



PC SPIRIT USER'S GUIDE

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FCC WARNING

This equipment generates and uses radio frequency energy and, if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio and television reception. It has been type tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient the receiving antenna.
- Relocate the computer with respect to the receiver.
- Move the computer away from the receiver.
- Plug the computer into a different outlet so that computer and receiver are on different branch circuits.

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commission helpful.

"How to Identify and Resolve Radio TV Interference Problems."

This booklet is available from:

U.S. Government Printing Office
Washington., D.C. 20402
Stock No. 004-000-00345-4

NOTE

This manual refers, on several pages, to a Hard Disk Initialization Diskette. The software for this diskette has been transferred to your MS-DOS 2.0 Systems Diskette, so that a separate diskette is not required and is not shipped with this binder.

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1: GENERAL INFORMATION

INTRODUCTION

The Eagle PC Spirit XL is a compact, portable business or personal computer for the user who appreciates convenience. Designed for efficient personal or business applications, it offers access to a variety of applications software. It also provides the user with an onboard hard disk storage unit -- 10 megabytes of storage for quick and easy use of the computer's software.

The ability to move quickly with a powerful computing resource at one's side has become an important aspect in today's world. The Eagle PC Spirit XL allows the computer user to travel and take his "office" system with him. With the communications ports which come standard, the traveling user can attach by phone line to remote databases and mainframes. He can transmit information from the field back to the office, receive up-to-the-minute data (stock prices, etc.), or perform remote computing.

In office situations requiring multiple work stations, the Eagle PC Spirit XL may be linked with others in a local area network to allow the transfer of information between individual users.

To meet the future computing needs of today's business, Eagle Computer provides a family of computer systems. This family approach ensures compatibility, expandability, and the capability to solve business problems. The inherent economics in this approach yields profitability through increased office efficiency. Your portable Eagle PC Spirit XL will fit right in.

1: GENERAL INFORMATION

DOCUMENTATION

Your Eagle PC Spirit XL computer is shipped with four binders of reference material.

- * **EAGLE PC SPIRIT XL USER'S GUIDE**
- * **MS-DOS OPERATING SYSTEM MANUAL**
- * **CP/M-86 OPERATING SYSTEM MANUAL**
- * **GW BASIC PROGRAMMER'S MANUAL**

This guide, the Eagle PC SPIRIT XL USER'S GUIDE, contains general instructions for operating and maintaining your computer system. A hard disk initialization diskette is also provided.

CAUTION

This diskette is used only in special circumstances. Thoroughly read Section 8: TROUBLESHOOTING GUIDE before using this diskette.

The MS-DOS OPERATING SYSTEM MANUAL and CP/M-86 OPERATING SYSTEM MANUAL contain detailed information on using the operating systems.

The GW BASIC PROGRAMMER'S MANUAL provides a complete description of the Basic language commands which take advantage of your Eagle system's color graphics and computational abilities.

1: GENERAL INFORMATION

All of these individual user's guides can be purchased directly from Eagle Computer, Inc. Please refer to Section 9 for more information about optional Eagle software packages.

NOTE

Before using your new Eagle computer, please read the Customer Support Guide included in the back of this User's Guide binder. Fill out the Warranty Agreement and send it to Eagle Computer, Inc. The warranty card 1) acknowledges that you have read and understood the terms and conditions of the software licensing agreements and 2) registers your computer with Eagle's comprehensive warranty program.

1: GENERAL INFORMATION

USER'S GUIDE GENERAL INDEX

The Eagle PC SPIRIT XL USER'S GUIDE is divided into the following sections:

SECTION 1: GENERAL INFORMATION - describes the contents of the User's Guide.

SECTION 2: INSTALLATION - outlines unpacking and inspection guidelines. Also describes the system installation and setup procedures.

SECTION 3: USING THE EAGLE - details the procedures for starting up the computer, keyboard usage, and preventive maintenance procedures.

SECTION 4: MS-DOS 2.0 UTILITY PROCEDURES - describes steps for backing up floppy and hard disks and gives practical examples of using the MS-DOS operating system features.

SECTION 5: CP/M-86 UTILITY PROCEDURES - describes steps for formatting diskettes, copying software, and assigning communications ports.

SECTION 6: ADVANCED USE - discusses the use of MS-DOS 2.0 Operating System's hierarchical directory structure, and describes the partitioning of the hard disk for multiple operating systems.

1: GENERAL INFORMATION

SECTION 7: WORD ABOUT PRINTERS - provides general information on the types of printers you can use with your Eagle computer, and printer setup and operating instructions.

SECTION 8: TROUBLESHOOTING GUIDE - provides solutions to common problems encountered with personal computers.

SECTION 9: SOFTWARE/HARDWARE OPTIONS - describes the software and hardware products available from Eagle Computer.

SECTION 10: HARDWARE INSTALLATION - details the requirements for connecting external devices, and provides procedures for opening the computer to install hardware.

APPENDIX A: Technical Specifications

APPENDIX B: Port Pinouts

APPENDIX C: Pathnames and Tree Structures

APPENDIX D: Eagle Character Set

APPENDIX E: Glossary

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2: INSTALLATION

INTRODUCTION

The Eagle PC Spirit XL computer is a compact, well designed system which can be easily unpacked and installed for immediate use.

The following topics are covered in this section:

- * Initial Unpacking and Inspection
- * Installation and Setup
- * System Description
- * Transporting your system

Before removing the computer from its shipping box, save yourself some time and trouble by taking a few moments to read about site requirements and unpacking precautions. Also refer to the **Customer Support Guide** in the back of this manual.

NOTE

The symbol [], two brackets encasing a letter or word, is used to denote a key throughout this User's Guide. For example, [Retrn] refers to the key with the printed word "Retrn". A character, word, or phrase for you to type on the keyboard will be enclosed in quote marks. DO NOT type the quote marks; they are there only to separate the characters from the rest of the text.

2: INSTALLATION

INITIAL UNPACKING AND INSPECTION

SITE REQUIREMENTS

The compact, portable design of your Eagle computer allows you considerable flexibility in choosing a suitable location. Most office and residential environments are fine; however, extremes of temperature and humidity should be avoided (Refer to Appendix A). Electrical requirements are listed on the next page.

2: INSTALLATION

ELECTRICAL REQUIREMENTS

1. A properly grounded three hole outlet.
2. Correct AC line voltage: 110 VAC, 60 Hz,
or
220 VAC, 60 Hz.
3. Motor driven appliances such as refrigerators, copiers, etc., should be plugged into a separate circuit.

WARNING

Your PC Spirit computer is designed to operate on either of the above voltages, but not both because of differences in fuses and power supplies. It is important for safety to use the correct voltage for your machine. Refer to the product label on the system's rear panel for the correct voltage.

2: INSTALLATION

UNPACKING PRECAUTIONS

- * Keep the shipping container in an upright position until the unit is unpacked.
- * Keep the shipping container and packing material. Should you need to repack the Eagle computer for moving, the original container provides the best protection for the system.
- * If the system is returned for repair, the computer **must** be in the original shipping container; otherwise Eagle will not accept it for servicing.
- * When unpacking the system, inspect it for any evidence of shipping damage. If you find any evidence of damage, stop unpacking, replace the system in the container, and notify your dealer immediately.

WARNING

The Eagle PC Spirit XL contains a winchester hard disk drive. Handle the unit with care. Jarring or bumping the unit could damage the disk drive.

2: INSTALLATION

INITIAL UNPACKING PROCEDURE

- STEP 1** Place the shipping container upright on a flat work surface. Clear another large flat work surface for the computer system once it is removed from the shipping container.
- STEP 2** Cut the strapping and open the top of the container.
- STEP 3** Remove the foam shipping blocks and packing material.
- STEP 4** Place a hand under each side of the system and carefully lift it out. Place it on the cleared work surface.
- STEP 5** Check to see that the following items have been shipped with your Eagle computer:
1. Computer with keyboard.
 2. Eagle PC Spirit XL
User's Guide.
 3. MS-DOS Manual.
 4. CP/M-86 Manual.
 5. GW BASIC Manual.
- STEP 6** If the system is found to be damaged, or if one of the items listed is missing, contact your dealer.

2: INSTALLATION

INSTALLATION AND SET-UP PROCEDURE

- STEP 1** Unlatch the keyboard and arrange the Eagle computer on your work station.
- STEP 2** Remove the cardboard insert from the floppy diskette drive (save this insert). You will need to reinsert it in the drive when you transport your system.

WARNING

Be sure to remove the cardboard insert before turning on the power. If left in place, the insert could damage a floppy disk drive motor.

- STEP 3** Make sure the power ON/OFF switch, located on the front panel of the main unit, is in the OFF position. (The red circle on the switch should be showing.)
- STEP 4** Check that the power voltage listed on the product label on the system's rear panel matches the voltage of your power outlet. (Refer to ELECTRICAL REQUIREMENTS earlier in this section.)

2: INSTALLATION

INSTALLATION AND SET-UP PROCEDURE (CONT'D)

STEP 5 Plug the power cord into a grounded, three-hole AC outlet.

You are now ready to use your computer. Refer to Section 3: USING YOUR EAGLE for instructions on how to start up your system after reading the **System Description** section beginning on the next page.

2: INSTALLATION

SYSTEM DESCRIPTION

This section will introduce you to the basic components of your Eagle PC Spirit XL computer.

NOTE

If you are unfamiliar with a term used in this User's Guide, please refer to the glossary in Appendix E.

MAIN UNIT - GENERAL

The main unit contains the main power ON/OFF control, video monitor display, and disk drives. The keyboard latches into place over and against the front panel when not in use. Inside the main unit is the Intel 8088 microprocessor, 128 KB (or more, optionally) of RAM, and the circuits to control interfacing of all devices.

Located on the rear panel are the two serial communications ports, the parallel printer port, power cord outlet, fuse and optional keyboard cable connection.

The side slot access panel contains the four interface board slots.

Refer to the illustrations on the following pages for the locations of these components.

