instant, usually on multiple processors. Contrast with "concurrent processing."

software: A generic term for all computer programs. A set of stored instructions and procedures that can be recalled as needed for the computer to execute. Contrast with "hardware."

sort: To divide records into groups according to specified logical patterns.

source code: A computer program in a human readable and maintainable (symbolic) form which can be converted by a translator or compiler into a machine-executable format. Also known as source and source program. See "object code."

special character: A graphic character that is not a number, a letter or a space.

spooling: 1. The apparent simultaneous operation of multiple input/output devices because the system is using multiple buffers for queuing input and output. 2. The storing of data to disk or tape prior to processing.

spreadsheet: A mathematical formula processor, like a word processor for numbers. A spreadsheet program allows you to enter a series of mathematical formulas, also known as mathematical models, which the spreadsheet software will constantly calculate.

stand-alone: A self-sufficient computer system with its own peripherals, which is not connected to any other system.

star topology: A network topology in which all the nodes are connected by a separate and independent wire to a central hub, which is usually the network server.

storage device: A device or portion of a device capable of receiving data, retaining it for an indefinite period of time and supplying it on command.

string: A sequenced group of characters or bits that is treated as a single item.

structured programming: A technique for organizing and coding programs that reduces complexity, improves clarity and makes them easier to debug and modify. Typically, a structured program is a hierarchy of modules that each have a single entry point and a single exit point; control is passed downward through the structure without unconditional branches to higher levels of the structure.

subdirectory: Any directory that is below another directory in the hierarchical directory structure.

subroutine: Procedure that performs some task without returning a value. A series or group of related statements which perform some specific action and can be used at one or more points in a computer program; for example, a subroutine which transforms lowercase characters to uppercase characters. Subroutines can be either inserted where needed or stored in one place and linked to multiple calling routines.

subsystem: A unified set of processes or set of components which perform a specific set of tasks or services, and are connected to and controlled by another system.

swapping: 1. In a time-sharing system, the process of either reading a program into memory from disk at the start of a time slice or writing it out to disk prior to execution of another user's time slice. 2. In virtual storage, the process wherein a page is brought from auxiliary storage and swapped for an active page.

switched line: Normally a phone line connected to the switched telephone network.

synchronous: A method of operation in which processing begins in response to internal events or to a clock-generated signal. Contrast with asynchronous.

synchronous transmission: A technique of data transmission in which data is transmitted at a fixed rate and both the sending and receiving devices use the same clocking signals to synchronize transmission rates. Contrast with "asynchronous transmission."

syntax: The rules governing the structure and grammar of a language.

syntax error: The breaking of a rule governing the structure or grammar of a programming language or operating system.

system: All of the equipment, personnel, material, procedures, documentation and information which forms a self-sufficient unit capable of attaining specified objectives.

system software: Those programs which directly affect or control hardware functions of a computer, such as an operating system or caching program. Contrast with "applications programs."

systems analyst: A person who performs analytical functions in defining computer-related problems. Systems analysts normally provide system definitions to the programmers who write the actual code.

table: A collection of data in which each item is uniquely identified by a label, by its position relative to other items or by some other means.

table lookup: A technique which uses a known value as a pointer to an unknown value in a table.

telecommunications: A means of communication in which computers use telephone lines to transmit and receive information.

terminal: A device, usually equipped with a keyboard and some kind of display, capable of sending and receiving information over a communication channel.

throughput: A measure of the amount of work performed by a computer system over a given period of time and under a given job load.

timesharing: The use of a central processor for two or more purposes during the same overall period of time by sharing, in fractions of a second, the amount of time available with each job.

track: A specified path parallel to the reference edge on a disk or tape where the data media moves past a given read/write head position.

transaction: In batch or remote batch entry, a job or a step. In a system with time sharing, an exchange between a terminal and another device that accomplishes a particular action or result; for example, the entry of a customer's deposit and the updating of the customer's balance.

transaction file: A file containing temporary information which is processed against a master file. Also known as a detail file.

translator: A program which performs translations from one language into another, such as a compiler.

transparent: Pertaining to information or activities which are not recognizable by a program, device or user.

troubleshoot: To detect, locate and eliminate errors in software or faults in hardware.

truncate: To drop off the least significant digits of a number series. (To cut off a number at a certain position to the right of the radix.)

TTL(Transistor-to-Transistor Logic): Normally refers to the transistor level logic applied to digital circuiting.

turnkey system: A computer system which contains all the hardware, software, training and installation required to perform a given application.

upload: The transfer of data from a local host system to a remote system. See "download."

user: A person who uses a computer.

utility software: A computer program created for general support of the processes of a computer or a program created to perform everyday tasks (e.g., a diagnostic or sort program).

validation: The checking of data for correctness or compliance with applicable standards, rules and conventions.

variable length record: A record having a length independent of the length of other records with which it is logically or physically associated. Contrast with "fixed-length record."

VDT: Video Display Terminal. A terminal with a cathode ray tube for video display and limited processing or editing capabilities, which is attached to a host computer, as opposed to a monitor attached to a microcomputer. See terminal, CRT, monitor.

vendor: A company that sells computers, peripherals, and/or operating systems and other software.

verify: To determine whether the transcription of data or other operation has been accomplished accurately. To check the results of keypunching.

vertical market: A vertical market is a highly specialized section of the marketplace which requires a specialized understanding of the needs of the industry. Usually applied to a type of business or activity which has specialized software and hardware needs, but is limited in the total number of possible customers.

virtual memory: A system of managing RAM and disk space so that a computer appears to have more memory than is physically installed. Virtual memory utilizes a technique of swapping segments of programs and data, called pages, to and from a disk storage device. Virtual memory transparently allows the user to use a small area of fast random access memory (or "real memory") in conjunction with a large amount of slower disk storage (or "virtual memory") while appearing to have a large, contiguous amount of memory in which to work.

virtual storage: A technique wherein two or more storage devices are combined to form what appears to the system as one large storage device. The size of virtual storage is limited by the maximum amount of storage addressable by the central processing unit (CPU) and the physical amount of storage available.

VLSI: very large scale integration: The process of placing a large number (usually more than 1,000) of integrated circuit elements on a single chip of semiconductor material.

voder: Vocal Coder. A speech synthesizer.

volume: A physical unit of a storage medium from which data may be written and read.

wait state: The period of time during which the processor waits for accompanying circuitry, like memory, to complete other activities, such as memory refresh cycles.

WAN: Wide Area Network. A group of local area networks which are joined together and share the same overall protocols to enable sharing of information or peripherals.

warm boot: A complete reload of a "warm" computer's operating system through the use of the system reset keys on the keyboard. The computer is "warm" at the start because the electricity is on. Contrast with "cold boot."

wideband: A channel width greater in bandwidth than a voice grade (300Hz to 3000Hz) channel. Normally associated with circuitry or cabling which can transmit video, audio and digital signals.

Winchester disk: A model name which has become a generic name for a hard disk drive. This fixed rigid disk is sealed within the computer or within a separate peripheral, providing greater storage capacity and faster access than a floppy disk drive.

window: A section of the video display which is used for some special purpose.

windowing: A means of dividing the computer screen into several areas so that a variety of information can be displayed simultaneously.

word: A string of bits that is the same size as the smallest individually addressable element of memory and is capable of being manipulated by the central processing unit (CPU) as one item. In microcomputers, usually 8 bits or 16 bits.

word processor: A program which allows the operator to create, edit and format text in a temporary format which is saved in the memory or storage of the computer until needed for printing or modification.

workspace: Slang for the amount of internal storage available for programs and data.

workstation: A microcomputer or terminal attached to a multi-user system.

WORM drive: Write Once Read Many drive. Typically a optical disk drive where information is digitized and stored on removable media by a laser process.

write: To record data on a hard disk, floppy diskette or memory.

zero suppression: The elimination of zeros, usually the leftmost, which have no significance to a numeral (i.e., 0000155 yields 155).

PART TWO

THE CRIMINAL JUSTICE SOFTWARE CATALOGUE

INTRODUCTION

The *Software Catalogue* was created to help criminal justice practitioners in their search for software programs. On the following pages, you will find indexed listings of over 150 applications designed specifically for use by corrections, courts, law enforcement, prosecution and other criminal justice disciplines. For each application, the listing describes the product's function and major features, indicates the operating system and type of microcomputer on which it operates, and provides contact names, addresses and telephone numbers. Each entry also has a comment section where additional information about the particular product may be found. (See Appendix A for a complete listing and detailed explanation of each field used to describe the software programs.)

The *Software Catalogue* has four indices which enable the reader to search the *Catalogue* in the following ways:

- *Vendor/Agency Name Index* — is organized alphabetically by the name of vendor or agency that developed the software. This index also lists the name of the developer's software product and the criminal justice discipline for which the product was designed.

- *Discipline Index* — arranges the software programs by the following disciplines: corrections, courts, fire, general administration, law enforcement and prosecution. Any programs that do not fit into these discipline categories are indexed under "Other." The vendor/agency and product name are also provided.

- *Hardware Type Index* — divides applications by three general types of microcomputer systems: single-user, multiuser and local area networks. For our purposes here, a single-user microcomputer is a stand-alone, self-contained microcomputer supporting a single user; a multiuser microcomputer is a single system processing data for several attached terminals; and a local area network is several connected microcomputers sharing resources but each using its own microprocessor.

- *Public Domain Index* — lists all of the software programs in the *Catalogue* that are in the public domain. The programs in the public domain index are subdivided by discipline and vendor/agency name.

Although the *Software Catalogue* contains many software programs, it should not be considered inclusive. Over a period of several months, SEARCH staff contacted vendors and criminal justice agencies across the country to inquire about microcomputer criminal justice application software: the descriptive material for each software program is based on information supplied by the product developer. The *Software Catalogue* does

not list price information due to the number of variables that can affect the price of any specific system such as:

- Some applications are sold as "turnkey" systems (i.e., sold only with specific hardware) and therefore cannot be compared with systems sold as software only;

- Most software is sold in modules and not all proposed systems utilize the same mixture or number of modules;

- System prices may vary dramatically if the customer is also purchasing hardware from the vendor;

- Different versions of the same product may vary in price due to licensing costs (site license, server license, single vs. multiuser license, etc.) and the specialized needs of the purchasing agency (training costs, on-site and telephone support, etc.);

- Some vendors offer discounted prices on the purchase of multiple copies of the same product or multiple copies of a combination of different products; and

- The rapid rate of change in the microcomputer industry often causes unanticipated price fluctuations which would cause the published pricing data to be quickly outdated.

For more detailed information and verification of the information listed here, please contact the vendor or agency directly.

Listing the vendor/agency or product in the ***Software Catalogue*** in no way implies recommendation or suitability for use. SEARCH Group, Inc. welcomes submission of additional entries by vendors and agencies that have developed microcomputer-based criminal justice application software. (See Appendix B for a blank submittal form.)

APPLICATION SOFTWARE FOR CRIMINAL JUSTICE

Vendor/Agency:	Adaptive Systems, Inc.
Address:	37 Walnut Street
	Hubbard, Ohio 44425
Phone:	(216) 534-5525
Contact Person:	Mr. Louis Carsone
Product:	Association Analysis
Discipline:	Law Enforcement
Function:	People-to-people link analysis under known associations
Features:	1. Multiple levels of password protection
Hardware:	Single-user micro
Operating System:	MS-DOS
Version:	3.1 or higher

Comments:

Vendor/Agency:	Adaptive Systems, Inc.
Address:	37 Walnut Street
	Hubbard, Ohio 44425
Phone:	(216) 534-5525
Contact Person:	Mr. Louis Carsone
Product:	Information Management System
Discipline:	Law Enforcement
Function:	Law enforcement records management system
Features:	1. Records retrieval
	2. Case management
	3. Master name index
	4. Vehicle and person relationships
	5. Daily case log
	6. Personnel and training
Hardware:	Single-user micro
	Local Area Network
Operating System:	MS-DOS, Novell
Version:	3.1 or higher

Comments:

Vendor/Agency:	Alexandria Department of Public Safety
Address:	2003 Mill Road Alexandria, Virginia 22314
Phone:	(703) 838-3833
Contact Person:	Mr. Clarence Webb
Product:	Fleet Management
Discipline:	Law Enforcement
Function:	Tracks agency vehicles
Features:	1. Size, make, model, etc. of each vehicle 2. Person assigned to each vehicle 3. Depreciation list 4. Report generation
Hardware:	Single-user micro
Operating System:	MS-DOS
Version:	3.0 and higher

Comments: This agency has developed over 50 law enforcement application programs which are in the public domain, including case log, gun purchase, payroll and leave, traffic summons and internal affairs systems.

Vendor/Agency:	Alhambra Police Department
Address:	220 West Woodward Avenue Alhambra, California 91801
Phone:	(818) 570-5105
Contact Person:	Mr. Will Perry
Product:	Computer Aided Status Program
Discipline:	Law Enforcement
Function:	Dispatch/fleet location information system
Features:	1. Vehicle dispatch assistance 2. Vehicle status 3. Pending status report 4. Names record management
Hardware:	Single-user micro
Operating System:	Apple DOS
Version:	3.3 or higher
Comments:	Computer Aided Status Program will handle 3,000 names.

Vendor/Agency:	AmeriData
Address:	7008 Northland Drive Minneapolis, Minnesota 55428
Phone:	(800) 328-3072
Contact Person:	Mr. Bruce Zimmerman
Product:	Law Enforcement System
Discipline:	Law Enforcement
Function:	Law enforcement management system
Features:	1. Call for service 2. Communication 3. Incident name 4. Property/vehicle 5. Wants/warrants 6. Offense 7. Special reports 8. Juvenile name 9. Utility 10. Known offender 11. Field contact 12. Arrest
Hardware:	Single-user micro Local Area Network
Operating System:	MS-DOS
Version:	3.1 or higher
Comments:	Law Enforcement System is designed to assist an agency serving a jurisdiction with a population of under 20,000.

Vendor/Agency:	Antioch Police Department
Address:	301 West 10th Street Antioch, California 94509
Phone:	(415) 757-2236
Contact Person:	Corporal Rich McEachin
Product:	Records Management System
Discipline:	Law Enforcement
Function:	Records management systems
Features:	1. Field identification information 2. Stolen property inventory
Hardware:	Single-user micro Local Area Network
Operating System:	MS-DOS
Version:	3.1 or higher

Comments: Records Management System is integrated with a computer-aided dispatch system. It is in the public domain.

Vendor/Agency:	Applied Solutions, Inc.
Address:	Post Office Box 1506 Beltsville, Maryland 20705
Phone:	(800) 722-4662
Contact Person:	Mr. Curt Willis
Product:	Jailstar
Discipline:	Corrections
Function:	On-line booking and prisoner records management system
Features:	1. 17 standard reports 2. Customized report generator 3. Integratable with multiple databases
Hardware:	Single-user micro Local Area Network
Operating System:	MS-DOS, Novell
Version:	3.1 or higher
Comments:	Jailstar supports up to 1,400 inmate records on line per 10MB. Agencies must put their request for demonstration in writing.

Vendor/Agency:	Arthur Young and Company/DecisionAide Software Products Group
Address:	1700 Valley Bank Center Phoenix, Arizona 85073
Phone:	(602) 258-4831
Contact Person:	Mr. Bruce Lawson
Product:	Clerk of the Court Payment Processing System
Discipline:	Courts
Function:	Court Administration
Features:	1. Support 2. Restitution, fines and reimbursement 3. Cash receipts — one-time fee system 4. Child support 5. Spousal maintenance 6. Associated service charges 7. Jury selection
Hardware:	Single-user micro
Operating System:	BOSS, MS-DOS, PLUTO
Version:	MAI/BASIC FOUR

Comments: The support, restitution, fines and reimbursement and cash receipts subsystems can be incorporated within one fully integrated system or work as stand-alone subsystems.

Vendor/Agency:	Arthur Young and Company/DecisionAide Software Products Group
Address:	1700 Valley Bank Center Phoenix, Arizona 85073
Phone:	(602) 258-4831
Contact Person:	Mr. Harvey Lowe
Product:	Jury Selection System
Discipline:	Courts
Function:	Jury selection system
Features:	1. Random selection based on time to be served 2. Selects and reports on particular groups or panels of candidates 3. Prints notification mailing labels 4. Attendance and mileage system 5. Excuse management file
Hardware:	Single-user micro Local Area Network
Operating System:	BOSS, MS-DOS, PLUTO
Version:	MAI/BASIC FOUR

Comments:

Vendor/Agency:	Arthur Young and Company/DecisionAide Software Products Group
Address:	1700 Valley Bank Center Phoenix, Arizona 85073
Phone:	(602) 258-4831
Contact Person:	Mr. Bruce Lawson
Product:	Traffic Citation Processing System
Discipline:	Courts
Function:	Interactive, multiuser traffic citation process and control system
Features:	1. Integrated cash receiving and delinquency notices 2. Tracks court appearance dates 3. Tracks locations and times for arraignments, hearings, trials, sentencing and continuances 4. Access to citation data by citation number and offender's name
Hardware:	Single-user micro Local Area Network
Operating System:	BOSS, MS-DOS, PLUTO
Version:	MAI/BASIC FOUR

Comments:

Vendor/Agency:	ATE Management Service Company
Address:	617 Vine Street, Suite 800 Cincinnati, Ohio 45202
Phone:	(800) 543-1944
Contact Person:	Mr. Bill Fowler
Product:	EZ Fleet
Discipline:	Law Enforcement
Function:	Fleet records management system
Features:	1. Vehicle history 2. Work orders 3. Parts inventory 4. Purchasing 5. Mechanic productivity 6. Work scheduling 7. Tire management 8. 21 main menu items with more than 120 submenus 9. Tracks more than 950 types of repairs 10. Maintains appropriate job standards by hour for each repair 11. Develops user's own preventive maintenance codes
Hardware:	Single-user micro Local Area Network
Operating System:	MS-DOS
Version:	3.1 or higher
Comments:	EZ Fleet can be used for fleets ranging in size from 150 vehicles to over 500 vehicles.

Vendor/Agency:	AT&T
Address:	3800 Golf Road Rolling Meadows, Illinois 60008
Phone:	(312) 981-3153
Contact Person:	Mr. Ronald Knapik
Product:	AT&T Law Enforcement Software
Discipline:	Corrections
Function:	Jail records management system
Features:	1. Jail management system 2. Commissary inventory system 3. Commodities inventory system 4. Civil process module 5. Prosecution management
Hardware:	Single-user micro Multiuser micro
Operating System:	UNIX, XENIX
Version:	Installation-dependent

Comments: Other features of AT&T Law Enforcement Software include: arrest menu, narrative search, criminal information reports, business information, vehicle maintenance and personnel information.

Vendor/Agency:	AT&T
Address:	3800 Golf Road Rolling Meadows, Illinois 60008
Phone:	(312) 981-3153
Contact Person:	Mr. Ronald Knapik
Product:	AT&T Law Enforcement Software
Discipline:	Law Enforcement
Function:	Records management systems
Features:	1. CAD system 2. Fire and business information system 3 Personnel system 4. Vehicle maintenance system 5. Traffic information system
Hardware:	Single-user micro Multiuser micro Local Area Network
Operating System:	UNIX, XENIX
Version:	Installation-dependent

Comments: Most of the features listed above either can be used as stand-alone systems or fully integrated into one package. The software runs on Unified Database Management System, a product of Unify Corporation.

Vendor/Agency:	AT&T
Address:	150 Martingale Road Schaumburg, Illinois 60173
Phone:	(312) 310-5000
Contact Person:	Mr. Martin Koleno
Product:	10-4 Police Records Management System
Discipline:	Law Enforcement
Function:	Law enforcement records management system
Features:	1. Incident data 2. Criminal history data 3. Warrant 4. Alarm data 5. Personnel history 6. Stolen property evidence 7. Voucher data 8. CAD 9. Ad hoc report generation 10. Query capability
Hardware:	Single-user micro Multiuser micro
Operating System:	UNIX
Version:	System V

Comments: The 10-4 Police Records Management System is recommended for small agencies. This product is tailored for customized applications. A fire dispatch option is available.

Vendor/Agency:	Barian Information Technologies
Address:	980 Sims #9-112 Golden, Colorado 80401
Phone:	(303) 826-5579
Contact Person:	Mr. Barry Miller
Product:	Cash Receipt System
Discipline:	Courts
Function:	Prints automated cash receipts
Features:	1. Calculates daily and monthly reports by receipt categories 2. Fine payments
Hardware:	Multiuser micro Local Area Network
Operating System:	MS-DOS
Version:	2.1 or higher
Comments:	Cash Receipt System is written in DataFlex and can be tailored to suit the needs of different types of courts.

Vendor/Agency:	Barian Information Technologies
Address:	980 Sims #9-112 Golden, Colorado 80401
Phone:	(303) 826-5579
Contact Person:	Mr. Barry Miller
Product:	Victim Compensation Case Tracking
Discipline:	Prosecution
Function:	Tracks victims of violent crimes and compensation awards
Features:	1. Tracks victim's name 2. Claimant 3. Suspect 4. Case information 5. Tracks monthly claims and payments 6. Generates federal statistical reports
Hardware:	Single-user micro Local Area Network
Operating System:	MS-DOS, Novell
Version:	2.1 or higher
Comments:	Victim Compensation Case Tracking is written in DataFlex.

Vendor/Agency:	Bensmiller Computer Systems, Inc.
Address:	Drawer D Whitsett, Texas 78075
Phone:	(800) 531-5934
Contact Person:	Ms. Jean Bensmiller
Product:	The Bensmiller System
Discipline:	Law Enforcement
Function:	Complete criminal justice public safety
Features:	1. Complete record system 2. UCR 3. Intelligence system 4. MO 5. Narcotics 6. Traffic 7. Accident 8. Reports — standard and ad hoc by individual department 9. Report generation capability 10. Evidence 11. Property stolen and recovered system
Hardware:	Single-user micro Multiuser micro
Operating System:	MS-DOS, UNIX, XENIX
Version:	3.1 or higher
Comments:	Other features of The Bensmiller System include: personnel management; inventory; integration with 911 computer-aided dispatch; master name, business, address and vehicle; character-by-character for license and/or fingerprint search; and proof identification for identified bodies.

Vendor/Agency:	BMD Systems Analysis
Address:	6471 Rancho Adobe Drive Sacramento, California 95828
Phone:	(916) 381-1649
Contact Person:	Mr. Bruce Douglass
Product:	Records and Information Management System
Discipline:	Law Enforcement
Function:	Law enforcement records management system
Features:	1. Case tracking 2. Vehicle tracking 3. Citation tracking 4. UCR 5. CAD 6. Alpha name search 7. Officer activity 8. Geo-based file 9. Warrants tracking 10. Ad hoc report generation
Hardware:	Single-user micro Multiuser micro
Operating System:	MS-DOS, MultiLink
Version:	3.1 or higher

Comments: Records and Information Management System is written in a compiled version of dBase III using Clipper. The system uses MultiLink software which connects an AT-type system to dumb terminals.

Vendor/Agency:	Business Control Systems, Inc.
Address:	2120 South Waldron Road, Suite C312 Fort Smith, Arkansas 72903
Phone:	(501) 452-0560
Contact Person:	Mr. Wendell Grubb
Product:	Municipal Court Information System
Discipline:	Courts
Function:	Integrated municipal court, law enforcement and jail records system
Features:	1. Dockets 2. Defendant profiles 3. Warrants 4. Time-payment control 5. DWI statistics 6. Police data 7. Citation/arrest processing 8. Court scheduling 9. Cash control 10. Fund distribution and accounting 11. Utility billing system 12. Probation monitoring 13. Electronic cash drawer 14. Sentence and restitution monitoring
Hardware:	Single-user micro Multiuser micro
Operating System:	MS-DOS, UNIX
Version:	3.2 or higher

Comments:

Vendor/Agency:	California, State of Commission on Peace Officer Standards and Training
Address:	1601 Alhambra Boulevard Sacramento, California 95816-7083
Phone:	(916) 739-3876
Contact Person:	Jim McArthur, Senior Consultant Management Counseling Services Bureau
Product:	Crime Analysis
Discipline:	Law Enforcement
Function:	Identifies high-crime areas
Features:	1. Graphic display of crime locations 2. Jurisdiction map 3. Suspect database
Hardware:	Single-user micro
Operating System:	MS-DOS
Version:	3.1 or higher

Comments: Crime Analysis is in the public domain; contact agency for public domain policies. Language: Microsoft BASIC.

Vendor/Agency:	California, State of Commission on Peace Officer Standards and Training
Address:	1601 Alhambra Boulevard Sacramento, California 95816-7083
Phone:	(916) 739-3876
Contact Person:	Jim McArthur, Senior Consultant Management Counseling Services Bureau
Product:	Patrol Workload Analysis
Discipline:	Law Enforcement
Function:	Allocates patrol resources in proportion to Calls-For-Service levels
Features:	1. Prepares duty schedules for shifts of either four 10-hour workdays or five 8-hour workdays 2. Identifies anticipated peak workload times (by hours, weekdays and times of the month)
Hardware:	Single-user micro
Operating System:	MS-DOS
Version:	3.1 or higher
Comments:	Patrol Workload Analysis is in the public domain; contact agency for public domain policies. Language: Microsoft BASIC.

Vendor/Agency:	California State University, San Jose, Police Department
Address:	1 Washington Square, Building G San Jose, California 95192
Phone:	(408) 924-2177
Contact Person:	Sgt. Edwin Anderson
Product:	Public Safety Data Systems
Discipline:	Law Enforcement
Function:	Law enforcement records management system
Features:	1. Crime reporting 2. Field interviews 3. Warrants 4. Master name index 5. Property files 6. Field event log — field activity tracking 7. Evidence files 8. Crime analysis reporting 9. Moving citations 10. Parking permit file
Hardware:	Single-user micro Local Area Network
Operating System:	The Macintosh Operating System, Omninet, Tops, MacServe, AppleTalk
Version:	
Comments:	This agency has developed Public Safety Data Systems in the public domain using a database application. Language: Omnis III Plus.

Vendor/Agency:	Choice Information Systems, Inc.
Address:	732 Thimble Shoals Boulevard, Suite 301 Newport News, Virginia 23606
Phone:	(804) 873-0837
Contact Person:	Mr. Terence E. Hahm
Product:	Sustain
Discipline:	Courts
Function:	Court case management system
Features:	1. Case number tracking/generation 2. Party indexing 3. Extended party indexing 4. Judge/case assignment 5. Docketing/register of actions 6. Summons/subpoena generation and tracking 7. Case scheduling/calendaring 8. Notice generation 9. Attorney/officer conflict monitoring 10. Calendar preparation 11. Continuance management
Hardware:	Single-user micro Local Area Network
Operating System:	MS-DOS, Novell
Version:	2.1 or higher
Comments:	Other features of Sustain include: document generation; motion tracking; case flow statistics; support orders; alimony and child support accounting; fine/restitution/garnishment accounting; issue tracking and case cross-reference. Language: MS COBOL, B-Trieve.

Vendor/Agency:	Cisco, Inc.
Address:	838 Ritchie Highway, Suite 5 Severna Park, Maryland 21146
Phone:	(301) 544-8882
Contact Person:	Mr. John Lund
Product:	Crime Analysis System Support
Discipline:	Law Enforcement
Function:	Statistical and management crime analysis system
Features:	1. Crime pattern detection 2. Resource allocation 3. Search and retrieve 4. File manager 5. Report generator
Hardware:	Single-user micro Local Area Network
Operating System:	MS-DOS, UNIX V, XENIX, Novell
Version:	2.1 or higher
Comments:	Language: RM COBOL Version 2.

Vendor/Agency:	Cisco, Inc.
Address:	838 Ritchie Highway, Suite 5 Severna Park, Maryland 21146
Phone:	(301) 544-8882
Contact Person:	Mr. John Lund
Product:	Investigative Management Information System
Discipline:	Prosecution
Function:	Comprehensive case tracking and management system
Features:	1. Case analysis report 2. Case assignment/patrol 3. Case assignment/investigation 4. Investigative workload summary 5. Case review report 6. Case aging summary report 7. Case activity list 8. Case listing by offense number 9. Case listing by victim 10. Disposition outcome report 11. Prosecution outcome assessment
Hardware:	Single-user micro Multiuser micro Local Area Network
Operating System:	MS-DOS, UNIX V, XENIX, Novell
Version:	2.1 or higher
Comments:	Language: RM COBOL version 2.

Vendor/Agency:	Cisco, Inc.
Address:	838 Ritchie Highway, Suite 5 Severna Park, Maryland 21146
Phone:	(301) 544-8882
Contact Person:	Mr. John Lund
Product:	Police Operations Support System-Extended
Discipline:	Law Enforcement
Function:	Crime prevention and deterrence management system
Features:	1. UCR 2. NCIC 3. Stolen property and inventory 4. Arrest system 5. Master name index 6. Juvenile 7. Offense 8. Vehicle 9. Fingerprint module 10. Calls for service 11. Special search method 12. Report narrative*
Hardware:	Single-user micro Multiuser micro Local Area Network
Operating System:	MS-DOS, UNIX V, XENIX, Novell
Version:	2.1 or higher
Comments:	*This feature is written in C and available only with the UNIX and XENIX versions. Language: RM COBOL version 2.

Vendor/Agency:	Clayton County Police
Address:	7930 North McDonough Street Jonesboro, Georgia 30236
Phone:	(404) 477-3617
Contact Person:	Sgt. George Pinson
Product:	Accident Report System
Discipline:	Law Enforcement
Function:	Accident records management system
Features:	1. Name search 2. Location search 3. Accident types 4. Number of injury 5. Seat belt inquiry 6. Accident report generation 7. Ad hoc report generation 8. Search by age, sex and race of the driver 9. Accident form modification
Hardware:	Single-user micro
Operating System:	Commodore 9000
Version:	Commodore 9000
Comments:	Language: BASIC.