2: INSTALLATION

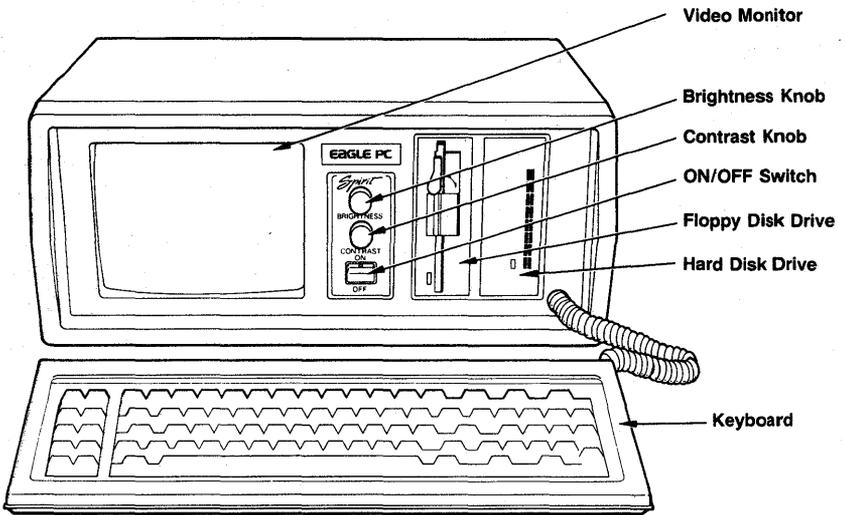


FIGURE 1: EAGLE PC SPIRIT XL FRONT VIEW

2: INSTALLATION

VIDEO MONITOR

The medium resolution monitor measures 9" diagonally with a text display of 80 columns by 25 rows. It will also display 640 X 200 pixel monochrome graphics, or 320 pels X 200 pixel color (gray-scale) graphics. Other text and graphics modes are also supported.

The video monitor uses a P31 green phosphor screen. It displays the 16 different colors as 16 different shades of green. The medium resolution (gray-scale) color graphics adaptor board generates full color output for an external color monitor attached to the computer.

The video display, under software control, can represent text in several modes: reverse video, blink, underline or security (non-visible text.) Software controls the intensity of the text screen display and determines whether the text or graphics mode is used.

2: INSTALLATION

FRONT PANEL CONTROLS

On the front panel of the main unit are the video monitor controls and power ON/OFF switch.

The BRIGHTNESS control varies the brightness of the entire screen.

The CONTRAST control adjusts the brightness of the low-intensity text or graphics.

The ON/OFF switch supplies power to the system. When the red circle is showing, the power is off.

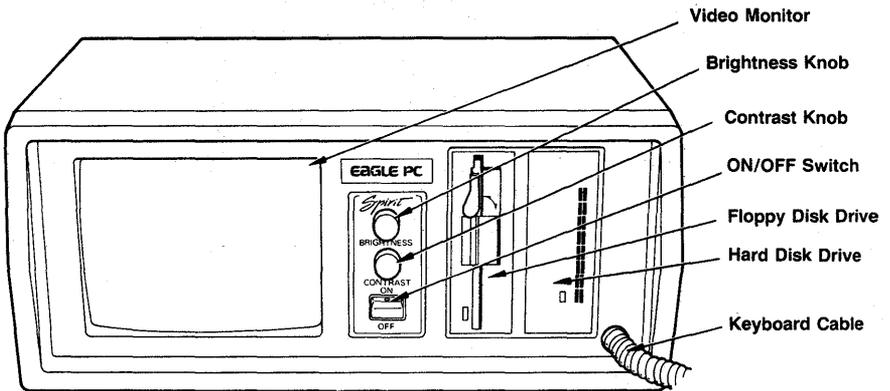


FIGURE 2: FRONT PANEL CONTROLS

2: INSTALLATION

HARD DISK DRIVE

On the right side of the front panel is the hard disk, with its cross-hatched vents and LED indicator(s). The hard disk can store up to 10 megabytes of data, or 5000 pages of text. For most purposes, you will want to start up your system from the hard disk, and store all your files on it. The hard disk is accessed through the operating system and various software programs.

The Eagle Spirit XL is shipped with three different types of hard disk drives.

CAUTION

ALWAYS backup your hard disk files onto floppy diskettes. A sudden power failure or power line surge could ruin your hard disk records, and, with them, you have lost hundreds of hours of input time as well as valuable information.

2: INSTALLATION

FLOPPY DISK DRIVE

The floppy disk drive is located between the front panel controls and the hard disk. The floppy disk drive accomodates 5-1/4 inch, 48 TPI (tracks per inch) diskettes. The disk drive lever locks the diskette into place after insertion. If the diskette is not loaded properly or the lever is not closed, your system may not be able to access the diskette, resulting in a disk read error message on your screen.

With all data, system files, and programs on the hard disk, the floppy disk drive is used to load or unload files to or from the system hard disk. A critical "house-keeping" task is a periodic backup of the files on the hard disk.

In order to backup your hard disk files you will need 5-1/4 inch, double-sided, double-density diskettes, formatted for 48 tracks per inch (48 TPI). Software application program diskettes must also conform to these specifications in order to be read by your PC Spirit computer.

2: INSTALLATION

REAR PANEL

The rear panel has two male 25-pin RS-232 serial communications ports (COM1 and COM2) and one 25-pin female parallel port (LPT1). The serial ports allow you to interface with a variety of serial devices like serial printers or modems. The parallel port is the communications connection for parallel printers. Refer to Section 7: WORD ABOUT PRINTERS for information about serial and parallel printers.

An access area is provided on the rear panel for the power cord, fuse and connection for optional keyboards. The power cord can be stored in this area during transportation. Refer to Figure 3.

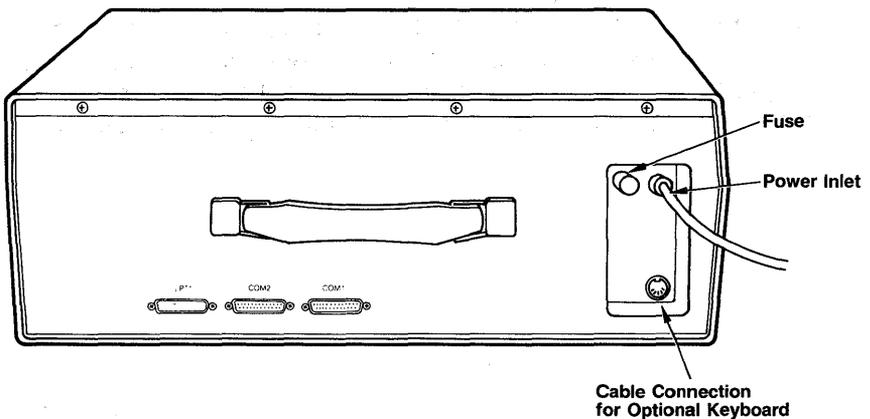


FIGURE 3: MAIN UNIT REAR PANEL

2: INSTALLATION

ACCESS AREA

The access area also has a side panel door with magnetic catch. The door can be opened by inserting your fingers into the access area through the rear opening and pushing the door open.

The side panel provides access to four interface boards. Figure 4 shows the locations of these boards.

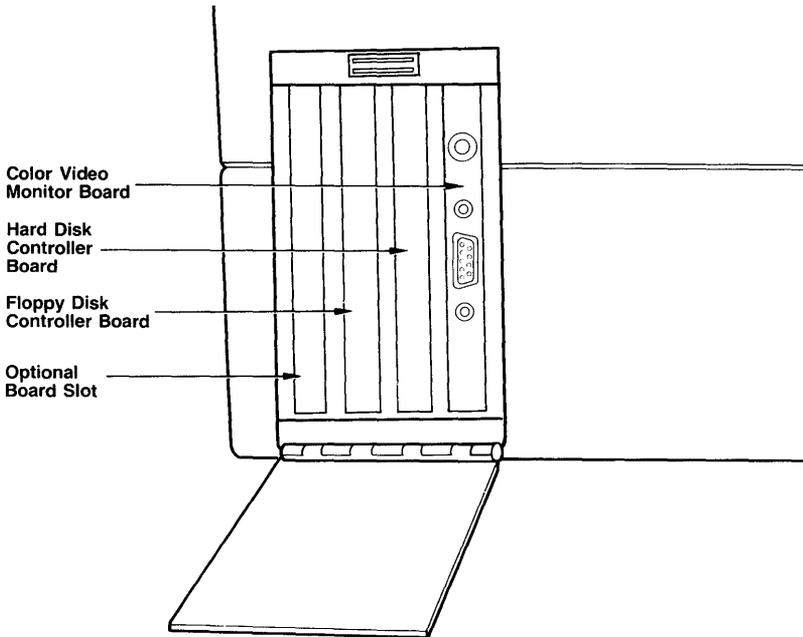


FIGURE 4: INTERFACE BOARD LOCATIONS

2: INSTALLATION

KEYBOARD - GENERAL

The keyboard is a separate unit that is attached to the main module by a lengthy cord to allow for individual placement. The keyboard contains 84 keys, including 10 function keys and a complete numeric keypad. Refer to the following pages for a brief description of the keyboard components. Refer to **Using the Keyboard** in Section 3 for more information on all the functions of the keys.

When closing up the system, insert the coiled keyboard cable through the hole in the lower right front of the main unit.

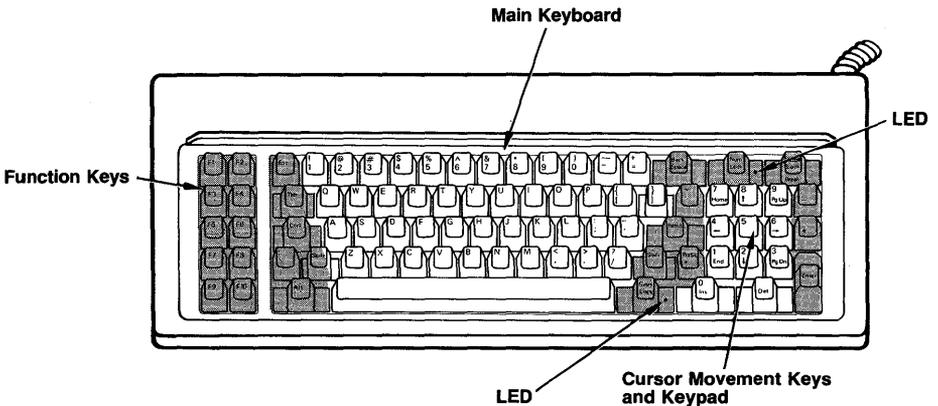


FIGURE 5: EAGLE KEYBOARD

2: INSTALLATION

MAIN KEYBOARD

The main section of the keyboard on the Eagle computer is similar to a standard typewriter. You will find three shift keys, two are identical and act exactly as found on a standard typewriter. The third shift key, [Caps Lock], shifts only the letters into uppercase. A convenient LED display will indicate whether the [Caps Lock] function is in use.