Vendor/Agency:	Clayton County Police
Address:	7930 North McDonough Street
	Jonesboro, Georgia 30236
Phone:	(404) 477-3617
Contact Person:	Sgt. George Pinson
Product:	Administrative Personnel Records
Discipline:	Law Enforcement
Function:	Personnel records system
Features:	1. Personnel
	2. Next of kin
	3. Emergency information
	4. Training information
Hardware:	Single-user micro
Operating System:	MS-DOS
Version:	3.0 or higher
Comments:	Language: dBase III Plus.

Vendor/Agency:	Clayton County Police
Address:	7930 North McDonough Street Jonesboro, Georgia 30236
Phone:	(404) 477-3617
Contact Person:	Sgt. George Pinson
Product:	Evidence Statistics System
Discipline:	Law Enforcement
Function:	Evidence inventory system
Features:	1. Entry report retrieval 2. Complete inventory maintenance 3. Report generation 4. Ad hoc report generation 5. Name search 6. Case number search 7. Item type search
Hardware:	Single-user micro
Operating System:	MS-DOS
Version:	3X or higher
Comments:	Language: dBase III Plus.

Vendor/Agency:	Clayton County Police
Address:	7930 North McDonough Street Jonesboro, Georgia 30236
Phone:	(404) 477-3617
Contact Person:	Sgt. George Pinson
Product:	Traffic Arrest Report System
Discipline:	Law Enforcement
Function:	Traffic report/arrest management system
Features:	1. Name search 2. Location search 3. Arrest types 4. Injury 5. Seat belt inquiry 6. Arrest report generation 7. Ad hoc report generation 8. Search by age, sex and race of the driver 9. Arrest information search 10. Full query from arrest data
Hardware:	Single-user micro
Operating System:	Commodore 9000
Version:	Commodore 9000
Comments:	Language: BASIC.

Vendor/Agency:	Collier County Sheriff's Department
Address:	Post Office Box 1277 Naples, Florida 33939
Phone:	(813) 793-9279
Contact Person:	Lt. Doug Caperton
Product:	Crime Analysis System
Discipline:	Law Enforcement
Function:	Intelligence/investigative information system
Features:	1. Phone number tracking 2. Name/vehicle/planes/boats searching 3. Relationship of data to narcotics/organized crime information 4. Ad hoc intelligence/investigative report generation
Hardware:	Single-user micro
Operating System:	MS-DOS
Version:	3.1 or higher
Comments:	Crime Analysis System is in the public domain. Language: dBase III Plus.

Vendor/Agency:	Collier County Sheriff's Department
Address:	Post Office Box 1277 Naples, Florida 33939
Phone:	(813) 793-9276
Contact Person:	Lt. Doug Caperton
Product:	UCR Part One Crime Analysis System
Discipline:	Law Enforcement
Function:	Crime analysis
Features:	1. MO pattern analysis 2. Time of day analysis 3. Location area pattern analysis 4. Ad hoc crime analysis reports
Hardware:	Single-user micro
Operating System:	MS-DOS
Version:	3.1 or higher
Comments:	This product is in the public domain. Language: dBase III Plus.

Vendor/Agency:	Colorado District Attorney's Council
Address:	6143 S. Willow Drive, Suite 401 Englewood, Colorado 80111
Phone:	(303) 779-0841
Contact Person:	Ms. Dee Lighter
Product:	Colorado District Attorney's Council - Case Tracking
Discipline:	Prosecution
Function:	Case management
Features:	1. Case tracking and control 2. Assignment of courtrooms, attorneys and judges 3. Calendaring and scheduling 4. Defendant and witness control 5. Docketing 6. Restitution 7. Report and document generation
Hardware:	Single-user micro Local Area Network
Operating System:	MS-DOS, Eagle-DOS
Version:	3.1, 2.1 & 1.08
Comments:	Colorado District Attorney's Council - Case Tracking is written in DataFlex 2.1.

Vendor/Agency:	ComGrafix, Inc.
Address:	302 South Garden Avenue Clearwater, Florida 34616
Phone:	(813) 443-6807
Contact Person:	Mr. Mike Lawrence
Product:	MapGrafix Mapping System
Discipline:	Law Enforcement
Function:	Computer-aided mapping
Features:	1. Digital mapping 2. Database management capability. 3. Cartographic tools for analyzing, displaying and managing spatially referenced geographic information.
Hardware:	Single-user micro Local Area Network
Operating System:	The Macintosh Operating System, AppleTalk
Version:	1.2
Comments:	This firm offers turnkey systems. The program uses Omnis III Plus or Double Helix as the supporting relational database.

Vendor/Agency:	ComGrafix, Inc.
Address:	302 South Garden Avenue Clearwater, Florida 34616
Phone:	(813) 443-6807
Contact Person:	Mr. Mike Lawrence
Product:	MapStar
Discipline:	Law Enforcement
Function:	Computer-aided fleet management
Features:	1. Automated vehicle location 2. Graphic and vehicle management reporting system
Hardware:	Single-user micro Local Area Network
Operating System:	The Macintosh Operating System, AppleTalk
Version:	1.2

Comments: MapStar interacts with radio, transmitter and satellite communications used for tracking system fleet vehicles. This firm offers turnkey systems. This program uses Omnis III Plus or Double Helix as the supporting relational database.

Vendor/Agency:	Community Technology, Inc.
Address:	1308 Parkland Court Champaign, Illinois 61821
Phone:	(217) 351-1705
Contact Person:	Mr. Richard D. Smeltzer
Product:	Automatic Number Identifier (ANI)
Discipline:	Law Enforcement
Function:	Automatic address/phone number system
Features:	1. Integrates with Computer Aided Dispatch systems 2. Identifies location/address of incoming phone call by telephone number 3. Holds call open 4. Recall capability
Hardware:	Single-user micro
Operating System:	ARIES
Version:	5.3
Comments:	ANI operates only on a Uricon super micro. Language: ARIES.

Vendor/Agency:	Community Technology, Inc.
Address:	1308 Parkland Court Champaign, Illinois 61821
Phone:	(217) 351-1705
Contact Person:	Mr. Richard D. Smeltzer
Product:	CAD
Discipline:	Law Enforcement
Function:	Records and management analysis report generator
Features:	1. Record analysis 2. Criminal record analysis 3. Person analysis 4. Vehicle analysis 5. Property analysis 6. Traffic analysis 7. Prioritize call 8. Patrol vehicles tracking 9. Monitors time out of service 10. Maintains history of problems at location (address) 11. Search local wants and warrants
Hardware:	Single-user micro
Operating System:	ARIES
Version:	5.3
Comments:	CAD operates only on vendor's hardware, which is a Uricon super micro with a Kentro KT7 CRT and a Texas Instruments 850 serial printer.

Vendor/Agency:	Computer Systems Technologies, Inc.
Address:	2448 South 102nd Street, Suite 250 Milwaukee, Wisconsin 53227
Phone:	(414) 541-7706
Contact Person:	Mr. Tom Gotthart
Product:	Criminal Justice Information System
Discipline:	Law Enforcement
Function:	Criminal justice information system
Features:	1. Master name or business name index and vehicle 2. Call reporting 3. Incident reporting 4. Pawn management 5. Field contact 6. Citation 7. Wants and warrants 8. Arrest records 9. Booking jail management 10. Bicycle registration 11. Animal licenses 12. Gun permits 13. Municipal and traffic citation
Hardware:	Single-user micro Multiuser micro
Operating System:	MS-DOS
Version:	3.1
Comments:	Criminal Justice Information System can be made multi-user-compatible by using an IBM AT-compatible as a multi-user system with dumb terminals. Language: COBOL.

Vendor/Agency:	Computil
Address:	1040 Route 46 Clifton, New Jersey 07013
Phone:	(201) 778-5656
Contact Person:	Mr. Frank Bailey
Product:	CAMCIS (Criminal and Municipal Court Information System)
Discipline:	Courts
Function:	Municipal court records management system
Features:	1. Criminal court case tracking history system 2. Comprehensive case tracking system (all inclusive) 3. Docketing system 4. Extensive name search capability — name-to-case 5. Financial reporting
Hardware:	Single-user micro Multiuser micro Local Area Network
Operating System:	MS-DOS, Novell
Version:	3.1 or higher
Comments:	CAMCIS is hardware-dependent. Customization is available. This product fully integrates with all other Computil products. Language: Microsoft Business BASIC.

Vendor/Agency:	Computil
Address:	1040 Route 46 Clifton, New Jersey 07013
Phone:	(201) 778-5656
Contact Person:	Mr. Frank Bailey
Product:	Computer Aided Dispatch, COP
Discipline:	Law Enforcement
Function:	Law enforcement crime analysis system
Features:	1. Flag warning 2. Vehicle tracking 3. Report generation 4. Manpower reports 5. Crime reports 6. 911 interface available 7. Calls for service 8. Incident tracking
Hardware:	Single-user micro Multiuser micro Local Area Network
Operating System:	MS-DOS, Novell
Version:	3.1 or higher
Comments:	Computer Aided Dispatch is hardware-dependent. It is one of three modules of the Computer on Patrol (COP) system. This product fully integrates with all other Computil products. Customization is available. Language: Microsoft Business BASIC.

Vendor/Agency:	Computil
Address:	1040 Route 46 Clifton, New Jersey 07013
Phone:	(201) 778-5656
Contact Person:	Mr. Frank Bailey
Product:	Crime Analysis, COP
Discipline:	Law Enforcement
Function:	Law enforcement crime analysis system
Features:	1. Analysis by time, area, MO, name 2. Person-to-person linking 3. Ad hoc crime analysis report generation 4. Geo-based crime analysis available
Hardware:	Single-user micro Multiuser micro Local Area Network
Operating System:	MS-DOS, Novell
Version:	3.1 or higher

Comments: Crime Analysis is hardware-dependent. It is one of three modules of the Computer on Patrol (COP) system. This product fully integrates with all other Computil products. Customization is available. Language: Microsoft Business BASIC.

Vendor/Agency:	Computil
Address:	1040 Route 46 Clifton, New Jersey 07013
Phone:	(201) 778-5656
Contact Person:	Mr. Frank Bailey
Product:	Police Records Management, COP
Discipline:	Law Enforcement
Function:	Law enforcement records management system
Features:	1. Arrest history 2. Master name index 3. Offense investigative system 4. Daily incident log 5. Chain of incidence 6. UCR 7. Adult arrest 8. Juvenile arrest 9. Ad hoc report generation 10. Customized screen layout 11. Intelligence
Hardware:	Single-user micro Multiuser micro Local Area Network
Operating System:	MS-DOS, Novell
Version:	3.1 or higher
Comments:	Police Records Management is hardware-dependent. It is one of three modules of the Computer on Patrol (COP) system. This product fully integrates with all other Computil products. Customization is available. Language: Microsoft Business BASIC.

Vendor/Agency:	Conference of District Attorneys
Address:	19 West Hargett Street, Suite 501 Raleigh, North Carolina 27609
Phone:	(919) 733-3484
Contact Person:	Ms. Patton Galloway
Product:	Prosecution Management Support System
Discipline:	Prosecution
Function:	Case management
Features:	1. Research/statistics 2. Resource allocation 3. Calendaring/scheduling 4. Victim/witness information
Hardware:	Single-user micro
Operating System:	MS-DOS
Version:	
Comments:	Prosecution Management Support System is in the public domain. It is written in dBase III Plus and compiled with Clipper.

Vendor/Agency:	Contract Programming Specialists Incorporated
Address:	2700 Freeway Boulevard, Suite 550 Brooklyn Center, Minnesota 55430
Phone:	(800) 777-5377
Contact Person:	Sandra R. Tschannen
Product:	LEADRS
Discipline:	Law Enforcement
Function:	County and municipal law enforcement recordkeeping
Features:	1. Custom report generator 2. Jail information 3. Citation 4. Property 5. Arrest 6. Initial complaint report 7. Master name index 8. On-line help text 9. Data privacy for adult and juvenile records 10. IBR State listings or summary UCR reports 11. Incident-based reporting for management/personnel evaluations, investigations, statistics, and budget preparations 12. Color screen capability
Hardware:	Single-user micro Local Area Network
Operating System:	MS-DOS, Novell, 3Com+, IBM Token Ring
Version:	3.1 or higher
Comments:	LEADRS is designed as a fully integrated incident database, however, the jail information, custom report generator, citation, property, arrest and initial complaint report modules can be installed in any combination by grouping those modules with the master name index module.

Vendor/Agency:	Coos Bay Police Department
Address:	500 Central Avenue Coos Bay, Oregon 97420
Phone:	(503) 269-8914
Contact Person:	Corporal Kevin Hedgepeth
Product:	Crime Analysis System
Discipline:	Law Enforcement
Function:	Crime Analysis
Features:	1. CAD 2. Oregon UCR 3. Geographic indexing (jurisdiction)
Hardware:	Single-user micro Local Area Network
Operating System:	MS-DOS, IBM PC Net VII
Version:	2.1 or higher

Comments: Crime Analysis System is in the public domain and was developed using RBase System 5. Language: Quick BASIC, Compiled BASIC, Pascal.

Vendor/Agency:	CRIMEAID, Inc.
Address:	Post Office Box 3144 Modesto, California 95353
Phone:	(209) 523-8966
Contact Person:	Mr. Ken Reed
Product:	CRIMEAID (Computerized Reporting Instrument for Managing, Evaluating and Analyzing Investigative Data)
Discipline:	Law Enforcement
Function:	Graphic investigative and crime analysis
Features:	1. Records management 2. Matrixing 3. Mapping 4. Link analysis charting 5. Word processing
Hardware:	Single-user micro Local Area Network
Operating System:	The Macintosh Operating System, AppleTalk
Version:	
Comments:	CRIMEAID graphically assists with advanced investigative and crime analysis techniques. Language: Pascal.

Vendor/Agency:	CRIMEAID, Inc.
Address:	Post Office Box 3144 Modesto, California 95353
Phone:	(209) 523-8966
Contact Person:	Mr. Ken Reed
Product:	FIREAID (Fire Service Integrated Response Evaluation Aid)
Discipline:	Fire
Function:	Graphic fire service analysis
Features:	1. Mapping 2. Integration of digitized photographs with data 3. Link analysis charting 4. Incident Command System (ICS) 5. Integrated Emergency Management System (IEMS) 6. Records management
Hardware:	Single-user micro Local Area Network
Operating System:	The Macintosh Operating System, AppleTalk
Version:	
Comments:	Language: C and Pascal.

Vendor/Agency:	Criterion, Inc.
Address:	9425 North MacArthur Boulevard Irving, Texas 75063-4705
Phone:	(800) 782-1818
Contact Person:	Ms. Bobbie Cooksey
Product:	Command Center
Discipline:	Law Enforcement
Function:	Geographic mapping and reporting system
Features:	1. Crime analysis 2. Patrol allocation 3. Directed patrol 4. Status mapping 5. Special event planning 6. Beat design 7. Geofile build
Hardware:	Single-user micro
Operating System:	MS-DOS
Version:	3.1 or higher

Comments: Command Center is a turnkey solution that provides customized support for administrative, tactical and strategic decisionmaking. Command Center accesses multiple databases and uses interactive maps and reports. Language: C.

Vendor/Agency:	Delaware State Police, Computer Support Section
Address:	P.O. Box 430 Dover, Delaware 19903
Phone:	(302) 736-5899
Contact Person:	Sgt. James Dillion
Product:	Crime Analysis Program
Discipline:	Law Enforcement
Function:	Analysis of crime and crime patterns
Features:	1. Pinpoints high-crime areas 2. Identifies crime patterns 3. Generates reports
Hardware:	Single-user micro Local Area Network
Operating System:	MS-DOS
Version:	3.1 or higher

Comments: This agency has developed approximately 60 law enforcement application programs which are in the public domain, including detective activity, evidence locker, medivac operations, trip summary, wiretap investigation, criminal warrants issuance and wheelbase management systems.

Vendor/Agency:	Diamond Systems, Inc.
Address:	Post Office Box 48301 Niles, Illinois 60648
Phone:	(312) 763-1722
Contact Person:	Mr. Roger Wayman
Product:	Bicycle License Program
Discipline:	Law Enforcement
Function:	Police department bicycle management system
Features:	1. Searches and stores files by license number/owner last name 2. Searches entire file by partial serial number 3. Identifies recovered bicycles and aids in the prosecution of offender
Hardware:	Single-user micro Multiuser micro
Operating System:	MS-DOS, Oasis 5.6 or greater, Business BASIC
Version:	2.1 or higher
Comments:	The source code is available at an additional cost. This product may integrate with other Diamond Systems products.

Vendor/Agency:	Diamond Systems, Inc.
Address:	Post Office Box 48301 Niles, Illinois 60648
Phone:	(312) 763-1722
Contact Person:	Mr. Roger Wayman
Product:	Budget Program
Discipline:	General Administration
Function:	Police department budget analysis system
Features:	1. Stores information by account number 2. Keeps balance of each account available 3. Sorts and keeps account balances by subaccount codes 4. Produces printed reports for expenditures of individual account 5. Includes balances and percent spent to date per account and total
Hardware:	Single-user micro Multiuser micro
Operating System:	MS-DOS, Oasis 5.6 or greater, Business BASIC
Version:	2.1 or higher
Comments:	The source code is available at an additional cost. This product may integrate with other Diamond Systems products.

Vendor/Agency:	Diamond Systems, Inc.
Address:	Post Office Box 48301 Niles, Illinois 60648
Phone:	(312) 763-1722
Contact Person:	Mr. Roger Wayman
Product:	Business File/Key Holder File Program
Discipline:	Law Enforcement
Function:	Police department file management system
Features:	1. Maintains records of files by business owners, managers and key holders 2. Allows file searches by business number (key number) 3. Alarm holder information 4. Street number, street name and business type information 5. User-defined business types, i.e., churches, schools.
Hardware:	Single-user micro Multiuser micro
Operating System:	MS-DOS, Oasis 5.6 or greater, Business BASIC
Version:	2.1 or higher
Comments:	The source code is available at an additional cost. This product may integrate with other Diamond Systems products.

Vendor/Agency:	Diamond Systems, Inc.
Address:	Post Office Box 48301 Niles, Illinois 60648
Phone:	(312) 763-1722
Contact Person:	Mr. Roger Wayman
Product:	Complaint Log Program
Discipline:	Law Enforcement
Function:	Police department logging system
Features:	1. Creates and maintains complaint log 2. Sorts and searches by month, date, offense code (UCR) and complaint number.
Hardware:	Single-user micro Multiuser micro
Operating System:	MS-DOS, Oasis 5.6 or greater, Business BASIC
Version:	2.1 or higher
Comments:	The source code is available at an additional cost. This product may integrate with other Diamond Systems products.

Vendor/Agency:	Diamond Systems, Inc.
Address:	Post Office Box 48301 Niles, Illinois 60648
Phone:	(312) 763-1722
Contact Person:	Mr. Roger Wayman
Product:	Consumable Supplies Inventory Maintenance
Discipline:	General Administration
Function:	Police department inventory system
Features:	1. Maintains consumable supplies records, i.e., paper, flares, ammunition
Hardware:	Single-user micro Multiuser micro
Operating System:	MS-DOS, Oasis 5.6 or greater, Business BASIC
Version:	2.1 or higher
Comments:	The source code is available at an additional cost. This product may integrate with other Diamond Systems products.

Vendor/Agency:	Diamond Systems, Inc.
Address:	Post Office Box 48301 Niles, Illinois 60648
Phone:	(312) 763-1722
Contact Person:	Mr. Roger Wayman
Product:	Department Property Inventory Program
Discipline:	Law Enforcement
Function:	Police department inventory system
Features:	1. Maintains records of department property owned and/or possessed by property name, model number, serial number, date of acquisition, cost, manufacturer and vendor 2. Sorts and searches by vehicles, radios, inhalators, weapons and furniture categories
Hardware:	Single-user micro Multiuser micro
Operating System:	MS-DOS, Oasis 5.6 or greater, Business BASIC
Version:	2.1 or higher
Comments:	The source code is available at an additional cost. This product may be integrated with other Diamond Systems products.

Vendor/Agency:	Diamond Systems, Inc.
Address:	Post Office Box 48301 Niles, Illinois 60648
Phone:	(312) 763-1722
Contact Person:	Mr. Roger Wayman
Product:	Dog/Animal Licenses
Discipline:	Law Enforcement
Function:	Police department animal licensing system
Features:	1. License number 2. Year of license 3. Date of purchase 4. Type, age, color and name of animal with comments
Hardware:	Single-user micro Multiuser micro
Operating System:	MS-DOS, Oasis 5.6 or greater, Business BASIC
Version:	2.1 or higher
Comments:	The source code is available at an additional cost. This product may integrate with other Diamond Systems products.

Vendor/Agency:	Diamond Systems, Inc.
Address:	Post Office Box 48301 Niles, Illinois 60648
Phone:	(312) 763-1722
Contact Person:	Mr. Roger Wayman
Product:	Emergency Phone Number Program
Discipline:	Law Enforcement
Function:	Police dispatcher file maintenance program
Features:	1. Frequently needed phone number file 2. Rapid phone number access 3. User-defined numbers include locksmiths, exterminators, board-up services, towing company lists, bee keepers and ambulance companies
Hardware:	Single-user micro Multiuser micro
Operating System:	MS-DOS, Oasis 5.6 or greater, Business BASIC
Version:	2.1 or higher
Comments:	The source code is available at an additional cost. This product may integrate with other Diamond Systems products.

Vendor/Agency:	Diamond Systems, Inc.
Address:	Post Office Box 48301 Niles, Illinois 60648
Phone:	(312) 763-1722
Contact Person:	Mr. Roger Wayman
Product:	Local Vehicle Licenses
Discipline:	Law Enforcement
Function:	Police department vehicle licensing system
Features:	1. State license number 2. Year of license 3. Date of purchase 4. Year, make, style, color of vehicle
Hardware:	Single-user micro Multiuser micro
Operating System:	MS-DOS, Oasis 5.6 or greater, Business BASIC
Version:	2.1 or higher
Comments:	The source code is available at an additional cost. This product may integrate with other Diamond Systems products.

Vendor/Agency:	Diamond Systems, Inc.
Address:	Post Office Box 48301 Niles, Illinois 60648
Phone:	(312) 763-1722
Contact Person:	Mr. Roger Wayman
Product:	Monthly Training Reports Program
Discipline:	Law Enforcement
Function:	Police department training report control system
Features:	1. Stores and prints monthly training reports 2. Reports seminar attendance 3. Reports roll-call training and individual group instructions 4. Documents monthly training data 5. Monitors breathalyzer recertification
Hardware:	Single-user micro Multiuser micro
Operating System:	MS-DOS, Oasis 5.6 or greater, Business BASIC
Version:	2.1 or higher
Comments:	The source code is available at an additional cost. This product may integrate with other Diamond Systems products.

Vendor/Agency:	Diamond Systems, Inc.
Address:	Post Office Box 48301 Niles, Illinois 60648
Phone:	(312) 763-1722
Contact Person:	Mr. Roger Wayman
Product:	Moving Ticket Analysis Program
Discipline:	Law Enforcement
Function:	Police department ticket management system
Features:	1. Stores moving ticket information including: a. Ticket number b. Violation c. Officer d. Time of day e. Date issued f. Accident involved g. Accident type h. Location beat number i. Disposition 2. Sorts any combination 3. Screen or hard copy output
Hardware:	Single-user micro Multiuser micro
Operating System:	MS-DOS, Oasis 5.6 or greater, Business BASIC
Version:	2.1 or higher
Comments:	The source code is available at an additional cost. This product may integrate with other Diamond Systems products.

Vendor/Agency:	Diamond Systems, Inc.
Address:	Post Office Box 48301 Niles, Illinois 60648
Phone:	(312) 763-1722
Contact Person:	Mr. Roger Wayman
Product:	Parking Ticket Maintenance Program
Discipline:	Law Enforcement
Function:	Police department ticket control system
Features:	1. Holds and sorts tickets by: a. Ticket number, violation code b. Officer number c. Date of disposition d. Date of issue e. Location code f. License plate number g. Amount of disposition 2. Summarized reports 3. Searches by license plate number
Hardware:	Single-user micro Multiuser micro
Operating System:	MS-DOS, Oasis 5.6 or greater, Business BASIC
Version:	2.1 or higher
Comments:	The source code is available at an additional cost. This product may integrate with other Diamond Systems products.

Vendor/Agency:	Diamond Systems, Inc.
Address:	Post Office Box 48301 Niles, Illinois 60648
Phone:	(312) 763-1722
Contact Person:	Mr. Roger Wayman
Product:	Scheduling Program
Discipline:	Law Enforcement
Function:	Law enforcement staff activity records management
Features:	1. Sorts by name 2. Uses 53 weekly files 3. Prints weekly schedules 4. Saves yearly data that can be sorted
Hardware:	Single-user micro Multiuser micro
Operating System:	MS-DOS, Oasis 5.6 or greater, Business BASIC
Version:	2.1 or higher
Comments:	The source code is available at an additional cost. This product may be integrated with other Diamond Systems products.

Vendor/Agency:	Diamond Systems, Inc.
Address:	Post Office Box 48301 Niles, Illinois 60648
Phone:	(312) 763-1722
Contact Person:	Mr. Roger Wayman
Product:	Statistical Records Program
Discipline:	Law Enforcement
Function:	Police department statistics management system
Features:	1. Stores 10 years of annual statistics 2. Maintains information on 40 categories named by the user 3. Draws screen graphs 4. Shows breakdown of statistics by month, week, day and percentage changes from one year to the next as well as averages for the 10-year period
Hardware:	Single-user micro Multiuser micro
Operating System:	MS-DOS, Oasis 5.6 or greater, Business BASIC
Version:	2.1 or higher
Comments:	The source code is available at an extra cost. This system can share data with other Diamond Systems products.

Vendor/Agency:	Diamond Systems, Inc.
Address:	Post Office Box 48301 Niles, Illinois 60648
Phone:	(312) 763-1722
Contact Person:	Mr. Roger Wayman
Product:	Testing Program
Discipline:	Law Enforcement
Function:	Police department testing package
Features:	1. Allows creation of multiple-choice and true/false tests 2. Tests are designed and taken on the screen 3. Tests can be printed and duplicated and used as paper tests
Hardware:	Single-user micro Multiuser micro
Operating System:	MS-DOS, Oasis 5.6 or greater, Business BASIC
Version:	2.1 or higher
Comments:	The source code is available at an additional cost. This product may integrate with other Diamond Systems products.

Vendor/Agency:	Diamond Systems, Inc.
Address:	Post Office Box 48301 Niles, Illinois 60648
Phone:	(312) 763-1722
Contact Person:	Mr. Roger Wayman
Product:	Warrant/Wanted Persons Program
Discipline:	Law Enforcement
Function:	Police department wanted persons management system
Features:	1. Sorts by name 2. Stores miscellaneous information 3. Instant file updating capability to help prevent inaccurate information causing illegal arrest or detainment that could lead to unnecessary lawsuit
Hardware:	Single-user micro Multiuser micro
Operating System:	MS-DOS, Oasis 5.6 or greater, Business BASIC
Version:	2.1 or higher
Comments:	The source code is available at an additional cost. This product may integrate with other Diamond Systems products.

Vendor/Agency:	DMA Data Industries, Inc.
Address:	5 Fir Court
	Oakland, New Jersey 07436
Phone:	(201) 337-8011
Contact Person:	Mr. Steven Polewacyk
Product:	Law Enforcement Automated Data System
Discipline:	Law Enforcement
Function:	Law enforcement records management system
Features:	1. CAD
	2. Arrest
	3. Wants/warrants
	4. Report generation
	5. Personnel tracking
	6. Gun permit
	7. Security features
	8. Criminal court
	9. Court management system
Hardware:	Single-user micro
	Local Area Network
Operating System:	MS-DOS
Version:	3.1 or higher

Comments:

Vendor/Agency:	Earl R. Hunt & Associates, Inc.
Address:	4313 Avenue F Austin, Texas 78751
Phone:	(512) 452-2822
Contact Person:	Mr. Earl Hunt
Product:	Justice Information Management System
Discipline:	Prosecution
Function:	Records management system
Features:	1. Jail management system 2. Bondsman liability system 3. Warrants system 4. Civil processes system 5. Prosecutor notes system 6. Bad check tracking system 7. Felony case management 8. Misdemeanor case management system 9. Civil case management system 10. Fee system 11. Probate case management 12. Ad hoc document generator
Hardware:	Single-user micro
Operating System:	AMOS
Version:	AMOS/L, AMOS/32

Comments: Jail Information Management System will support from three to 360 users. Each subsystem can be purchased as a stand-alone system or in combination with other subsystems. This product is written in Alpha BASIC (compiled).

Vendor/Agency:	Edicon
Address:	95 Allens Creek Road Rochester, New York 14618
Phone:	(716) 271-2950
Contact Person:	Mr. Lee Schilling
Product:	Edicon Mug Identification System
Discipline:	Law Enforcement
Function:	Mug shot automation system
Features:	1. Booking — captures mug shot and enters information about suspect simultaneously 2. Witness search — searches mug shots in database and lets user view most likely candidates 3. Database for property involved in case 4. Photographic-quality output in color or black-and-white
Hardware:	Single-user micro Local Area Network
Operating System:	MS-DOS
Version:	3.1 or higher, Edicon software

Comments:

Vendor/Agency:	ETAK, Inc.
Address:	1455 Adams Drive Menlo Park, California 94025
Phone:	(415) 328-3825
Contact Person:	Mr. Ralph May
Product:	Fleet Management System
Discipline:	Law Enforcement
Function:	Automates fleet management records system
Features:	1. Dispatch vehicle status — location display 2. Dispatch unit recommendation 3. Direct communication with fleet vehicles 4. Animated dispatch map display 5. Graphic or report log file system 6. Integrates with spreadsheets and word processing products
Hardware:	Single-user micro Multiuser micro
Operating System:	UNIX
Version:	3.1 or higher
Comments:	Vendor can provide customized turnkey installation. This system interfaces with a Motorola KDP 4800 multidata terminal or Data Radio Modem 1200. Language: C.