KEYPAD

The calculator keypad, like the keypad on an adding machine or calculator, is used for entering numbers and mathematical expressions. The keypad consists of 14 keys: numbers 0-9, decimal point (.), plus (+), minus (-), and asterisk (*) keys.

The keypad keys will also control cursor movement when used with certain software packages. In those instances the [Num Lock] key controls whether the keys are to be considered numeric digits, or cursor movement keys. When the [Num Lock] key is pressed (LED light on), the keypad keys are used as numeric keys.

FUNCTION KEYS

The gray keys to the left of the main keyboard, labelled F1-F10, are called **Function Keys**. They perform special functions which differ depending upon the software program used.

2: INSTALLATION

CLOSING UP THE SYSTEM

- STEP 1** Exit from the software program after saving your work, and return to the operating system prompt "C>".
- STEP 2** Remove diskette from floppy drive.
- STEP 3** Type "PD" to run the power down program.

WARNING

ALWAYS run the "PD" program before turning off your system. This step retracts the hard disk drive read/write heads into a special shipping position. You can irreparably damage the hard disk by neglecting to perform this step.

- STEP 4** Turn the power switch to the OFF position (red circle showing).
- STEP 5** Disconnect the cables to the external devices and close the slot access panel door.
- STEP 6** Unplug the system and store the power cord in the rear panel access area.

2: INSTALLATION

CLOSING UP THE SYSTEM (CONT'D)

- STEP 7** Place the cardboard insert in the floppy disk drive and close the drive lever.
- STEP 8** Raise the keyboard, rotating it along its lower edge, as you insert the keyboard cable through the front panel cable opening. Slide the keyboard latches into place. Refer to Figure 6.

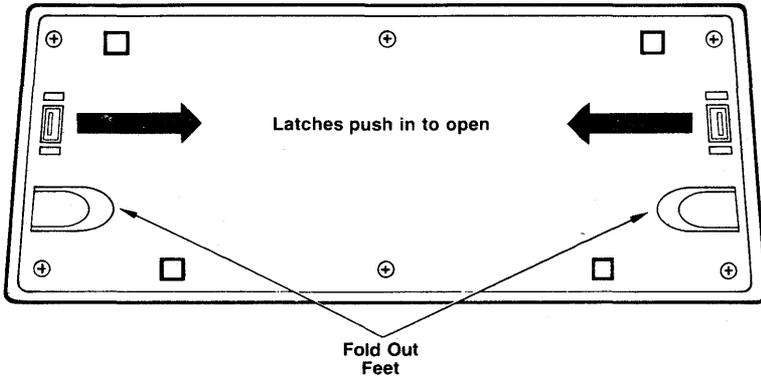


FIGURE 6: KEYBOARD BOTTOM

2: INSTALLATION

TRANSPORTING PRECAUTIONS

The Eagle Spirit XL has been designed to fit under airline seats, and it is light enough to carry comfortably. The system is capable of enduring the usual bumps and jars, but it is not indestructible. We recommend that you personally handle the system when you travel to ensure its proper care and security.

Eagle offers a sturdy, attractive carrying case to transport your system. See your Eagle dealer for price and availability.

3: USING YOUR EAGLE

INTRODUCTION

Once you have unpacked and set up your Eagle computer, you are ready to begin operation. At this point, the exact procedures you perform will depend upon what software you have. The basics of running your system will be presented in this section.

Information regarding floppy diskettes is presented first in this section. Following that will be a discussion of operating systems and instructions for booting up (loading system software) from either the hard disk or a floppy diskette. A description on using the keyboard is presented, followed by a discussion of the proper way to turn off your system and general preventive maintenance.

3: USING YOUR EAGLE

BEFORE YOU BEGIN

When using your software for the first time, you should backup your initial master set of application software onto floppy diskettes. The master copies should then be stored away -- to restore your originals if problems occur. Anytime in the future when you purchase application software you should make duplicate copies before use.

NOTE

Before you begin using your computer, buy a box of diskettes. You will need double-sided, double-density, 5-1/4 inch soft-sectored diskettes.

Before you perform these tasks, read all of this section, USING YOUR EAGLE, and Section 4: MOS-DOS 2.0 UTILITY PROCEDURES. Read Section 5: CP/M-86 UTILITY PROCEDURES if you have CP/M-86 software. After reading this material and understanding the steps to perform, go ahead and start up your system.

3: USING YOUR EAGLE

DISKETTE CARE

A floppy diskette is a circular piece of mylar plastic coated on one or both sides with a magnetic material. The diskette is enclosed in a plastic or paper jacket to protect it from fingerprints, dust, and other contaminants. Refer to Figure 7 on the next page.

The oblong cut-out in the protective jacket permits the read/write disk drive head to contact the exposed magnetic portion of the disk surface to record your information. **Never** touch this portion of the disk; oils from your fingers can contaminate the diskette surface.

The "write protect" notch on the diskette prevents unwanted or accidental erasure of information. When the notch is covered with a small adhesive tab accompanying the disks, the diskette can be read from, but no information can be written onto the diskette. You may write information on the diskette only when the notch is left uncovered.

3: USING YOUR EAGLE

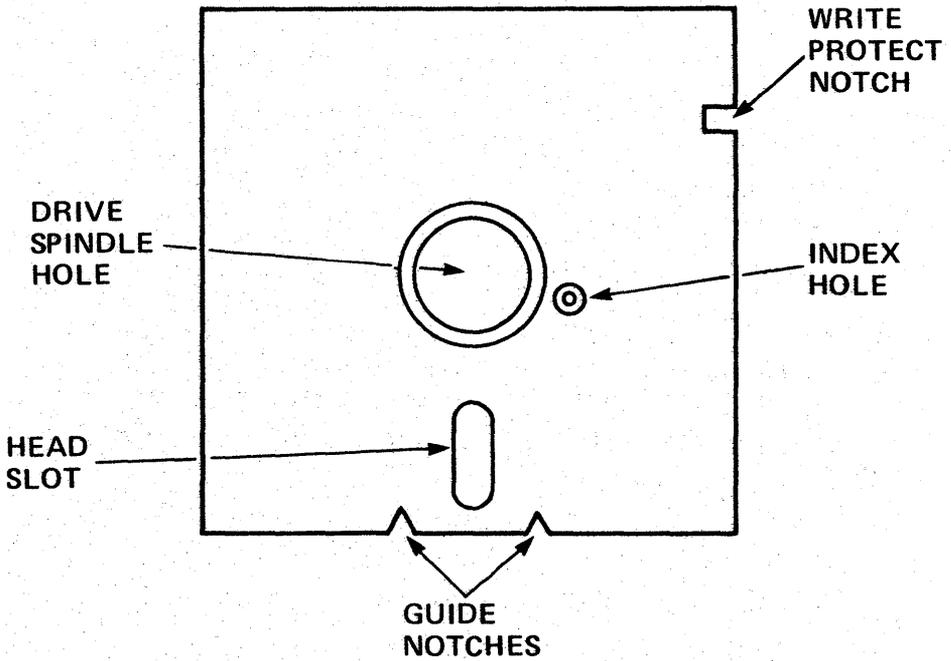


FIGURE 7: FLOPPY DISKETTE

3: USING YOUR EAGLE

HANDLING PRECAUTIONS

Floppy diskettes are fragile and can be easily damaged if improperly handled. Your diskettes will soon be storing the results of hundreds of hours of valuable time and, thus, should be treated carefully. Heed the simple precautions on the following pages to insure the continued good health of all your diskettes.

- * Do not bend or fold the diskette. The magnetic coating will crack and you will lose your stored information.
- * Do not insert or remove a diskette when the disk drive indicator light is on. Pulling the disk out with the indicator light on can damage the disk's stored information.
- * Do not use paper clips, rubber bands, or tape on the diskette.
- * Do not touch or attempt to clean the exposed surfaces of the diskette. Any scratches or oil deposits can cause loss of stored data.
- * Keep the diskette away from magnetic fields, which can destroy a diskette's data. Many common devices such as telephones and paper holder stands use magnets.

3: USING YOUR EAGLE

- * Do not eat, drink, or smoke when handling diskettes.
- * Replace the diskette if it becomes physically damaged, or if the recording surface becomes contaminated. Discard damaged disks.
- * Make duplicate copies of your diskettes on a regular basis.

NOTE

When purchasing diskettes for your system, be sure to ask for 5-1/4 inch, double-sided, double density, soft sectored disks.

3: USING YOUR EAGLE

FORMATTING A DISKETTE

Before a new diskette can store your programs and files, it has to be "formatted". Formatting magnetically divides the disk into tracks and sectors which the Eagle computer uses as reference points when storing and reading your files. For instructions on formatting disks, please refer to Section 4, MS-DOS 2.0 UTILITY PROCEDURES, or Section 5, CP/M-86 UTILITY PROCEDURES.