Vendor/Agency:	Federal Signal Corporation/CMI, Inc.
Address:	Post Office Box 40/41011 Highway 6 Minturn, Colorado 81645
Phone:	(303) 949-4440
Contact Person:	Mr. Jerry Miller
Product:	ADAMS (Alcohol Data Acquisition & Management System)
Discipline:	Law Enforcement
Function:	Centralized and remote alcohol analyzing system
Features:	1. Remote field Alcohol Breath Analysis Instrument communicates with a centralized microcomputer. 2. Generates evidence card 3. Report generator
Hardware:	Single-user micro
Operating System:	MS-DOS
Version:	2.1 or higher
Comments:	ADAMS is sold as a turnkey package with the Intoxilizer programmed with dBase III Plus version 1.0 with Quicksilver Compiler.

Vendor/Agency:	Financial Accounting Systems, Inc.
Address:	211 Main Street, Suite 312, Post Office Box 1208 Joplin, Missouri 64801
Phone:	(417) 623-8647 or (800) 345-8726
Contact Person:	Mr. Doyle Castlebery
Product:	Custodial Funds Accounting
Discipline:	Corrections
Function:	Accounting for corrections or other institutions where individuals are not allowed to keep cash
Features:	1. Individual cash, income and expense accounts 2. Money received control 3. Detailed transactions 4. Accounting base on transaction 5. Custodial funds system
Hardware:	Single-user micro Multiuser micro
Operating System:	MS-DOS, UNIX 5.0, XENIX 3.0
Version:	
Comments:	Custodial Funds Accounting can operate within a UNIX or IBM XT/AT-compatible environment. Language: COBOL.

Vendor/Agency:	FIREPRO Incorporated
Address:	49 Walnut Park, Building Number 3 P.O. Box 811145 Wellesley Hills, Massachusetts 02181
Phone:	(617) 237-1153
Contact Person:	Susan Adamski
Product:	Fire Link
Discipline:	Fire
Function:	Fire Service Management and Administration
Features:	1. Fire Index Scoring (Fire Prevention) 2. Hazardous use permit 3. Fund raising 4. Vehicle maintenance and efficiency models 5. Budget planning 6. Hydrant testing 7. Personnel hours tracking 8. Hazardous material tracking 9. Radio inventory 10. Fire prevention violation tracking
Hardware:	Single-user micro
Operating System:	The Macintosh Operating System
Version:	

Comments:

Vendor/Agency:	Gemini Systems
Address:	89 County Road
	Scarborough, Maine 04074
Phone:	(207) 839-6526
Contact Person:	Darleen Catan
Product:	Witness Notification/WP
Discipline:	Prosecution
Function:	Witness notification
Features:	1. Witness control
	2. Subpoenas
Hardware:	Single-user micro
	Local Area Network
Operating System:	BTOS
Version:	

Comments:

Vendor/Agency:	Gering Police Department
Address:	945 O Street Gering, Nebraska 69341
Phone:	(308) 436-5089
Contact Person:	Sgt. Steven R. Gilmore
Product:	Records Management System
Discipline:	Law Enforcement
Function:	Records management system
Features:	1. Case narrative 2. Investigative narrative 3. Master name index 4. Court dispositions 5. Level I and Level II UCR 6. Evidence 7. Stolen property 8. Pawn slips
Hardware:	Single-user micro
Operating System:	MS-DOS
Version:	3.1 OR HIGHER
Comments:	Records Management System is in the public domain. The system is UCR-based and is written in dBase III Plus.

Vendor/Agency:	Gwinnett County Police, Planning and Training
Address:	Post Office Box 602 Lawrenceville, Georgia 30246
Phone:	(404) 995-2700
Contact Person:	Mr. Erick Moran
Product:	Law Enforcement Support System
Discipline:	Law Enforcement
Function:	Law enforcement records management system
Features:	1. Animal control — registration and records management system 2. Pawn shop — records management system 3. Detective case management system
Hardware:	Single-user micro
Operating System:	MS-DOS
Version:	3.1 or higher
Comments:	This product was developed using RBase 5000, and is in the public domain.

Vendor/Agency:	Hawk Systems
Address:	19531 Ventura Boulevard Tarzana, California 91356
Phone:	(818) 905-0666
Contact Person:	Mr. Paul Jones
Product:	Public Safety
Discipline:	Law Enforcement
Function:	Visual database system
Features:	1. Emergency response management 2. Facilities planning and control 3. Interfaces with other Hawk Systems products 4. Occurrence management 5. FEMA reporting 6. Hazardous materials location and control
Hardware:	Single-user micro
Operating System:	The Macintosh Operating System
Version:	
Comments:	Hawk Systems specializes in geo-based systems. The main product line uses a graphic-based database management product to describe the layout of a city, building or groups of buildings. All systems are customized, turnkey systems.

Vendor/Agency:	Huntington Beach Police Department
Address:	2000 Main Street Post Office Box 70 Huntington Beach, California 92648
Phone:	(714) 960-8888
Contact Person:	Ran Stanton
Product:	Police Department Applicant
Discipline:	Law Enforcement
Function:	Applicant records management
Features:	1. Reference file 2. Previous employment file 3. Education file 4. Previous law enforcement file 5. Automated references letter generator 6. Automated employment application generator
Hardware:	Single-user micro
Operating System:	CTOS
Version:	
Comments:	Police Department Applicant is written in RBase 5000.

Vendor/Agency:	Illinois Criminal Justice Information Authority
Address:	1205 Riverside Plaza
	Chicago, Illinois 60606
Phone:	(312) 793-8674
Contact Person:	Mr. Tom Downing
Product:	Rapid Automated Prosecution System
Discipline:	Prosecution
Function:	Prosecution management
Features:	1. Case tracking and analysis
	2. Docketing
	3. Calendaring/scheduling
	4. Report and document generation
	5. Restitution
	6. Assignment of courtrooms, attorneys and judges
	7. Statute retrieval
Hardware:	Single-user micro
	Local Area Network
Operating System:	MS-DOS
Version:	3.1

Comments:

Vendor/Agency:	Imageering
Address:	3314 Poplar Avenue Memphis, Tennessee 38111
Phone:	(800) 922-4267 or (901) 323-4762
Contact Person:	Mr. Terry Pahn
Product:	Mug Master
Discipline:	Law Enforcement
Function:	Suspect identification software and library
Features:	1. Witness identification processing 2. Associates and AKA link analysis 3. Fingerprints, arrest records, link to NCIC
Hardware:	Single-user micro
Operating System:	The Macintosh Operating System
Version:	

Comments: Mug Master uses the established FBI catalog of feature characteristics. Vendor provides hardware and software turnkey installations. This package can integrate with other established databases and other Imageering products: Imagemaster, crime scene video/record recording, and Motion Master and Paint Store, which can alter mug shot records. Language: C and Pascal.

Vendor/Agency:	Information Communication Corporation
Address:	6300 Hillcroft, Suite 304 Houston, Texas 77081
Phone:	(713) 271-0005
Contact Person:	Mr. Bob Roenigk
Product:	Records Management System for Law Enforcement
Discipline:	Law Enforcement
Function:	Law enforcement records management system
Features:	1. Calls for service 2. Incidents and offense reports 3. Crime analysis 4. Traffic accidents 5. Evidence and recovered property management 6. Juvenile records 7. Arrests and dispositions 8. Field interviews 9. Wants and warrants 10. Fire incidents 11. UCR
Hardware:	Single-user micro Multiuser micro
Operating System:	MS-DOS, UNIX, XENIX
Version:	3.0 or higher, System V, version 5.0,
Comments:	The product can customized. Some of the features can be stand-alone systems.

Vendor/Agency:	Institute of Police Technology and Management
Address:	University of North Florida 4567 St. Johns Bluff Road, South Jacksonville, Florida 32216
Phone:	(904) 646-2722
Contact Person:	Mr. George Atkinson
Product:	CAT-II
Discipline:	Law Enforcement
Function:	Computer-assisted police training system
Features:	1. Automated interactive police training system 2. Test score capability 3. Individual answer analysis
Hardware:	Single-user micro
Operating System:	MS-DOS
Version:	3.0 or higher
Comments:	CAT-II is designed for small agencies.

Vendor/Agency:	Institute of Police Technology and Management
Address:	University of North Florida 4567 St. Johns Bluff Road, South Jacksonville, Florida 32216
Phone:	(904) 646-2722
Contact Person:	Mr. George Atkinson
Product:	FLEET-TRAK
Discipline:	Law Enforcement
Function:	Fleet records management system
Features:	1. Vehicle cost records 2. Vehicle miles per gallon 3. Vehicle operating costs 4. Vehicle and fleet report generator 5. Preventive maintenance system
Hardware:	Single-user micro
Operating System:	MS-DOS
Version:	3.0 or higher

Comments:

Vendor/Agency:	Institute of Police Technology and Management
Address:	University of North Florida 4567 St. Johns Bluff Road, South Jacksonville, Florida 32216
Phone:	(904) 646-2722
Contact Person:	Mr. George Atkinson
Product:	IBS First Signal Parking Management System
Discipline:	Law Enforcement
Function:	On-site and centralized citation issuance system
Features:	1. Hand-held computer and portable printer 2. Interfaces with IBM PC to download information 3. Interfaces with other IPTM database systems
Hardware:	Single-user micro
Operating System:	MS-DOS
Version:	3.1 or higher
Comments:	Vendor provides all hardware and software to support this system.

Vendor/Agency:	Institute of Police Technology and Management
Address:	University of North Florida 4567 St. Johns Bluff Road, South Jacksonville, Florida 32216
Phone:	(904) 646-2722
Contact Person:	Mr. George Atkinson
Product:	P-TOM
Discipline:	Law Enforcement
Function:	Police traffic unit: motorist records and management system
Features:	1. Training file 2. Accident file 3. Ticket file 4. Blood-alcohol count file 5. Employee file
Hardware:	Single-user micro
Operating System:	MS-DOS
Version:	3.0 or higher

Comments:

Vendor/Agency:	Institute of Police Technology and Management
Address:	University of North Florida 4567 St. Johns Bluff Road, South Jacksonville, Florida 32216
Phone:	(904) 646-2722
Contact Person:	Mr. George Atkinson
Product:	POLICE COMPUTER SYSTEM
Discipline:	Law Enforcement
Function:	Comprehensive law enforcement records management system
Features:	1. Accident file 2. Incident file 3. Arrest file 4. Master name index file 5. UCR generation 6. Property file 7. Registration file 8. Parking/citation file 9. Suspect information management 10. Fleet vehicle management
Hardware:	Single-user micro
Operating System:	MS-DOS
Version:	3.0 or higher

Comments:

Vendor/Agency:	Institute of Police Technology and Management
Address:	University of North Florida 4567 St. Johns Bluff Road, South Jacksonville, Florida 32216
Phone:	(904) 646-2722
Contact Person:	Mr. George Atkinson
Product:	POLICE-TRAK
Discipline:	Law Enforcement
Function:	Comprehensive law enforcement records management system
Features:	1. Initial data entry 2. Incident records 3. Arrest files 4. Name files 5. Accident files 6. Registration files 7. UCR generation 8. Property room records 9. Parking/traffic ticket file 10. Suspect information management 11. Fleet vehicle management
Hardware:	Single-user micro Local Area Network
Operating System:	MS-DOS, Novell Netware-E
Version:	3.0 or higher
Comments:	Other modules include: budget files, warrant files, training files, personnel activity, stolen property files, inventory control, geo-based emergency locater, internal affairs activity, field interrogation records, false alarm activity, caseload management and other customized applications.

Vendor/Agency:	Institute of Police Technology and Management
Address:	University of North Florida 4567 St. Johns Bluff Road, South Jacksonville, Florida 32216
Phone:	(904) 646-2722
Contact Person:	Mr. George Atkinson
Product:	TACTICAL CRIME ANALYSIS PACKAGE
Discipline:	Law Enforcement
Function:	Crime analysis information system
Features:	1. Sex offenses 2. Robberies 3. Burglaries 4. Larceny from autos 5. Stolen autos 6. Crime pattern system 7. Known offender system 8. Specific crime data records system
Hardware:	Single-user micro
Operating System:	MS-DOS
Version:	3.0 or higher

Comments:

Vendor/Agency:	King County Prosecutor - Fraud Division
Address:	Room E-208 King County Courthouse Seattle, Washington 98104
Phone:	(206) 340-4763
Contact Person:	Mr. Ron Borger
Product:	Fraud Case Tracking
Discipline:	Prosecution
Function:	Fraud case management
Features:	1. Case tracking 2. Statistical reporting 3. Calendaring/scheduling 4. Phonic name search
Hardware:	Single-user micro
Operating System:	MS-DOS
Version:	3.2
Comments:	Fraud Case Tracking is written in dBase III Plus.

Vendor/Agency:	King-Fisher Company
Address:	2350 Foster Avenue Wheeling, Illinois 60090
Phone:	(312) 398-7100
Contact Person:	Mr. Carl King
Product:	Computer Aided Dispatch
Discipline:	Law Enforcement
Function:	Automated dispatching/fire alarm system
Features:	1. Report generation 2. CAD — 911 or E 911 3. Incident reporting 4. Dispatching 5. Hazardous material 6. Mapping 7. National Fire Institute Reporting System interface 8. Incident pre-planning 9. Extended pre-planning 10. Personnel
Hardware:	Single-user micro Multiuser micro Local Area Network
Operating System:	MS-DOS, UNIX V, Novell Netware SFT level 1
Version:	3.1 or higher
Comments:	Vendor offers turnkey and/or customized installation applications.

Vendor/Agency:	Knopf Data Systems (KDS)
Address:	Post Office Box 1076
	Salinas, California 93902
Phone:	(408) 758-3337
Contact Person:	Mr. Bill Knopf
Product:	Law Enforcement Automated Data System
Discipline:	Law Enforcement
Function:	Law enforcement records management system
Features:	1. UCR
	2. Arrest
	3. Wants/warrants
	4. Report generation
	5. Personnel tracking
	6. Gun permit
	7. Security features
	8. Criminal court
	9. Court management system
	10. Crime analysis
Hardware:	Single-user micro
	Multiuser micro
	Local Area Network
Operating System:	MS-DOS, Novell Netware, XENIX
Version:	2.1 or higher, ELS or ADV Netware 286, version V
Comments:	The product is menu-driven. Language: BASIC 2C runtime.

Vendor/Agency:	KVS Information Systems, Inc.
Address:	4043 Maple Road, Suite 201 Amherst, New York 14226
Phone:	(716) 834-3202
Contact Person:	Mr. Peter Hronsky
Product:	Local Court/Vehicle/Traffic Management System
Discipline:	Courts
Function:	Court records management system
Features:	1. Case docketing 2. Monitors cases maintaining statutory timing requirements 3. Case scheduling information 4. Fines, fees and surcharges collected by court accounting system 5. Report generator 6. Ad hoc report generator 7. Violations report 8. Disposition report 9. Justice Court fund report 10. Court schedule 11. Undispositioned report 12. Cash receipts report/court docket
Hardware:	Single-user micro Multiuser micro
Operating System:	MS-DOS, UNIX
Version:	3.1 or higher, System V
Comments:	Vendor provides software and hardware turnkey installations. Customization is available. Language: COBOL.

Vendor/Agency:	KVS Information Systems, Inc.
Address:	4043 Maple Road, Suite 201 Amherst, New York 14226
Phone:	(716) 834-3202
Contact Person:	Mr. Peter Hronsky
Product:	Municipal Accounting System
Discipline:	General Administration
Function:	Automated financial control for public funds
Features:	1. General ledger 2. Budget preparation/development 3. Purchasing/encumbrance 4. Accounts payable 5. Payroll 6. Fixed asset accounting 7. Utility billing 8. Electric billing 9. Order entry 10. Cash management 11. Project management
Hardware:	Single-user micro Multiuser micro
Operating System:	MS-DOS, UNIX V
Version:	3.1 or higher

Comments: Other features of Municipal Accounting System include: equipment maintenance, word processing, continuing property records, voter registration, grantee/grantor, tax billing and collection and other specialized modules. Vendor provides turnkey software/hardware installations. Customization is available. Language: COBOL.

Vendor/Agency:	KVS Information Systems, Inc.
Address:	4043 Maple Road, Suite 201 Amherst, New York 14226
Phone:	(716) 834-3202
Contact Person:	Mr. Peter Hronsky
Product:	Police Operations with Enhanced Reporting
Discipline:	Law Enforcement
Function:	Interactive automated records management system
Features:	1. Master name index 2. Arrest module 3. Juvenile module 4. Property and inventory module 5. Vehicle module 6. Offense module 7. UCR 8. Suspect module 9. Calls for service 10. Wants/warrants 11. Known offender
Hardware:	Single-user micro Local Area Network
Operating System:	MS-DOS, UNIX V
Version:	3.1 or higher
Comments:	Vendor provides software/hardware turnkey installations. Customization is available. Other features of Police Operations with Enhanced Reporting include: field contact, incident name, investigation support, personnel and training and other specialized modules. Language: COBOL.

Vendor/Agency:	Lake County District Attorney
Address:	255 North Forbes Street Lakeport, California 95453
Phone:	(707) 263-2286
Contact Person:	Mr. Mike Hagar
Product:	Office of the Attorney General Brief Bank
Discipline:	Prosecution
Function:	Case management
Features:	1. Case tracking and analysis 2. Statistical reporting 3. Document and report generation 4. Docketing 5. Witness control
Hardware:	Single-user micro Local Area Network
Operating System:	MS-DOS
Version:	3.0
Comments:	Office of the Attorney General Brief Bank is written in SMART and is in the public domain.

Vendor/Agency:	Lane County District Attorney's Office
Address:	Lane County Courthouse Eugene, Oregon 97401
Phone:	(503) 687-4261
Contact Person:	Mr. Ed Hagen
Product:	D.A.'s Information System
Discipline:	Prosecution
Function:	Prosecution management
Features:	1. Case tracking and analysis 2. Docketing 3. Calendaring/scheduling 4. Report and document generation 5. Restitution 6. Assignment of courtrooms, attorneys and judges 7. Statute retrieval
Hardware:	Single-user micro
Operating System:	MS-DOS
Version:	

Comments: D.A.'s Information System is written in dBase III Plus and is in the public domain.

Vendor/Agency:	Los Angeles, City of
Address:	200 North Main Street/Mail Stop 232 Los Angeles, California 90012
Phone:	(213) 485-2531
Contact Person:	Lt. John Zorn
Product:	Records Management System
Discipline:	Law Enforcement
Function:	Database management system
Features:	1. Name link analysis 2. Case tracking 3. Intelligence 4. Investigative
Hardware:	Single-user micro
Operating System:	MS-DOS
Version:	3.0 and higher

Comments: The Los Angeles Police Department developed Records Management System on the Paradox database manager. The system is in the public domain.

Vendor/Agency:	Los Angeles Police Department Investigative Analysis
Address:	150 North Los Angeles Street - Room 810 Los Angeles, California 90012
Phone:	(213) 485-2676
Contact Person:	Sgt. Jeff Willis
Product:	HITMAN (Homicide Information Tracking Management Automation Network)
Discipline:	Law Enforcement
Function:	Homicide/investigative clue management system
Features:	1. Ad hoc report generator 2. Homicide categorization 3. Clue and MO linking/tracking • gang relationships • narcotics • prostitution relationships • sexual offenses 4. Unlimited file query capability
Hardware:	Single-user micro
Operating System:	DOS
Version:	3.1 or higher
Comments:	HITMAN is written in RBase System-V.

Vendor/Agency:	Los Angeles Police Department Investigative Analysis
Address:	150 North Los Angeles Street - Room 810 Los Angeles, California 90012
Phone:	(213) 485-2676
Contact Person:	Sgt. Jeff Willis
Product:	Narcotics Case Tracking System
Discipline:	Law Enforcement
Function:	Narcotic suspect case tracking records management
Features:	1. Ad hoc report generator 2. Comprehensive statistical report generator
Hardware:	Single-user micro
Operating System:	DOS
Version:	3.1 or higher
Comments:	The Narcotics Case Tracking System is written in RBASE System-V.

Vendor/Agency:	Los Angeles Police Department Investigative Analysis
Address:	150 North Los Angeles Street - Room 810 Los Angeles, California 90012
Phone:	(213) 485-2676
Contact Person:	Sgt. Jeff Willis
Product:	SCIN (Sex Crimes Information Network)
Discipline:	Law Enforcement
Function:	Rape clue management system
Features:	1. Ad hoc report generator 2. Rape classification (20 categories) 3. Homicides 4. Clue and MO linking/tracking • gang relationships • narcotics 5. Narcotics 6. Unlimited file query capability
Hardware:	Single-user micro
Operating System:	DOS
Version:	3.1 or higher
Comments:	SCIN is written in RBase System-V.

Vendor/Agency:	Management Decision Systems, Inc.
Address:	1109 East Carmen Tempe, Arizona 85283
Phone:	(602) 897-9720
Contact Person:	Mr. Ron Jones
Product:	Court Management Systems
Discipline:	Courts
Function:	City and county court records management system
Features:	1. Case docketing 2. Reporting for criminal, civil, traffic, small claims, domestic and parking 3. Calendaring 4. Financial 5. Search warrants 6. Jury selection
Hardware:	Single-user micro Multiuser micro Local Area Network
Operating System:	MS-DOS, XENIX, Novell
Version:	3.1 or higher, 2.01

Comments: This product has over 27 various modules that can be customized for criminal justice applications. It uses compiled dBase III Plus so that it can operate in a UNIX (compiled using FoxBase III), XENIX (compiled using Quick Silver), MS-DOS micro-based network or microcomputer stand-alone system. Modules can be customized and fully integrated.

Vendor/Agency:	Mapping Information Systems Corporation
Address:	Hendrick Hudson Building, 200 Broadway Troy, New York 12180
Phone:	(800) FASTMAP
Contact Person:	Mr. Shawn O'Sullivan
Product:	Map Information
Discipline:	Law Enforcement
Function:	Map information system that integrates with dBase III Plus
Features:	1. Map data 2. Map display 3. Data analysis 4. Full search capability 5. Boundary location
Hardware:	Single-user micro Local Area Network
Operating System:	MS-DOS, Novell
Version:	2.0 or higher
Comments:	Language: C

Vendor/Agency:	Masys Corporation
Address:	435 Ford Road, Suite 465 Minneapolis, Minnesota 55426
Phone:	(612) 546-9556
Contact Person:	Mr. Ernie Swartout Mr. John Hemak
Product:	ENFORS/Investigative System
Discipline:	Law Enforcement
Function:	Investigative records management system
Features:	1. Crime analysis 2. Investigative — field contact 3. Name file 4. Case status 5. Special search 6. Case writer 7. Access security
Hardware:	Single-user micro
Operating System:	MS-DOS running in a shell under the Texas Instruments operating system
Version:	3.2
Comments:	Language: COBOL.

Vendor/Agency:	Masys Corporation
Address:	435 Ford Road, Suite 465 Minneapolis, Minnesota 55426
Phone:	(612) 546-9556
Contact Person:	Mr. Ernie Swartout Mr. John Hemak
Product:	ENFORS/Jail Records Management System
Discipline:	Corrections
Function:	Jail records management system
Features:	1. Inmate records management 2. Inmate location/activity tracking 3. Report generator 4. Module customizing available 5. Prisoner funds
Hardware:	Single-user micro
Operating System:	MS-DOS running in a shell under the Texas Instruments operating system
Version:	3.2
Comments:	The vendor provides turnkey hardware/software installation. System customization is available. Jail Records Management System can be fully integrated with this vendor's Law Enforcement Records Management System. Language: COBOL.

Vendor/Agency:	Masys Corporation
Address:	435 Ford Road, Suite 465 Minneapolis, Minnesota 55426
Phone:	(612) 546-9556
Contact Person:	Mr. Ernie Swartout Mr. John Hemak
Product:	ENFORS/Law Enforcement Records Management System
Discipline:	Law Enforcement
Function:	Law enforcement records management system
Features:	1. Comprehensive master name search system 2. Personnel skills and training 3. Calls for service 4. Property 5. Offense tracking 6. Incident-based UCR for Minnesota 7. Level I UCR out-of-state
Hardware:	Single-user micro
Operating System:	MS-DOS running in a shell under the Texas Instruments operating system
Version:	3.2 or higher
Comments:	The vendor provides turnkey hardware/software installation. System customization is available. Language: COBOL.

Vendor/Agency:	Metro Technology Services, Inc.
Address:	81 Great Valley Parkway Malvern, Pennsylvania 19355
Phone:	(215) 296-7450
Contact Person:	Mr. Tony Iannacone
Product:	Automated Law Enforcement Record Tracking
Discipline:	Law Enforcement
Function:	Law enforcement records management system
Features:	1. Incident 2. Wants/warrants 3. Names 4. Parking enforcement 5. Citation issuance 6. UCR 7. Officer activity 8. Accident file 9. Fleet maintenance activity 10. Personnel: skills and training 11. Case management
Hardware:	Single-user micro Local Area Network
Operating System:	MS-DOS, DNA
Version:	3.1 or higher

Comments: Other features of Automated Law Enforcement Record Tracking include: case management, MO, crime analysis, query module, juvenile and a parking enforcement system. The multiuser version can be supported by a MS-DOS-compatible local area network (DNA). Language: Clipper-compiled dBase III Plus.

Vendor/Agency:	Micro Craft, Inc.
Address:	688 Discovery Drive Huntsville, Alabama 35806
Phone:	(800) 225-3147
Contact Person:	Ms. Mary Lou Glover
Product:	Docket
Discipline:	Courts
Function:	Docket calendar management system
Features:	1. Critical deadline system 2. Reminder dates 3. Daily, weekly and monthly reports
Hardware:	Single-user micro
Operating System:	MS-DOS, CPM 86
Version:	2.0 CPM and higher
Comments:	Language: Compiled C-BASIC.

Vendor/Agency:	Micro Craft, Inc.
Address:	688 Discovery Drive Huntsville, Alabama 35806
Phone:	(800) 225-3147
Contact Person:	Ms. Mary Lou Glover
Product:	General Ledger
Discipline:	General Administration
Function:	Finance and accounting
Features:	1. Monthly reports 2. Year-to-date reports
Hardware:	Single-user micro
Operating System:	MS-DOS, CPM, CPM 86
Version:	2.0 and higher

Comments: General Ledger will integrate with Micro Craft's Verdict and Check Write cash disbursement systems. Language: Compiled C-BASIC.

Vendor/Agency:	Micro Craft, Inc.
Address:	688 Discovery Drive Huntsville, Alabama 35806
Phone:	(800) 225-3147
Contact Person:	Ms. Mary Lou Glover
Product:	Litigator
Discipline:	Courts
Function:	Litigation records management system
Features:	1. Client file 2. Witness file 3. Expert witness file 4. Document file 5. Conflict of interest system
Hardware:	Single-user micro
Operating System:	MS-DOS, CPM 86
Version:	CPM/2.0 and higher
Comments:	Language: Compiled C-BASIC.

Vendor/Agency:	Micro Craft, Inc.
Address:	688 Discovery Drive Huntsville, Alabama 35806
Phone:	(800) 225-3147
Contact Person:	Ms. Mary Lou Glover
Product:	Verdict
Discipline:	Courts
Function:	Time and bill management system for attorneys
Features:	1. Management reports 2. Trust accounts 3. Eight billing formats 4. Time and bill management
Hardware:	Single-user micro
Operating System:	MS-DOS, CPM, CPM/86
Version:	2.0 and higher
Comments:	Verdict will integrate with Micro Craft's General Ledger and/or Check Write cash disbursement systems. Language: Compiled C-BASIC.

Vendor/Agency:	Monroe Systems for Business, Inc.
Address:	The American Road Morris Plains, New Jersey 07950
Phone:	(201) 993-2000
Contact Person:	Mr. Joseph Dolce
Product:	Monroe Law Enforcement Telecommunications System
Discipline:	Law Enforcement
Function:	NCIC/NLETS telecommunications (where approved)
Features:	1. Protected data 2. NCIC data retrieval 3. Automated report generator
Hardware:	Single-user micro
Operating System:	Concurrent DOS
Version:	4.1 or higher
Comments:	In the multitasking, single-user environment, this product supports access to NCIC/NLETS and/or internal records management. Language: Assembler.

Vendor/Agency:	Municipal Data Systems
Address:	3 High Street, Post Office Box 339 Skowhegan, Maine 04976
Phone:	(207) 474-5405
Contact Person:	Mr. Scott Moody
Product:	MDS Police Software System
Discipline:	Law Enforcement
Function:	Law enforcement records management system
Features:	1. Warrants/wants 2. Citations 3. Complaints 4. Accidents 5. Street coding 6. Court logs 7. UCR tally sheet 8. Stolen property log 9. Statistical reporting 10. Ad hoc report generation 11. Key file reporting 12. Daily log with dispatcher inquiry capability
Hardware:	Single-user micro Local Area Network
Operating System:	MS-DOS, Novell
Version:	2.0 or higher
Comments:	MDS Police Software System is marketed as an integrated system. Customization is available.