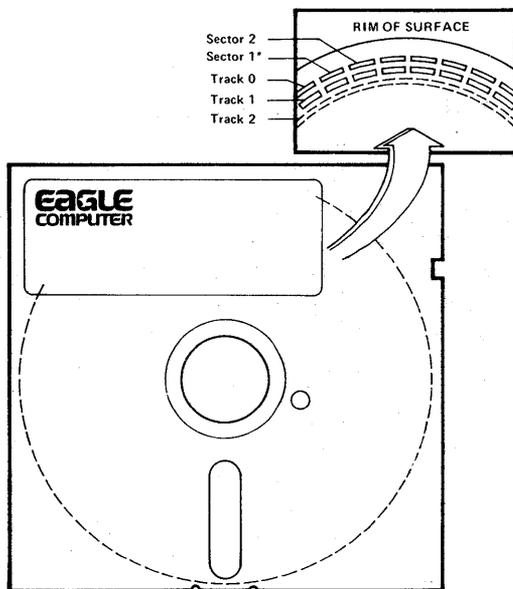


FIGURE 8: DISKETTE SKELETON VIEW

3: USING YOUR EAGLE

LABELING DISKETTES

It is important to label your diskettes carefully. The label should state what is stored on the diskette and whether it is a master, working, or backup diskette. Other notations, such as which operating system is required, can also be valuable label information.

To label your diskette, fill out one of the adhesive labels that accompany the diskette package **BEFORE** you attach it to the diskette.

CAUTION

Writing on a label attached to a diskette with a ball-point pen or pencil can gouge the recording surface, resulting in the loss of stored information. If you must write on a label which is already attached to a diskette, then use a felt-tipped pen and press lightly.

3: USING YOUR EAGLE

STORING DISKETTES

Always replace the diskette in its protective envelope after you remove it from the disk drive, even if you plan to reinsert it in a short time.

There are many ways to store your diskettes. We recommend that you store them upright in a hard plastic container or in plastic diskette pockets like the one included with this manual. Label your containers or diskette pockets for easy reference. Both storage items can be purchased from your local authorized Eagle computer dealer.

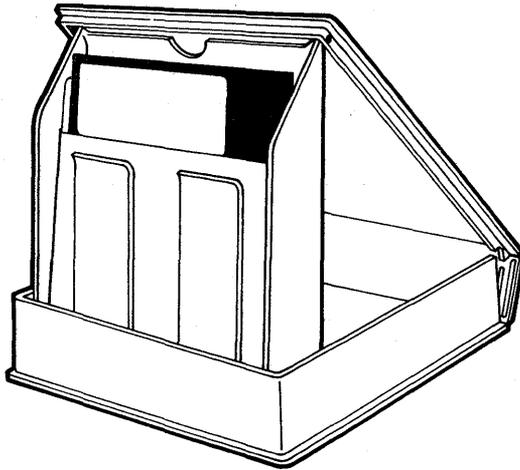


FIGURE 9: DISKETTE STORAGE CASE

3: USING YOUR EAGLE

INSERTING AND REMOVING DISKETTES

- STEP 1** Turn the floppy diskette drive lever to the vertical position.
- STEP 2** With the diskette label facing to the left and the notch on the bottom, slide the diskette into the disk drive slot. If it does not slide in easily, stop! Do not force it. Remove it and try again.
- STEP 3** Once the disk is comfortably inserted in the disk drive, turn the lever down to the horizontal position. Refer to the figures on the next page.
- STEP 4** To remove the diskette, turn the lever to the vertical position and remove the diskette from the drive.

3: USING YOUR EAGLE

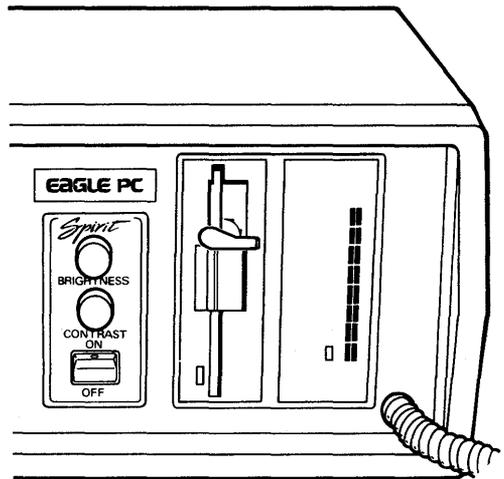
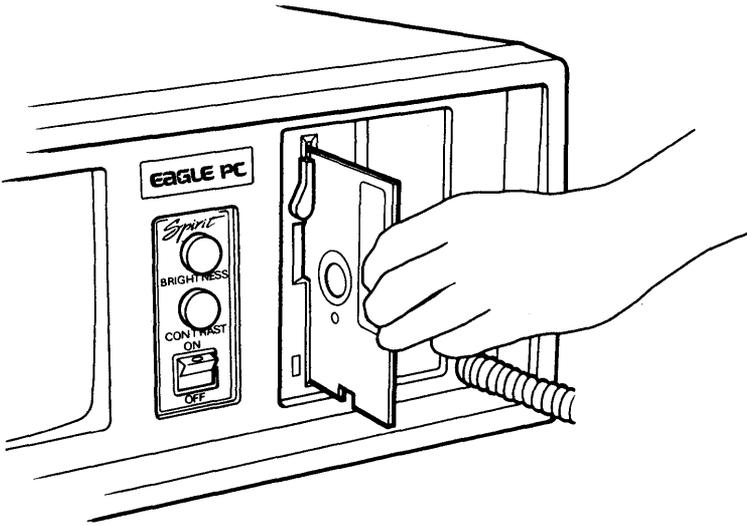


FIGURE 10: INSERTING A DISKETTE

3: USING YOUR EAGLE

OPERATING SYSTEMS

An operating system directs data traffic to the proper destinations, and is the software which runs the computer. It interacts intimately with the physical hardware which makes up the computer. Many of its operations are invisible to the user and are quite complex.

Usually an operating system has certain standard routines which the user can use to manually transfer files, direct communications, and access the disk drives. Often the user can configure parameters in the operating system, so that later the "invisible" operations of the operating system (perhaps used by subsequent applications programs) will automatically perform correctly.

Every time a computer system is successfully turned on and booted-up, some kind of operating system has been used. Sometimes the operating system is a familiar one like MS-DOS or CP/M-86, but often games or other popular software use a special operating system which fulfills the minimum requirements for their application, but which can not be copied (it is hoped) using the usual operating system routines.

Your Eagle Spirit XL is shipped with two operating systems, MS-DOS 2.0 and CP/M-86. The MS-DOS 2.0 operating system is installed on the hard disk. The MS-DOS 2.0 and CP/M-86 software binders also include their respective operating system on diskette.

3: USING YOUR EAGLE

The MS-DOS 2.0 operating system on the floppy diskette is identical to the operating system installed on the hard disk. Either can be used to copy an operating system onto a floppy diskette.

Eagle also provides as standard the CP/M-86 operating system on diskette. This operating system will not recognize diskettes formatted or written to by the MS-DOS operating system (and vice versa). At this time, the two operating systems cannot both reside on the hard disk at the same time.

The MS-DOS 1.25 operating system is also available from Eagle as an option (See Section 9). This operating system will not recognize material on floppy diskettes written by MS-DOS 2.0, but it is upwardly compatible - that is, MS-DOS 2.0 can read and manipulate 1.25 files.

Eagle's MS-DOS 1.25 is substantially similar to IBM's PC-DOS 1.1 operating system. Eagle's MS-DOS 2.0 similarly mirrors IBM's PC-DOS 2.0 operating system.

3: USING YOUR EAGLE

SYSTEM START-UP

To start up, the system must be plugged in and the power switch turned on. When these two things are performed the EPROM routines cause the computer to read the operating system off of a disk drive (this is called booting up the system).

The system first tries to get the operating system from a floppy diskette properly inserted in the floppy drive. If the system is unable to detect a properly installed floppy diskette in the drive, it proceeds to boot (retrieve) the operating system from the hard disk.

When the operating system has been successfully loaded into the computer, various things may occur. For MS-DOS operating systems, if there is a batch file named AUTOEXEC.BAT on the disk drive from which the operating system was obtained, then the computer will perform those batch assignments before restoring control to the user. If there is no such batch file, then MS-DOS will request the user to input the correct date and time. CP/M-86 can also be directed to run certain programs upon booting.

NOTE

Entering [Retrn] is a quick way to answer date and time requests when they are not important.

3: USING YOUR EAGLE

BOOT-UP FROM POWER OFF

Below is a summary of how to boot from each of the disk drives from a power-off condition assuming no initial programs are run upon booting, for example, where no AUTOEXEC.BAT file is present:

BOOT FROM HARD DISK

STEP 1 Remove diskette (if present) from the floppy drive.

NOTE

If a floppy diskette is in the drive, then upon power up, the computer will try to boot from it. As an alternative to removing the floppy diskette entirely from the drive, the lever can be put in the open position.

STEP 2 Depress the power switch on the front panel of the computer to turn on your system.

STEP 3 After a few seconds the hard disk LED indicator will light and the hard disk drive will engage. A date and time screen prompt will appear on the video monitor screen display.

3: USING YOUR EAGLE

BOOT FROM HARD DISK (CONT'D)

STEP 4 Enter the correct date and time, or press the [Retrn] key to accept the indicated defaults.

STEP 5 The system prompt "C>" will appear. "C" indicates that the default drive on which you will work is C, the hard disk drive.

NOTE

If your system fails to power up, or fails to boot up, refer to Section 8: TROUBLESHOOTING GUIDE for help.

3: USING YOUR EAGLE

BOOT FROM FLOPPY DISKETTE

- STEP 1** Insert a floppy diskette into the drive slot. Close the lever over the diskette.
- STEP 2** Turn on the power. The power switch is located on the front panel.

NOTE

If the system fails to boot off the floppy diskette, then it will proceed to boot off the hard disk.

- STEP 3** If the system fails to boot from the floppy diskette because it booted from the hard disk, simultaneously press the [Ctrl], [Alt], and [Del] keys.
- STEP 4** **MS-DOS Diskette:** If the booting is successful, the date and time screen message will appear. Enter the date and time or press the [Retrn] key to accept the defaults. The "A>" system prompt will appear on the screen. "A" indicates that the default drive you are using is the floppy disk drive.

3: USING YOUR EAGLE

BOOT FROM FLOPPY DISKETTE (CONT'D)

STEP 4 (CONT'D)

CP/M-86 Diskette: If the booting is successful, the operating system title and version number will appear on the screen followed by the system prompt "A>".