Vendor/Agency:	North Providence Police Department
Address:	1967 Mineral Spring Avenue North Providence, Rhode Island 02904
Phone:	(401) 231-4533, Ext. 244
Contact Person:	Sgt. William C. Abbatematteo
Product:	Records Management System
Discipline:	Law Enforcement
Function:	Law Enforcement Records Management System
Features:	1. Incident tracking 2. Report generator, time study analysis, UCR, stolen property, arrests 3. User-defined sorting capability 4. Case management 5. Monthly statistical reporting 6. Workload statistics 7. Citation tracking 8. Accident file 9. Parking tag fee collection system 10. Crime analysis 11. Link name and MO analysis 12. Wants and warrants
Hardware:	Multiuser micro
Operating System:	XENIX
Version:	3.1.2
Comments:	Records Management System is in the public domain and is written in Profile 16.

Vendor/Agency:	Office of the Prosecutor Coordinator
Address:	750 Tower Building, 323 Center Little Rock, Arkansas 72201
Phone:	(501) 371-3671
Contact Person:	Ms. Beth Henderson
Product:	Arkansas Prosecuting Attorneys Association Case Management System
Discipline:	Prosecution
Function:	Case management
Features:	1. Tracks cases 2. Generates documents and reports
Hardware:	Single-user micro Local Area Network
Operating System:	MS-DOS
Version:	3.1
Comments:	Arkansas Prosecuting Attorneys Association Case Management System is written in DataFlex version 2.2 and is in the public domain.

Vendor/Agency:	Office of the Prosecutor Coordinator
Address:	750 Tower Building, 323 Center Little Rock, Arkansas 72201
Phone:	(501) 371-3671
Contact Person:	Ms. Beth Henderson
Product:	Hot Check System
Discipline:	Prosecution
Function:	Manage collection and disbursement of hot check funds
Features:	1. Generates letters to defendants 2. Generates arrest warrants 3. Prints receipts 4. Generates reports
Hardware:	Single-user micro Local Area Network
Operating System:	MS-DOS
Version:	3.1
Comments:	Hot Check System is written in DataFlex version 2.2 and is in the public domain.

Vendor/Agency:	Office of the Prosecutor Coordinator
Address:	750 Tower Building, 323 Center Little Rock, Arkansas 72201
Phone:	(501) 371-3671
Contact Person:	Ms. Beth Henderson
Product:	Restitution Program
Discipline:	Prosecution
Function:	Restitution management
Features:	1. Disburses money to victims 2. Prints checks and receipts 3. Disbursement journals, collection ledgers 4. Letter and report generation 5. Audit trail
Hardware:	Single-user micro Local Area Network
Operating System:	MS-DOS
Version:	3.1
Comments:	Restitution Program is written in DataFlex version 2.2 and is in the public domain.

Vendor/Agency:	Olympia Office of the Administrator for the Courts
Address:	1206 South Quince Street Olympia, Washington 98504
Phone:	(206) 753-3365
Contact Person:	Mr. Wes Divin
Product:	PC Calendaring
Discipline:	Courts
Function:	Court scheduling records management system
Features:	1. Case filing records management 2. Case data 3. Parties of the case 4. Attorneys and/or other representatives 5. Case scheduling procedure system 6. Multiple formatted calendar display system 7. Generation of attendance notices 8. Multiple query functions
Hardware:	Single-user micro
Operating System:	MS-DOS
Version:	3.2 or higher
Comments:	PC Calendaring is in the public domain; contact agency for public domain policy.

Vendor/Agency:	Olympia Office of the Administrator for the Courts
Address:	1206 South Quince Street Olympia, Washington 98504
Phone:	(206) 753-3365
Contact Person:	Mr. Roy Jobe
Product:	Receipt Accounting System
Discipline:	Courts
Function:	Automates fines/penalties receipt management system
Features:	1. Posts fines to the transaction, activates a slip printer 2. Activates a receipt printer at register 3. Opens a cash drawer 4. Report generation
Hardware:	Single-user micro
Operating System:	MS-DOS
Version:	3.2 or higher

Comments: Receipt Accounting System is in the public domain, but restrictions apply. Contact the agency for public domain policy.

Vendor/Agency:	Ontario Police Department
Address:	200 North Cherry Avenue Ontario, California 91764
Phone:	(714) 351-6677
Contact Person:	Detective Robert Britt
Product:	Suspect Tracking System
Discipline:	Law Enforcement
Function:	Airport Narcotics Suspect Records Management
Features:	1. Name link analysis 2. Ad hoc report generator 3. Airport detail records management 4. Narcotic activity tracking
Hardware:	Single-user micro
Operating System:	DOS
Version:	3.1 or higher
Comments:	The Suspect Tracking System is designed to support multiagency airport narcotic units.

Vendor/Agency:	Placerville Police Department
Address:	730 Main Street Placerville, California 95667
Phone:	(916) 622-0111
Contact Person:	Mr. Steven Haskins
Product:	Records Management System
Discipline:	Law Enforcement
Function:	Records management
Features:	1. Bad check case system 2. Bicycle registration 3. Statistics 4. Case tracking 5. Citation statistics
Hardware:	Single-user micro
Operating System:	MS-DOS
Version:	3.1 or higher
Comments:	Records Management System is in the public domain. Language: dBase III.

Vendor/Agency:	Prosecuting Attorneys Coordinating Council
Address:	306 Townsend, Suite 400
	Lansing, Michigan 48913
Phone:	(517) 334-6060
Contact Person:	Mr. John Goergen
Product:	Case and Defendant Tracking
Discipline:	Prosecution
Function:	Case management
Features:	1. Case tracking and analysis
	2. Calendaring and scheduling
	3. Attorney, judge and courtroom assignment
	4. Brief bank
	5. Statute retrieval
	6. Witness control
	7. Document and report generation
	8. Docketing
Hardware:	Single-user micro
	Multiuser micro
Operating System:	UNIX
Version:	System III & System V
Comments:	Case and Defendant Tracking is written in Informix.

Vendor/Agency:	Redwood City Police Department
Address:	1020 Middlefield Road Redwood City, California 94062
Phone:	(415) 365-7100
Contact Person:	Jeanne Chisholm
Product:	COPS/APPLE III SYSTEM
Discipline:	Law Enforcement
Function:	Records management system
Features:	1. Activity reporting 2. Case control 3. Known offender 4. Police personnel 5. Research/statistics 6. Stolen property 7. Traffic citation and accident analysis 8. UCR
Hardware:	Single-user micro
Operating System:	(SOS) Sophisticated Operating System
Version:	3.0 and below
Comments:	COPS/APPLE III is a public domain system developed for the Apple III.

Vendor/Agency:	Rialto Police Department
Address:	128 North Willow Rialto, California 92376
Phone:	(714) 820-2644
Contact Person:	Sgt. Ken Becknell
Product:	Crime Analysis Unit System
Discipline:	Law Enforcement
Function:	Records management systems
Features:	1. Name search 2. Case tracking 3. MO, location, date searching 4. Geo-based (user-defined) 5. Crime analysis by pattern/location 6. Vehicles 7. Stolen property 8. Business and residential case tracking
Hardware:	Single-user micro
Operating System:	MS-DOS
Version:	3.1 or higher
Comments:	Criminal Analysis Unit System is in the public domain. Language: dBase III Plus.

Vendor/Agency:	Sauk County Sheriff's Office
Address:	510 Broadway, Courthouse Baraboo, Wisconsin 53913
Phone:	(608) 356-4895
Contact Person:	Cpt. Joseph Prantner
Product:	Records Management Systems
Discipline:	Law Enforcement
Function:	Records management systems
Features:	1. CAD 2. Criminal arrests 3. Warrants 4. Warnings — defective equipment 5. Accidents 6. Jail records — booking 7. Crime analysis — case-by-case 8. Personnel 9. Training 10. Citation tracking 11. Case management
Hardware:	Single-user Local Area Network
Operating System:	MS-DOS, 3Com, Novell
Version:	3.1 or higher

Comments: Other features of Records Management Systems include: evidence locker, stolen property, hazardous material development and fleet management. These modules either can be integrated or stand-alone microcomputer systems. The system was developed in the public domain, using a 3Com network. Language: RBase System 5.

Vendor/Agency:	Sauk County Sheriff's Office
Address:	510 Broadway - Courthouse Baraboo, Wisconsin 53913
Phone:	(608) 356-4895
Contact Person:	Mr. Randy Stammen
Product:	Sauk County Sheriff's Information System
Discipline:	Law Enforcement
Function:	Law enforcement records management
Features:	1. Arrests 2. Report generation 3. Stolen property 4. Warrant control 5. Evidence control 6. Traffic accident reporting 7. Vehicle maintenance
Hardware:	Single-user micro Local Area Network
Operating System:	MS-DOS
Version:	
Comments:	Sauk County Sheriff's Information System is written is Rbase 5000.

Vendor/Agency:	SEARCH Group, Inc.
Address:	925 Secret River Drive, Suite H Sacramento, California 95831
Phone:	(916) 392-2550
Contact Person:	Ms. Julie Gutierrez
Product:	D.A.'s ASSISTANT
Discipline:	Prosecution
Function:	Prosecutor records management system
Features:	1. Case management 2. Password security 3. Defendant, charges and sentencing information 4. Historical case information 5. Nine standard reports 6. All related persons (victims/witness) 7. Prosecutor schedule — court events 8. Query by name or case number 9. Ad hoc report generator
Hardware:	Single-user micro Local Area Network
Operating System:	MS-DOS, Novell, 3Com
Version:	3.0 or higher
Comments:	D.A.'s ASSISTANT is a public domain system written in DataFlex.

Vendor/Agency:	SEARCH Group, Inc.
Address:	925 Secret River Drive, Suite H Sacramento, California 95831
Phone:	(916) 392-2550
Contact Person:	Ms. Julie Gutierrez
Product:	LOCKUP
Discipline:	Corrections
Function:	Jail records management system
Features:	1. Booking 2. Release 3. Search inquiry 4. Modify 5. Medical and classification 6. Outdate 7. Billing 8. Log 9. Report 10. Utilities
Hardware:	Single-user micro Local Area Network
Operating System:	MS-DOS, Novell, 3Com
Version:	3.1 or higher
Comments:	LOCKUP is in the public domain. Language: dBase III Plus.

Vendor/Agency:	SEARCH Group, Inc.
Address:	925 Secret River Drive, Suite H Sacramento, California 95831
Phone:	(916) 392-2550
Contact Person:	Robert Marx
Product:	MICRONYM Plus
Discipline:	Other
Function:	Automates State Criminal History Repository Records
Features:	1. Password Security 2. Data Checking 3. Variable Length Records 4. Transaction Logging 5. Compatibility with Federal Programs 6. Generalized Report Writer 7. Adaptable to Use as a Prototype
Hardware:	Single-user micro Local Area Network
Operating System:	DOS, Novell, 3Com, UNIX
Version:	3.1 or higher
Comments:	MICRONYM Plus is in the public domain. MICRONYM Plus was written in Oracle and was designed for State Identification Bureaus. While there is a version of Oracle that runs on PCs, most State Identification Bureaus would implement MICRONYM Plus on minicomputers or mainframes.

Vendor/Agency:	Sioux County Attorney's Office
Address:	32 Sixth Street, N.W. Sioux Center, Iowa 51250
Phone:	(712) 722-2424
Contact Person:	Mr. Mark Schouten
Product:	Prosecution Management Support System
Discipline:	Prosecution
Function:	Case management
Features:	1. Case tracking 2. Docketing 3. Calendaring/scheduling 4. Report generation 5. Witness control
Hardware:	Single-user micro
Operating System:	MS-DOS
Version:	

Comments: Prosecution Management Support System is written in dBase III and is in the public domain.

Vendor/Agency:	Software Support Systems Inc.
Address:	P.O. Box 486 Alexandria, Louisiana 71309
Phone:	(318) 445-8558
Contact Person:	Mr. Robert G. Levy
Product:	District Attorney Record Keeping System
Discipline:	Prosecution
Function:	Case management
Features:	1. Case tracking 2. Report generation 3. Legal documents 4. Worthless check collection 5. Traffic ticket tracking
Hardware:	Single-user micro Multiuser micro
Operating System:	MS-DOS, XENIX, UNIX
Version:	3.3, 286 & 386, System V
Comments:	District Attorney Record Keeping System is written in C.

Vendor/Agency:	Software Unlimited Corporation
Address:	Post Office Box 5 Tupelo, Mississippi 38801
Phone:	(601) 844-0404
Contact Person:	Ms. June Hamilton-Geddie
Product:	Case Management System
Discipline:	Prosecution
Function:	Case management system
Features:	1. Case load information 2. Security passwords 3. Case records data 4. Defendant demographic data 5. Historical case information 6. Statistical and analysis reports 7. Aging report for open case and trial monitoring 8. Disposition on historical cases or open cases by law enforcement agency 9. Prosecutor's activity recording for annual management reports 10. Listing of open cases by filing date
Hardware:	Single-user micro Multiuser micro Local Area Network
Operating System:	MS-DOS, XENIX, UNIX
Version:	Installation-dependent
Comments:	Other features of Case Management System include: tracking continuances and printing all open cases by category; statutes analysis and cooperative agency information. Vendor can integrate products or establish stand-alone systems. Language: DBL.

Vendor/Agency:	Software Unlimited Corporation
Address:	Post Office Box 5 Tupelo, Mississippi 38801
Phone:	(601) 844-0404
Contact Person:	Ms. June Hamilton-Geddie
Product:	Child Support Tracking System
Discipline:	Prosecution
Function:	Court child support tracking system
Features:	1. On-line case information, payment history and status 2. Daily account and balancing reports 3. Lists audit trail of all monies collected 4. Integrates "payment due" and "application to appear" processing 5. Lists cases with no payments within a specified period 6. Prints monthly data for compilation of state and federal forms 7. Prints payment history 8. Automatic payment due and payment due tracking 9. Active/inactive case status allows the "holding" of cases 10. Menu-driven screen 11. On-line entry, updating and retrieval of data
Hardware:	Single-user micro Multiuser micro Local Area Network
Operating System:	MS-DOS, XENIX, UNIX
Version:	Installation-dependent
Comments:	Vendor can integrate products or establish stand-alone systems. Language: DBL.

Vendor/Agency:	Software Unlimited Corporation
Address:	Post Office Box 5 Tupelo, Mississippi 38801
Phone:	(601) 844-0404
Contact Person:	Ms. June Hamilton-Geddie
Product:	Event Tracking/Calendaring
Discipline:	Prosecution
Function:	Event tracking for courts and prosecution
Features:	1. Tracks upcoming events 2. Produces calendars by: prosecutor, location, date, time, judge, defense attorney, event type and administration 3. Generates individualized calendar notices 4. User-defined tallies and tables including: events, action/result, location and case type 5. Menu-driven
Hardware:	Single-user micro Multiuser micro Local Area Network
Operating System:	MS-DOS, XENIX, UNIX
Version:	Installation-dependent
Comments:	Vendor can integrate products or establish stand-alone systems. Language: DBL.