Other Software Diskettes: In some cases, the software will automatically enter directly into the program. In other cases, you will need to type in the name of the program from the operating system. Refer to **Installing Purchased Software** in Section 4 for more information.

NOTE

If you experience trouble booting from the floppy diskette, please refer to Section 8: **TROUBLESHOOTING GUIDE**.

3: USING YOUR EAGLE

REBOOT SYSTEM WITH POWER ON

Sometimes after booting off the hard disk, you may desire to boot off a floppy diskette (to run a specific program or game). Or, on occasion, the system may get "locked up" so that it no longer responds to the keyboard. (Such a problem might occur after trying to use a nonexistent or unconnected device.)

In these cases, it is possible to restart the system by rebooting - there is no need to turn the power off. In fact, when rebooting do not turn the power off except as a last resort, because the hard disk should have the PD (power down) run before turning the power off.

CAUTION

**Unsaved work will be lost when
rebooting is performed.**

In general, to reboot, hold down the [Ctrl], [Alt], and [Del] keys simultaneously. Again, the system is designed to boot off the floppy drive first, then the hard disk.

If you experience trouble rebooting consult Section 8: TROUBLESHOOTING GUIDE before resorting to turning the power off (which could damage the hard disk).

3: USING YOUR EAGLE

REBOOT FROM HARD DISK

- STEP 1** Remove any diskette from the floppy drive.
- STEP 2** Simultaneously hold down [Ctrl] and [Alt] keys, and then press the [Del] key.
- STEP 3** The same sequence of steps as booting from the hard disk from power off will need to be performed - entering the date and time or waiting for the system to perform a batch file. The "C>" prompt will then appear.

3: USING YOUR EAGLE

REBOOT FROM FLOPPY DISKETTE

- STEP 1** Put the appropriate floppy diskette into the drive slot. Close the lever over the diskette.
- STEP 2** Simultaneously hold down [Ctrl] and [Alt] keys and then press [Del].
- STEP 3** The floppy disk LED indicator should light, and the disk drive should engage. Follow the steps as outlined in Step 4 of the procedure, BOOT FROM FLOPPY DISKETTE. The "A>" prompt should appear indicating the default drive is the floppy drive if no program is initially executed.

3: USING YOUR EAGLE

CP/M-86 OPERATING SYSTEM

The Eagle PC Spirit fully supports both MS-DOS 2.0 and CP/M-86 operating systems. MS-DOS 2.0 has been installed on the hard disk because it is felt that the Spirit XL user will find that more convenient. The CP/M-86 Operating System and system files are provided on a floppy diskette in your **CP/M-86 OPERATING SYSTEM MANUAL**. With this diskette, you will be able to boot your system with the CP/M-86 Operating System and manipulate files designed for that system.

To boot the CP/M-86 Operating System, insert the CP/M-86 operating system diskette in the drive and turn on the system. After the operating system is loaded, a message stating the operating system version number will appear, followed by the familiar "A>" prompt.

Currently, only files on floppy diskettes will be able to be read by CP/M-86. The hard disk is not accessible when using CP/M-86.

Refer to Section 5: CP/M-86 UTILITY PROCEDURES for more information on using the CP/M-86 operating system.

3: USING YOUR EAGLE

USING THE KEYBOARD

ALPHANUMERIC KEYS

The main section of the keyboard is arranged in the standard format of most typewriters. Both upper and lowercase symbols are accessible using utility keys like [Shift] discussed below. A full set of punctuation symbols are also provided.

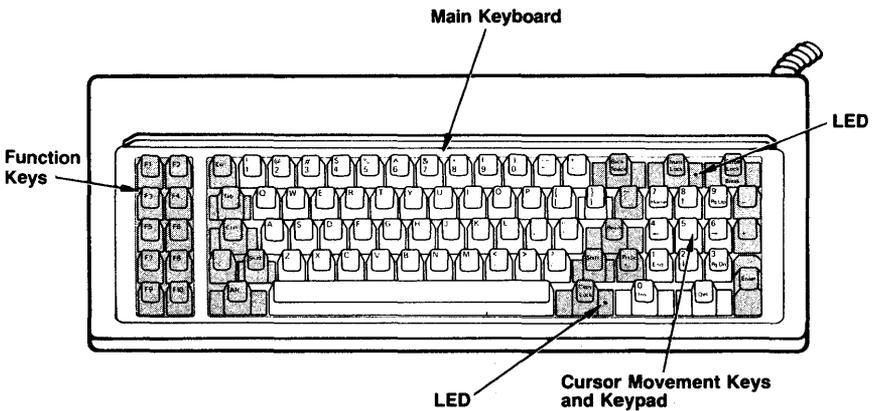


FIGURE 11: EAGLE KEYBOARD

3: USING YOUR EAGLE

UTILITY KEYS

The main section of the keyboard has several keys not always found on typewriters which can be used to modify the function of other keys or provide special input to the computer. A list of these keys (beginning at the top left of the keyboard and moving across the row) and their use follows:

- [Esc]:** Also known as ESCAPE. Software will use the ESCAPE character to signal the user's intent to stop or abort a program. It is also used sometimes as a prefix to codes which determine selection of print styles.
- [Back Space]:** This key moves the cursor to the left one position. Usually, software will consider that the letter which was "Back Spaced" over has been deleted. This key therefore is used to correct minor entry errors.
- [Num Lock]:** The [Num Lock] key is used to change the definition of the keypad keys. When the computer is first booted up (or rebooted), the keypad ., +, -, and * keys are interpreted as special function keys. Some applications software will then use these special functions to control cursor movement.

3: USING YOUR EAGLE

- [Scroll Lock]:** This key is supported only with certain software programs. The [Break] function is used with the [Ctrl] key. See below.
- [Tab]:** This key is used to advance the cursor to tab positions. The default tab is every seven spaces. Applications software may define a different tab field, and may support a backwards Tab (through, perhaps, [Shift] + [Tab]).
- [Ctrl]:** Also known as CONTROL. This key modifies the function of other keys. Control characters (the characters resulting from [Ctrl] modifying another key (like [Ctrl] + [C])), are displayed on the screen, as for example, **^C**.
- [Retrn]:** Also known as RETURN. This key is used to enter commands or data into the computer. As an example, all operating system commands (like DIR) are typed in and followed by a [Retrn].
- [Shift]:** These two keys, one on each side of the bottom row of letters can be used interchangeably. The main function of the shift keys is to obtain the uppercase symbols for the keys in the main section of the keyboard.

3: USING YOUR EAGLE

[Shift]:
(Cont'd) When [Caps Lock] is depressed, the use of a [Shift] key and an alphabetical key "untoggles" (inactivates) the [Caps Lock] function, so that the lowercase character is obtained.

A [Shift] key will also "toggle" the state of the [Num Lock] key if the keypad keys are struck when [Shift] is depressed.

[PrtSc *]: [Shift] + the [PrtSc *] key will print out whatever is displayed on the screen on the LPT1 printer device.

[Alt]: Also known as ALTERNATE. This key also modifies the function of other keys, as [Shift] and [Ctrl] do. When [Alt] is used to modify another symbol, the result usually has no printed symbol.

[Caps Lock]: This key raises the alphabetical characters (A-Z) to uppercase. Numbers and punctuation symbols are not affected. When the "LOCK" function is being used, the LED indicator will glow.

[Ins]: Allows the insertion of text in the middle of existing text, when supported by software.

[Del]: Removes character underneath cursor and shifts remaining text to the left, when supported by software.

3: USING YOUR EAGLE

[Enter]: Functionally the same as [Retrn]. Can be used anytime that [Retrn] is used.

As mentioned earlier, [Ctrl] + [Alt] + [Del] reboots the computer.

See your **MS-DOS OPERATING SYSTEM MANUAL** for details regarding the editing uses of function keys F1-F5.

3: USING YOUR EAGLE

THE KEYPAD AND [Num Lock]

The comments below which refer to numbers concern only the numerals within the keypad, **not** the numerals on the main keyboard.

The keypad is located at the right side of the keyboard. The keypad includes the digits 0-9, the decimal point (.) and the arithmetic keys: minus (-), plus (+), and asterisk (*).

The [Num Lock] key is used to change the definition of the keypad keys. When the computer is first booted up (or rebooted), the keypad numerals, ., -, +, and * are interpreted as special function keys. Some applications software will then define these special functions to control cursor movement.

NOTE

In applications software which support these cursor movement functions, **DO NOT** use the space bar to move the cursor to the right. Using the space bar in this manner will insert spaces along the entire path of the cursor. Instead, use the right-direction cursor movement key (appropriately toggled to the un-[Num Lock] state).

3: USING YOUR EAGLE

Numeric data input can be sped up by using the keypad as a 10-key entry pad. In order for those keys to be interpreted as digits and not as special function keys used by software, press the [Num Lock] key. The LED indicator will glow, indicating that the function has been toggled on (activated).

NOTE

Some software programs do not take [Num Lock] into consideration if the keypad digits are used only for directional purposes (games, for instance). However, applications software like word processors and spreadsheets will usually make the distinction between true "Num Locked" digits and special directional functions.

A [Shift] key in combination with one of the keypad digits will temporarily reverse the state of [Num Lock]. [Num Lock]'s LED indicator does not reflect this temporary change.

3: USING YOUR EAGLE

An additional use of the keypad is the access of members of Eagle's 255-element Character Set (see Appendix D) not ordinarily accessible through the keyboard. To access any of those characters, hold down the [Alt] key and type in three digits on the keypad which represent the decimal value of the desired character (see Appendix D). After striking the third digit, release the [Alt] key. For example, to display a happy-face on your screen, hold down [Alt], type 001 with the keypad digits, and release [Alt].

3: USING YOUR EAGLE

FUNCTION KEYS

There are ten function keys labelled F1 through F10 on the left side of the keyboard. These keys have special uses depending on how software supports them. The ten function keys on the keyboard access up to forty different function "keys." F11-F20 are obtained by using the [Shift] key with keys F1-F10. F21-F30 are obtained by using the [Ctrl] key with F1-F10. And F31-F40 are obtained by using the [Alt] key with F1-F10. In summary, [Shift] "adds" ten to any function key, [Ctrl] "adds" twenty, and [Alt] "adds" thirty.