Vendor/Agency:	Software Unlimited Corporation
Address:	Post Office Box 5 Tupelo, Mississippi 38801
Phone:	(601) 844-0404
Contact Person:	Ms. June Hamilton-Geddie
Product:	Hot/Worthless Checks
Discipline:	Prosecution
Function:	Tracks hot and worthless checks
Features:	1. Tracks checks by check number or complaint number 2. Full information on check writer, check holder and bank 3. Hot checks may be grouped by complaint, individual cases or user-defined 4. Complete transaction entry for restitution journal information 5. Tracks bad checks 6. Bad check ledger 7. Closed cases history 8. Forms and report generation
Hardware:	Single-user micro Multiuser micro Local Area Network
Operating System:	MS-DOS, XENIX, UNIX
Version:	Installation-dependent
Comments:	Vendor can integrate products or establish stand-alone systems. Language: DBL.

Vendor/Agency:	Software Unlimited Corporation
Address:	Post Office Box 5 Tupelo, Mississippi 38801
Phone:	(601) 844-0404
Contact Person:	Ms. June Hamilton-Geddie
Product:	Victim/Witness
Discipline:	Prosecution
Function:	Victim/witness records management system
Features:	1. Tracks victims and witnesses for all cases 2. Prints subpoenas and witness letters 3. Menu-driven/easy to use 4. Tracks by witness type, including expert or officer 5. Forms and report generation
Hardware:	Single-user micro Multiuser micro Local Area Network
Operating System:	MS-DOS, XENIX, UNIX
Version:	Installation-dependent
Comments:	Vendor can integrate products or establish stand-alone systems. Language DBL.

Vendor/Agency:	Spillman Data Systems, Inc.
Address:	15 South Main Street Logan, Utah 84321
Phone:	(801) 753-1610
Contact Person:	Mr. Taft Barrington
Product:	Law Enforcement Software
Discipline:	Law Enforcement
Function:	Records management
Features:	1. CAD — four levels 2. Criminal information — wants/warrants, etc. 3. Traffic information 4. Jail management 5. Civil process 6. Prosecution management 7. Fleet vehicle maintenance and management 8. Personnel/training 9. Business and fire information 10. Commodity inventory 11. Commissary inventory
Hardware:	Single-user micro Multiuser micro
Operating System:	XENIX
Version:	Installation-dependent
Comments:	Additional modules for Law Enforcement Software are available and most can function as XENIX stand-alone systems. Vendor can custom install systems in either a UNIX or XENIX environment. Language: Unify and C.

Vendor/Agency:	Strafford County Attorney's Office
Address:	P.O. Box 799, County Farm Road Dover, New Hampshire 03820
Phone:	(603) 749-2808
Contact Person:	Mr. Lincoln Soldati
Product:	County Attorney's Management Information System
Discipline:	Prosecution
Function:	Case management
Features:	1. Case tracking 2. Crime trend analysis 3. Calendaring/scheduling 4. Report generation 5. Offender-based transaction statistics 6. Witness control
Hardware:	Single-user micro Multiuser micro
Operating System:	XENIX
Version:	
Comments:	County Attorney's Management Information System is written in Informix and is in the public domain.

Vendor/Agency:	SYNTAX
Address:	1501 West Valley Highway North, Suite 104 Auburn, Washington 98001
Phone:	(206) 833-2525
Contact Person:	Mr. Dave Stevenson
Product:	Computer Aided Dispatch
Discipline:	Law Enforcement
Function:	Automated dispatch system
Features:	1. Geo-based 2. Master name index 3. 911 interface 4. Mobile data terminal interface 5. Supports fire, EMS and police
Hardware:	Single-user micro Local Area Network
Operating System:	MS-DOS, Novell, 3Com or IBM PC Network
Version:	2.1 or higher

Comments: Computer Aided Dispatch can integrate with SYNTAX's Jail Administration, Judicial Information Management, Licensed Animal Management or Law Enforcement Management systems. Language: Pascal and C.

Vendor/Agency:	SYNTAX
Address:	1501 West Valley Highway North, Suite 104 Auburn, Washington 98001
Phone:	(206) 833-2525
Contact Person:	Mr. Dave Stevenson
Product:	Jail Administration System
Discipline:	Corrections
Function:	Automates administrative and management records system
Features:	1. Booking and release process 2. Court tracking 3. Inmate activity tracking 4. Criminal history records 5. Inmate criminal history 6. Commissary accounting 7. Multijurisdiction billing
Hardware:	Single-user micro Local Area Network
Operating System:	MS-DOS, Novell, 3Com or IBM PC network
Version:	2.1 or higher
Comments:	Jail Administration System can integrate with SYNTAX's Law Enforcement Management Systems. Language: Pascal and C

Vendor/Agency:	SYNTAX
Address:	1501 West Valley Highway North, Suite 104 Auburn, Washington 98001
Phone:	(206) 833-2525
Contact Person:	Mr. Dave Stevenson
Product:	Judicial Information Management System
Discipline:	Courts
Function:	Municipal court automation system
Features:	1. Citation filing 2. Citation management 3. Witness list management 4. Docket management 5. Case activity management 6. Failure to appear processing 7. Time payment management 8. Warrant processing
Hardware:	Single-user micro Local Area Network
Operating System:	MS-DOS, Novell, 3Com or IBM PC Network
Version:	2.1 or higher
Comments:	Judicial Information System can integrate with SYNTAX's Law Enforcement Management Systems.

Vendor/Agency:	SYNTAX
Address:	1501 West Valley Highway North, Suite 104 Auburn, Washington 98001
Phone:	(206) 833-2525
Contact Person:	Mr. Dave Stevenson
Product:	LEMS (Law Enforcement Management Systems)
Discipline:	Law Enforcement
Function:	Law enforcement management systems
Features:	1. Records management 2. Crime analysis and management reporting 3. Jail administration 4. General registration, such as house checks, etc. 5. Tickets and citations — tracking and management system 6. Evidence property management 7. Pawn property 8. CAD — single- or multiagency 9. Municipal court management 10. Vehicle maintenance tracking and cross-tracking 11. Personnel administration
Hardware:	Single-user micro Local Area Network
Operating System:	MS-DOS, Novell, 3Com, or IBM PC Network
Version:	2.1 or higher
Comments:	The jail administration, municipal court management and computer-aided dispatch modules are optional. The CAD module can be stand-alone.

Vendor/Agency:	SYNTAX
Address:	1501 West Valley Highway North, Suite 104 Auburn, Washington 98032
Phone:	(206) 833-2525
Contact Person:	Mr. Dave Stevenson
Product:	Licensed Animal Management System
Discipline:	Other
Function:	Automates animal licensing records
Features:	1. License registration 2. Fee tracking 3. Vaccination records 4. Animals handled 5. Intake/disposition 6. Membership management 7. Complaints and citation
Hardware:	Single-user micro Local Area Network
Operating System:	MS-DOS, Novell, 3Com or IBM PC Network
Version:	2.1 or higher
Comments:	Licensed Animal Management System can integrate with SYNTAX's Law Enforcement Management Systems.

Vendor/Agency:	Systems Innovation, Inc.
Address:	Post Office Box 430 Hallstead, Pennsylvania 18822
Phone:	(717) 879-4221
Contact Person:	Mr. William Tomlin
Product:	Xcaliber
Discipline:	Law Enforcement
Function:	Multiuser law enforcement records management system
Features:	1. Daily log module 2. Incident tracking 3. Accident 4. Ticket 5. Warrants 6. Incident and arrest 7. Juvenile — password-protected 8. UCR generator 9. Budget module, time and employee tracking 10. Employee leave 11. Fleet maintenance history
Hardware:	Single-user micro Multiuser micro Local Area Network
Operating System:	MS-DOS, CPM, UNIX, XENIX, Novell, 3Com, Alloy NTNX, PCNET
Version:	2.1 or higher, 5, 3 and higher
Comments:	Xcaliber supports: fees received, registration, property evidence, budget, police history, in-house inventory, alcohol enforcement, alarm billing and emergency management. The system and modules can be customized, such as including an incident-based reporting capability. Language: DataFlex, compiled.

Vendor/Agency:	Tenth Circuit Solicitor's Office
Address:	P.O. Box 4046
	Anderson, South Carolina 29622
Phone:	(803) 260-4046
Contact Person:	Mr. Charles W. Huggins II
Product:	Solicitor's Management System
Discipline:	Prosecution
Function:	Case management
Features:	1. Case tracking and analysis
	2. Case Disposition Reports
	3. Docketing
	4. Judge assignment
	5. Report generation
Hardware:	Single-user micro
	Multiuser micro
Operating System:	UNIX, XENIX
Version:	System III
Comments:	Solicitor's Management System is written in C.

Vendor/Agency:	Tucson Police Department
Address:	P. O. Box 1071 Tucson, Arizona 85702
Phone:	(602) 791-4523
Contact Person:	Donald S. Ijams, Senior Management Analyst
Product:	Evidence Tracking System
Discipline:	Law Enforcement
Function:	Recovered Property and Evidence Management System
Features:	1. Data Entry 2. Ad hoc Query Function 3. Report Generator 4. Chain of Custody History 5. Statistical Module 6. Custody Status Update Function 7. On-line Data Entry 8. System Purging - Archiving
Hardware:	Single-user micro
Operating System:	DOS
Version:	3.0 or higher
Comments:	Evidence Tracking System was developed using INFORMIX.

Vendor/Agency:	U.S. Department of Commerce NOAA/OAD/HAZM
Address:	7600 Sand Point Way Northeast Seattle, Washington 98115
Phone:	(206) 526-6317
Contact Person:	Mr. John Robinson
Product:	Computer Aided Management of Emergency Operations
Discipline:	Other
Function:	Chemical and hazardous material emergency response system
Features:	1. Contingency planning 2. 2700 chemical name database 3. Synonym chemical name search 4. ALOHA (Area Location Of Hazardous Atmospheres) 5. SAM (Station for Atmospheric Monitoring)
Hardware:	Single-user micro
Operating System:	The Macintosh Operating System
Version:	
Comments:	This system is in the public domain. Language: Fortran, Filevision and Hypercard.

Vendor/Agency:	VIA/SYS
Address:	1662 Bonanza Drive, Suite 3A/Post Office Box 4168 Park City, Utah 84060
Phone:	(801) 649-0700
Contact Person:	Mark Stiegemeier
Product:	Crime Reporting and Information System (CRIS)
Discipline:	Law Enforcement
Function:	Fully integrated law enforcement information system
Features:	1. CAD 2. Communication gateway 3. Officer report generator 4. 911 interface 5. Records statistics 6. Manpower analysis 7. IBR and UCR
Hardware:	Single-user micro Local Area Network
Operating System:	MS-DOS, Novell
Version:	2.1 or higher
Comments:	Language: Advanced Revelation.

Vendor/Agency:	Visatex
Address:	1745 Dell Avenue Campbell, California 95008
Phone:	(408) 866-6562
Contact Person:	Mr. Don Sumner
Product:	Computer Sketching System - COMPUSKETCH™
Discipline:	Law Enforcement
Function:	Automated witness description and sketching system
Features:	1. Suspect sketching 2. Suspect identification 3. User-defined report generation using Macpaint
Hardware:	Single-user micro
Operating System:	The Macintosh Operating System
Version:	
Comments:	This system automates the composite sketch process within a single-user Macintosh environment.

Vendor/Agency:	Wayne County Friend of the Court
Address:	1100 Cadillac Tower 65 Cadillac Square Detroit, Michigan 48226
Phone:	(313) 224-5405
Contact Person:	Al Thomas, Business Manager
Product:	Bar Code File Tracking System
Discipline:	General Administration
Function:	Automated File Tracking
Features:	1. Generates bar code labels 2. File identification 3. Employee identification 4. Hand-held scanner input 5. Automated file location
Hardware:	Single-user micro
Operating System:	DOS
Version:	3.1 or higher
Comments:	Bar Code File Tracking System was written in DBASE III Plus.

Vendor/Agency:	West Virginia Office of the Attorney General
Address:	State Capitol Charleston, West Virginia 25305
Phone:	(304) 348-2021
Contact Person:	Mr. Bill Ullrich
Product:	Attorney General's Reflex System
Discipline:	Prosecution
Function:	Case management
Features:	1. Case tracking 2. Report generation 3. Work load analysis
Hardware:	Single-user micro
Operating System:	MS-DOS
Version:	3.2
Comments:	Attorney General's Reflex System is written in Reflex and is in the public domain.

Vendor/Agency:	Western Washington University Police
Address:	516 High Street Bellingham, Washington 98225
Phone:	(206) 676-3555
Contact Person:	Lt. Dave Doughty
Product:	Material Safety Data Sheet
Discipline:	Law Enforcement
Function:	Hazardous material records management
Features:	1. Chemical inventory 2. Contact level 3. Flash point information 4. Chemical safety information 5. Location information 6. Report generator
Hardware:	Single-user micro
Operating System:	DOS
Version:	3.1 or higher
Comments:	The Material Safety Data Sheet is in the public domain and was written in FOX Base.

Vendor/Agency:	Yankton County State's Attorney
Address:	322 Walnut, P.O. Box 58 Yankton, South Dakota 57078
Phone:	(605) 665-4301
Contact Person:	Mr. Craig Kennedy
Product:	Case Management System
Discipline:	Prosecution
Function:	Case management
Features:	1. Case tracking 2. Report generation 3. Calendaring/scheduling 4. Defendant control
Hardware:	Single-user micro
Operating System:	Appleworks PRODOS
Version:	
Comments:	Case Management System is operating on an Apple II E and an Apple III.

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APPENDICES

Appendix A: Descriptions of Fields in *Software Catalogue*
Appendix B: Form for Submittals to *Software Catalogue*

APPENDIX A

Description of Fields in *Software Catalogue*

Field	Description
Vendor/Agency:	Name of the firm or agency which developed or markets the program.
Address:	Mailing address of the firm or agency which devloped or markets the program.
Phone:	Vendor/Agency telephone number.
Contact Person:	The name of the person who is responsible for marketing the product.
Product:	The product name and its revision or version number.
Discipline:	One of the following disciplines will be assigned by SEARCH, based on the information provided: Corrections, Courts, Fire, General Administration, Law Enforcement, Prosecution or Other.
Function:	The primary purpose of the program. (For example, Law Enforcement Records Management.)
Features:	The major components or functional modules of the stand-alone program. This should not include the names of stand-alone modules in an integrated system.
Hardware:	One or more of the following: Single-user micro — a single-user PC or microcomputer Multiuser micro — a microcomputer serving multiple terminals Local Area Network — several interconnected microcomputers
Operating System Version:	The name and version of the supported operating systems.
Comments:	Any additional comments which will help to classify or describe the software application program.

APPENDIX B

Form for Submittals to *Software Catalogue*

Vendor/Agency: _____

Address: _____

Phone: _____

Contact Person: _____

Product: _____

Discipline: _____

Function: _____

Features: _____

Hardware: (circle all that apply)
Single-user microcomputer
Multiuser microcomputer
Local Area Network

Operating System: _____

Version: _____

Price: _____

Comments: _____

Please complete this form and mail to SEARCH Group, Inc.:

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