The user can custom tailor his function keys with a software package like FlexKey from Eagle to perform practically any set of operations. In addition, the MS-DOS Operating System uses F1-F5 for certain editing features.

3: USING YOUR EAGLE

OTHER SPECIAL KEYS

- [Ctrl] + [PrtSc*]:** This combination will cause whatever subsequently is displayed on the screen to be echoed to the LPT1 device, until [Ctrl] + [PrtSc*] is struck again.
- [Ctrl] + [Break]:** Cancels the current operation, only if the **Break Off** command is not set in the operating system.
- [Ctrl] + [Num Lock]:** Suspends system operation. To resume operating, strike this combination again.
- [Ctrl] + [S]:** Suspends display scrolling until [Ctrl] + [S] is struck again.

3: USING YOUR EAGLE

TURNING OFF YOUR SYSTEM

Because the Eagle PC Spirit XL has a hard disk, proper steps should be taken to prevent damage before turning off the system. The platter within the hard disk spins at 3600 RPM and the read/write heads extend radially from the center out to the appropriate tracks. Because the platter slows down when the power is turned off, it is important that the read/write heads be fully retracted to a special shipping location.

BEFORE turning off the system power run the **PD** program. Or, if FlexMenu has been purchased, then choose the **QUIT** option. If the power is turned off without performing one of these two methods, you can damage the hard disk.

3: USING YOUR EAGLE

TURNING OFF YOUR SYSTEM

- STEP 1** Exit from the software program after saving your work, and return to the operating system prompt C>.
- STEP 2** Remove diskette from floppy drive.
- STEP 3** Type "PD" and [Retrn] to run the power-down program.

WARNING

ALWAYS run the "PD" program before turning off your system. This step retracts the hard disk drives read/write heads into a special shipping position. You can irreparably damage the hard disk by neglecting to perform this step.

- STEP 4** Turn the power switch to the OFF position. Refer to **Closing Up The System** in Section 2 if you plan to transport your system.

3: USING YOUR EAGLE

PREVENTIVE MAINTENANCE

The Eagle PC Spirit XL has been designed to provide years of trouble-free service. If the following preventive maintenance guidelines are followed, your system should be as good looking and reliable as the day it was purchased.

VIDEO SCREEN Do not allow direct sunlight to strike the display screen for extended amounts of time. Sunlight can damage the phosphor screen.

Clean the surface of the video display with a window cleaner and a soft cloth or paper towel.

KEYBOARD Clean the keyboard keys or enclosure with a damp (not wet) cloth.

MAIN UNIT Keep the ventilation slots at the right rear of the main unit clear and clean. Do not block the ventilation vents.

Do not place drinks, food, cigarettes, or small objects (like paper clips) on top of the main unit. Foreign material which enters the interior of the computer can damage the electronics.

3: USING YOUR EAGLE

FLOPPY DISK DRIVE

Every six months the floppy diskette drive heads should be cleaned with a head cleaning kit recommended by your Eagle dealer.

DISKETTES

Please refer to **Diskette Care** in Section 3.

4: MS-DOS 2.0 UTILITY PROCEDURES

INTRODUCTION

The material in this section only concerns the MS-DOS 2.0 Operating System, which is on your hard disk. This material is presented so that you can perform certain fundamental operations without resorting to other manuals. Several of these operations must be performed upon initial start up of the system, other operations are presented as a useful reference.

See your **MS-DOS OPERATING SYSTEM MANUAL** for more information.

4: MS-DOS 2.0 UTILITY PROCEDURES

DISK DRIVE DESIGNATORS

Your Eagle PC Spirit XL can access files from either the hard disk or floppy diskettes. For convenience, the disk drives are given abbreviated reference symbols. Under the MS-DOS 2.0 Operating System, the floppy drive is **A** and the hard disk is **C**. A second floppy drive would be **B**, and an external hard disk would be **D**. These **A,B,C,D** labels are referred to as drive designators.

When using MS-DOS or CP/M-86 Operating Systems, the standard prompt is **X>**, where "**X**" indicates the current default disk drive. By default, it means that the operating system will look on that drive for programs and files, unless you specify a particular drive.

For instance, **C>DIR** will provide a directory of drive **C**, the hard disk.

NOTE

"C>" is printed by the operating system on the screen. The user should then type **"DIR"** and [Retrn]. This holds true for the following examples as well.

4: MS-DOS 2.0 UTILITY PROCEDURES

C>DIR A: will provide a directory of a floppy diskette in the floppy drive.

It is possible to change default drives by typing "X:" in the operating system, where "X" is the desired new default operating system.

For example, the following display demonstrates how to change the default to the floppy drive and request its directory, after having booted up on the hard disk:

```
C>A:  
A>DIR
```

MS-DOS 2.0 also allows you to call a drive by any designator through use of the ASSIGN program. See your **MS-DOS OPERATING SYSTEM MANUAL** for details.

4: MS-DOS 2.0 UTILITY PROCEDURES

BACKING UP YOUR HARD DISK

Periodically (perhaps once a week or even every day for certain files), the contents of the hard disk should be copied onto floppy diskettes. In this way, should an event occur which ruins the files on your hard disk (a powerline surge, for example), you will have some chance of restoring your system.

To perform any kind of backup, you must have several formatted floppy diskettes. For instructions, see the subsection **Diskettes, Formats, and Copying**.

A completely filled 10 megabyte hard disk, assuming a backup of every file is performed, requires 28 formatted diskettes.

4: MS-DOS 2.0 UTILITY PROCEDURES

HARD DISK BACKUP

The following procedure will back up all the files on your hard disk, including all the subdirectories' files on your hard disk.

- STEP 1** Format your floppy diskettes (see DISKETTES, FORMATS, and COPYING in this section for details).
- STEP 2** Be sure that you are in the root directory. Type "CD \" to return to the root directory.
- STEP 3** Insert the first formatted diskette in the floppy drive and close the lever.
- STEP 4** In response to the operating system prompt "**C>**", type "BACKUP C: A:/S", and press [Retrn].
- STEP 5** The BACKUP program will prompt you to insert other diskettes when necessary.
- STEP 6** When each backup diskette is filled, label the diskette - include a sequence number and date. Store the diskette in a safe place.

4: MS-DOS 2.0 UTILITY PROCEDURES

BACKUP SUGGESTIONS

All the operating system files of your hard disk are on the floppy diskette in your MS-DOS OPERATING SYSTEM MANUAL, so they do not require backup. Instead you will need to backup the files you subsequently install in the hard disk.

The advantage of using BACKUP instead of the COPY command, is that BACKUP will keep track of which subdirectory the files came from, and will completely fill a diskette by splitting up files across two diskettes, which COPY cannot do.

The **"/A"** option can let you re-use backup diskettes so that you need only one set of diskettes. The most economical use of diskettes combined with the quickest backup is to use the combined options **"/M/A"**.

BACKUP OPTIONS

As the hard disk becomes filled with data you can take advantage of the available backup options. For instance, many files never change, so there is no need to back them up every week, so long as you have one copy around. Also, it is possible to selectively back up just the files which are important to you (such as sales records, or your own BASIC programs).

The backup program can backup individual files, or filenames with wildcards **?** and ***** (such as ***.BAS**), or entire contents of subdirectories when filenames are specified, the files are taken off of the current directory, unless a pathname is specified.

4: MS-DOS 2.0 UTILITY PROCEDURES

The **"/M"** option of the **BACKUP** command will back up only those files which have been modified since the last time a backup was performed. The **"/D"** option will backup files written after a specified date.

NOTE

To utilize the /D option effectively, you must provide your system the correct date everytime you boot your system.

If you have created subdirectories, you can backup the files in that subdirectory by specifying the pathname of the subdirectory in the **BACKUP** command. In addition, the **"/S"** option will backup the files in that specified (or default) subdirectory and all subdirectories deeper.

See your **MS-DOS 2.0 OPERATING SYSTEM MANUAL** for more detail.

4: MS-DOS 2.0 UTILITY PROCEDURES

RESTORING YOUR HARD DISK

If you have to retrieve files from the backup diskettes you have made, then you **must** use the RESTORE command.

To restore floppy diskette files to your system hard disk, type "RESTORE A: C:\S" in response to the operating system prompt "C>". This command will cause all the files on the backup diskette to be transferred to the hard disk, with all files restored to the proper directory starting with the root directory. If a subdirectory is absent or if you have had to re-initialize your hard disk (Section 8), RESTORE will create the subdirectories necessary to restore your files to the subdirectories they were backed up from.

See your **MS-DOS 2.0 OPERATING SYSTEM MANUAL** for greater detail.

4: MS-DOS 2.0 UTILITY PROCEDURES

DISKETTES, FORMATS AND COPYING

All diskettes which your Eagle PC Spirit XL will use must be formatted in one way or another. Formatting a diskette, allocates the space on the diskette so that the areas have recognizable locations (such as Sector 7, Track 3).

The two blank diskettes you use to store programs or make hard disk backups with need to be formatted using your computer system. The program diskettes you purchase which have software on them have already been formatted. Formatting a diskette erases the contents, so be careful not to format diskettes which have information already on them.

FORMATTING A DISKETTE

To format a diskette, you must use the FORMAT program which resides in the root directory of the hard disk. You must be in the operating system to access the program.

With the FORMAT program, you must specify the drive the diskette will be in (usually "A"). You can also specify certain optional specifications, for example, whether an operating system will be installed on the freshly formatted diskette. Refer to your **MS-DOS OPERATING SYSTEM MANUAL** for detailed information.

4: MS-DOS 2.0 UTILITY PROCEDURES

For example, to format a diskette, type the following (assume the default drive is "C" and the current directory is the hard disk root directory):

C>FORMAT A:

This produces a diskette which has nine sectors (the standard for MS-DOS 2.0). Because earlier versions of MS-DOS used diskettes with eight sectors, the FORMAT program allows you to create 8-sectored diskettes with the "/8" option. MS-DOS 2.0 can operate with diskettes having either eight or nine sectors. A diskette with nine sectors has a greater storage capacity than a diskette with eight, (360 Kbytes vs. 320 Kbytes).

The "/S" option installs an operating system onto the diskette after it has been formatted. This results in a diskette which can be booted from (a system diskette).

4: MS-DOS 2.0 UTILITY PROCEDURES

COPYING A DISKETTE

When you purchase software it is good practice to make a duplicate copy for safekeeping. There are at least two valid ways to copy the contents of a diskette.

1. Use **FORMAT** and **DISKCOPY**
2. Use **FORMAT** and **COPY**

Details of these commands can be found in your **MS-DOS OPERATING SYSTEM MANUAL**. A brief summary of how to use these commands is found on the following pages.

DISKCOPY will take the contents of a diskette in Drive and produce an exact tract-for-tract copy onto. The Eagle PC Spirit XL has only one floppy drive. When using **DISKCOPY**, the computer will perform a single-floppy copy and prompt you when to switch the original and target diskettes out of the single drive. The target diskette has to be formatted prior to using **DISKCOPY**.

4: MS-DOS 2.0 UTILITY PROCEDURES

To copy a diskette which has no subdirectories, one could also format a blank diskette and then type, for example, "COPY A:*. * B:". The Spirit XL has only one floppy drive, so the operating system will recognize that "B:" refers to a second diskette, not another drive.

If the diskette being copied is bootable, i.e. has an operating system on it, then after (or during) the formatting, an operating system must be installed. Use the /S FORMAT option or the /B and /V FORMAT options together with SYS. The correct choice depends upon the operating system you have on the diskette and which operating system you have booted up. For simplicity, use DISKCOPY to copy diskettes which boot.

NOTE

Certain files which make up the operating system are known as "hidden files" and cannot be accessed by name with the COPY command. Therefore, to copy a diskette which has an operating system on it, do NOT use "COPY A:*. * B:". DISKCOPY can perform the desired copying.

4: MS-DOS 2.0 UTILITY PROCEDURES

INSTALLING PURCHASED SOFTWARE

When software is purchased it will usually be on a floppy diskette. For convenience, you will want to have the software on your hard disk. Discussed below is how to make this transfer. You can opt not to install it on your hard disk as long as you are content to access the floppy disk drive whenever the software is used.

The floppy diskette will be one of two kinds: one you boot from (it has an operating system and possibly an AUTOEXEC.BAT file), or one that contains files. The latter type will be the easiest for you to transfer.

The discussions that follow assume that you have not set up any special tree structure for your hard disk, and that the floppy diskette does not have a tree. All transfers are from the diskette's root directory to the hard disk's root directory. If trees are involved, insert the appropriate pathnames in the COPY command.

4: MS-DOS 2.0 UTILITY PROCEDURES

BOOTING DISKETTES

A diskette capable of booting your computer has an operating system on it. A DIR of such a diskette reveals the presence of the operating system's COMMAND.COM file. It is critical that you not transfer the COMMAND.COM file to your hard disk.

These diskettes may also have a file on them which is named "AUTOEXEC.BAT". You may determine this by performing a DIR on the floppy diskette (such as "DIR A:"). The AUTOEXEC.BAT file is a batch file. It contains instructions that the computer will perform immediately after booting. Most of the time it has fairly simple commands, involving the running of another program on the diskette.

You will want to have any such batch files on your hard disk, so that your new software will perform as its designers intended. However, you may not want the batch file named "AUTOEXEC.BAT" on your hard disk, because your system will always run this software when it is started up. If you purchase several diskettes, each having its own AUTOEXEC.BAT file on them, it is obvious that you can't name them all the same thing on your hard disk.

The strategy, therefore, is to transfer the software from these diskettes and to transfer the AUTOEXEC.BAT file, but to give it a new name. The .BAT extension must be kept, however.

4: MS-DOS 2.0 UTILITY PROCEDURES

Suppose that you bought some game software, and you find the diskette has an AUTOEXEC.BAT file on it. You should rename that file something like GAMES1.BAT on your hard disk. Batch files (those with the extension .BAT) are performed by the computer when the first part of their name is entered in the operating system. Therefore, when the software is transferred and the batch file is renamed, typing "GAMES1" will run the software.

It is highly unlikely that a diskette will have an AUTOEXEC.BAT file without also having an operating system. Therefore, we make the assumption that a diskette with an AUTOEXEC.BAT file also has an operating system. If the operating system wasn't in the diskette for some reason, then "COPY A:*. * C:" will work fine if there are no filename conflicts.

If you do not have an AUTOEXEC.BAT file on your hard disk (one you created for your own needs), then perform the following steps in order to transfer the diskette files to the hard disk.

4: MS-DOS 2.0 UTILITY PROCEDURES

TRANSFER FROM DISKETTE WHICH BOOTS

- STEP 1** Boot the computer from the hard disk.
- STEP 2** Insert the diskette into the floppy drive and close the lever.
- STEP 3** Obtain a directory listing of the diskette, by typing "DIR A:".

CAUTION

It is important that the file **COMMAND.COM** on the floppy diskette **NOT** be transferred. That file is part of the operating system, and Eagle's operating system will not perform correctly if a foreign operating system file is used.

4: MS-DOS 2.0 UTILITY PROCEDURES

TRANSFER FROM DISKETTE WHICH BOOTS (CONT'D)

STEP 4 Copy each file, name by name, from the floppy diskette to the hard disk, by typing "COPY A:FILE.EXT C:", where "FILE.EXT" represents the name and extension of a given file.

CAUTION

If you already had software on your hard disk with names used by the files on the diskette, then they will be replaced by the new files. Therefore, it pays to look at the diskette's filenames before using COPY.

STEP 5 When all the files have been transferred, and if the diskette has an AUTOEXEC.BAT file, type "REN AUTOEXEC.BAT XXXXXXXX.BAT" at the operating system's prompt "C>". "XXXXXXX" represents the new name.

STEP 6 Return the diskette to its proper place.

If, before the transfer, you indeed had an AUTOEXEC.BAT file on the hard disk, then you must temporarily rename it to something else, perform the above steps, and then rename it back to AUTOEXEC.BAT.

4: MS-DOS 2.0 UTILITY PROCEDURES

DISKETTES WITH JUST FILES

Make sure that the diskette does not have a "COMMAND.COM" file. If it does not, then the transfer is very simple. The command "COPY A:*. * C:" will retrieve the files satisfactorily (if there are no filename problems). Typically, an AUTOEXEC.BAT file will not be present on such a diskette.

PURCHASED BASIC PROGRAMS

The IBM Personal Computer's Basic language is "BASICA". If you purchase Basic programs designed for the IBM Personal Computer, and the diskette has an "AUTOEXEC.BAT" file, then some editing of the batch file is necessary. Use any word processor or editing program and change all references from "BASICA" to "GWBASIC", the name of Eagle's Basic language.

All references to "BASICA" must be changed to "GWBASIC", no matter whether the programs have been transferred to the hard disk or continue to be used from a floppy diskette.

4: MS-DOS 2.0 UTILITY PROCEDURES

COMMUNICATIONS

To use printers, modems, or other devices, you will use the ports on the rear panel of the main unit. The ports can be configured in the operating system so that they will properly communicate with these devices.

The two serial ports are known as COM1 and COM2. The operating system command "MODE" will set up these ports for communications. For command example, "MODE COM1: 1200" sets up the port for 1200 baud rate.

The parallel port is known as LPT1. However, the computer always expects your printer to connect to LPT1. Therefore, if you have a serial printer, use "MODE" to assign LPT1's output to COM1 or COM2.

You can also use "MODE" to select the type of video output. See your **MS-DOS OPERATING SYSTEM MANUAL** for more information.

5: CP/M-86 UTILITY PROCEDURES

INTRODUCTION

The CP/M-86 Operating System, supplied on two floppy diskettes in your CP/M-86 Operating System Manual, is the second operating system shipped with your Eagle PC Spirit. This operating system is not installed on the hard disk, and at this time cannot be put on the hard disk. The information in this section refers to certain fundamental operations, some of which are performed upon initial system startup; other operations are presented as a useful reference.

For more information on the CP/M-86 Operating System, refer to the CP/M-86 OPERATING SYSTEM MANUAL.

DISKUTIL and DESIGN are special Eagle utility programs for the CP/M-86 Operating System. They are not discussed in the CP/M-86 OPERATING SYSTEM MANUAL, but are included in this section.

5: CP/M-86 UTILITY PROCEDURES

THE ASSIGN PROGRAM

To use external devices that connect to the serial and parallel ports, you must indicate to the system which ports data should be sent to, and the characteristics (speed, etc.) of such ports. In the CP/M-86 Operating System, the ASSIGN program allows you to select the ports you need and their characteristics, using a menu-driven format. Select menu options to set up your system for communication with external devices.

ASSIGN is also used to select the cursor type and whether the date and time are to be displayed at the bottom of the screen.

To run this program, enter the operating system (indicated by prompt "A>") and type "ASSIGN" and [Retrn]. In the program, the [Esc] key can be used to return to preceding menus.

5: CP/M-86 UTILITY PROCEDURES

PROGRAM OPTIONS

The first menu to appear after running ASSIGN asks whether you will initialize a printer port, a serial port to be used for a non-printer device, or whether other options are going to be used.

If you indicate that you are setting up a communication port for a printer, then the next menu will ask you to select the port: Serial A, Serial B, or Parallel.

NOTE

The port labels on the back of your machine correspond to the Serial A, B, and Parallel ports as follows:

COMM1 = Serial A
COMM2 = Serial B
LPT1 = Parallel Port

If you indicate a serial port for your printer, or indicated earlier that you were setting up a serial port for a non-printer device, the subsequent menus will ask you for port information like baud rate and other special character information.

5: CP/M-86 UTILITY PROCEDURES

After the port and its characteristics have been selected, or, if in the beginning, you wanted to perform the "other system operations", then a menu with nine options is displayed.

NOTE

After you select the characteristics for a port, choose the option which saves the port characteristics on your floppy diskette (this way you do not have to change the port setup again, unless your equipment changes). If a printer is involved, choose the "printer test" option to ensure that the printer, its cabling and your computer work correctly.

This nine-option menu also presents the opportunity to change cursor types and to select whether the screen's bottom line (status line) should display the date and time.

5: CP/M-86 UTILITY PROCEDURES

THE DISKUTIL PROGRAM

This program will perform basic disk operations like formatting blank diskettes and copying entire diskettes. A read-only test of a diskettes integrity can also be performed.

To run this program, enter the operating system (indicated by the prompt A>) and type "DISKUTIL" and press [Retrn]. The "DISKUTIL" program has four options:

- * Perform a read only test on floppy diskette.
- * Format a diskette.
- * Copy a diskette.
- * Copy a diskette with formatting.

To select an option, move the block cursor up or down with the [8] and [2] keys on the keypad. When the desired option is highlighted, press [Retrn].

5: CP/M-86 UTILITY PROCEDURES

COPYING DISKETTES

If you want to make a copy of a diskette, the easiest option is "Copy a diskette with formatting", which will format a blank diskette before copying it.

If you have already formatted a diskette, the "Copy a diskette" option would be appropriate.

CAUTION

Do not use the "Copy a diskette" option if your target diskette already has files on it. The target diskette should be formatted only, with no files. Otherwise, those files already on it will be destroyed.

It is a good idea to "Perform a read only test on floppy diskette" after a copying option has been performed, or when there seems to be trouble with a diskette. That option will determine whether there are any bad sectors on the floppy diskette.

Because the Spirit XL has only a single floppy diskette drive, the diskettes involved in a copy will need to be inserted and removed several times. The program will prompt you on those occasions.

5: CP/M-86 UTILITY PROCEDURES

OTHER FEATURES

When in the CP/M-86 Operating System, the function keys F1-F10 will perform several standard operations. In the table below, unless noted in the comments column, each command is immediately followed by a [Retrn]. With the two PIP commands, the user provides additional detail in the command string, then enters the [Retrn].

TABLE 1: FUNCTION KEY COMMANDS

KEY	COMMAND	COMMENTS
F1	DIR A:	
F2	DIR B:	
F3	STAT	
F4	STAT B:	
F5	PIP_	Comments + [Retrn]
F6	PIP B:=A:*. *[V]_	Comments + [Retrn]
F7	STAT *.*	
F8	STAT B:*. *	
F9	ASSIGN	
F10	DISKUTIL	

The symbol "_" above indicates that a space is left before the next character entered.

5: CP/M-86 UTILITY PROCEDURES

PRINTING WHAT'S ON THE SCREEN

To print what is displayed on the screen (if the port parameters have correctly been setup with "ASSIGN"), strike [Shift] and [PrtSc].

HELP PROGRAM

Type "HELP" at the operating system prompt to obtain information on many of CP/M-86's commands. The "HELP" program will provide you with lists of available help topics.

6: ADVANCED USE

INTRODUCTION

This section discusses advanced programming information on the MS-DOS 2.0 Operating System. The section is divided into two major topics:

- * MS-DOS 2.0 Subdirectories
- * Partitioning the Hard Disk with MS-DOS 2.0

The information in the first section is intended to be just an introduction to the MS-DOS 2.0 OPERATING SYSTEM MANUAL.

6: ADVANCED USE

MS-DOS 2.0 SUBDIRECTORIES

MS-DOS 2.0 provides you with the capability to create multiple levels of directories. With previous versions of MS-DOS, a single directory structure was used for managing files on diskettes. Each diskette or hard disk contained a single directory listing all the files, which could be very cumbersome to use.

With MS-DOS 2.0, you can create new files, and group these files into different directories. These directories are smaller, more specific and much easier to manipulate. Any one directory can contain a number of files, and it can also contain **other** directories (or subdirectories). This method of file organization using multiple directories is known as a hierarchial directory structure, or a "tree" structure.

This "tree" structure is actually upside down. The "root" directory is at the top, and is the first level of the directory structure. The subdirectories are branches of the tree, and the files are leaves. Refer to Figure 12.

If you do not use subdirectories, then your directory structure is essentially a tree with no branches. You have one directory area where all files are maintained, the root directory. Most instructions in this guide, so far, have assumed that subdirectories are not involved.

6: ADVANCED USE

All system files are in the root directory. When the computer is first started up (assuming there is no AUTOEXEC.BAT file to change directories), you come up in the root directory. If you create subdirectories, we recommend that you keep system files in the root directory. Other programs and data files can usually be placed anywhere appropriate in the directory hierarchy.

The TREE program displays all subdirectories and their location in the hierarchy. For more information, see your **MS-DOS OPERATING SYSTEM MANUAL**.

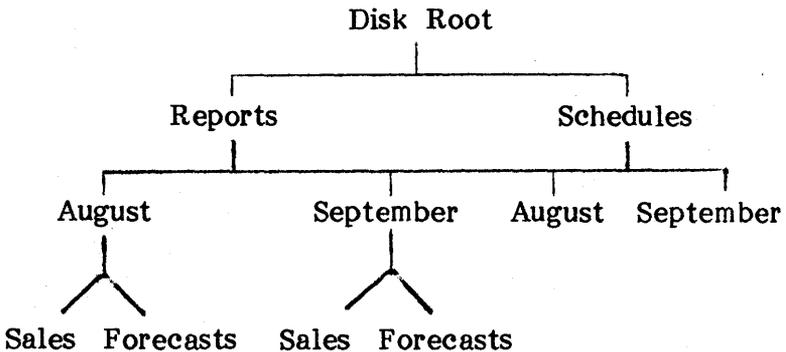


FIGURE 12: SAMPLE TREE STRUCTURE

6: ADVANCED USE

PATHNAMES

The root directory is always denoted as "`\`". The directory named "REPORTS", can be accessed by the pathname "REPORTS". A pathname is a sequence of directory names, followed by a simple filename, separated by slashes (`\`). All files in the directory "REPORTS" can be accessed with this pathname as a prefix. As an example, the file "AUGUST.LKV" on the "REPORTS" directory can be addressed from any other directory as "`\REPORTS\AUGUST.LKV`".

To reference other directories in the tree structure, there are several valid pathnames to allow you to travel from the one you are in to the one you want to access.

Any time a pathname is used, and the first directory named in the path is not "`\`", the root directory, the operating system will work from the current directory's path starting from the root directory.

The "`..`" directory is an abbreviation for the current directory's parent (next highest directory). It can be a convenient way to move to "nearby" subdirectories. It is also possible to use the operating system commands DIR, COPY, BACKUP, RESTORE, etc. in one directory to handle any other directory.

NOTE

**Refer to the MS-DOS 2.0 SYSTEM
MANUAL for more information.**

6: ADVANCED USE

DIRECTORY COMMANDS

Subdirectories are created in the operating system. You do not have to be in the root directory to manipulate them. The following commands are used to create, delete, locate and search for directories within a tree heirarchy structure.

MD [[d:]path] This command (Make Directory) creates a new directory within the structure. The directory can be specified for any appropriate disk drive [d:]. **Path** indicates where in the hierarchy the new directory is to be located.

RD [[d:]path] This command (Remove Directory) deletes a directory. All files must be deleted before a directory can be removed from the hierarchy.

CD [[d:]path] This command (Change Directory) informs the operating system which directory the user wants. "CD \" will change the current directory back to the root, while "CD" will reveal what the current directory is. (also revealed through DIR or DIR /w.)

6: ADVANCED USE

PATH
[[d:]path];
...;...

With this command you can specify a string of directories (a search path) for the operating system if it cannot find a program or file in the current directory.

"PATH \" will allow you to access root directory application programs from any subdirectory.

"PATH" command, used alone, reveals the currently defined search path.

"PATH;" destroys the existing search path, keeping any searches within only the current directory.

For more information, refer to the MS-DOS 2.0 OPERATING SYSTEM MANUAL.

PARTITIONING YOUR HARD DISK USING MS-DOS 2.0

Your hard disk is capable of storing several different operating systems. Each operating system will require its own special formatting and particular directory area. To accommodate these different operating systems and information storage techniques, you need to divide the hard disk into areas for each operating system. Such areas are known as partitions. You cannot directly transfer data between partitions.

Partitions can have different sizes. If you intend to use only one operating system (such as MS-DOS 2.0), then the entire hard disk can be made available to that one partition. (Your Eagle PC Spirit XL comes from the factory preformatted, with MS-DOS 2.0 installed in a partition which spans the entire hard disk.)

If you know that you will want more than one operating system installed, it is best to initially partition your hard disk for the areas you will ultimately need. Currently, Eagle provides software for partitioning for MS-DOS 2.0, but not other operating systems. If you intend to use other operating systems later, you should initially allocate an appropriately sized partition for MS-DOS 2.0.

After creating new partitions, you will need to format the new areas before installing the other operating systems. These steps are not discussed here. The following pages will describe how to create and change MS-DOS 2.0 partitions.

6: ADVANCED USE

PARTITIONS AND THE FDISK PROGRAM

Your standard MS-DOS 2.0 hard disk software has a program, FDISK, which is used to create and destroy the partition for MS-DOS 2.0. Each operating system which you intend to put on the hard disk requires a program like FDISK to create a partition, and other programs to format that area and install the software. Other operating systems can only be installed if the MS-DOS 2.0 partition leaves room for them.

FDISK is designed to report the allocated areas of the hard disk for up to four partitions. Partitions are the areas allocated for each operating system; they are not the "walls" between areas but the areas themselves. The partitions which are created by other operating system FDISK-like programs are described as "non-DOS."

Allocating an area on the hard disk into partitions is performed on the basis of "cylinders." A cylinder is the volume in space swept out by the read/write heads of the hard disk as the hard disk's platters spin beneath the heads on a particular track. Cylinders are roughly analagous to tracks, except that a cylinder refers to the "same" spatial track on several read/write surfaces.

The hard disk in your Eagle PC Spirit XL can be one of several types. Depending upon the type, the hard disk can have one platter, two read/write heads, and 612 cylinders (0-611) or two platters, four read/write heads, and 306 cylinders. Each cylinder can contain a number of bytes equal to 10 million divided by either 612 or 306.

6: ADVANCED USE

FDISK is used to allocate cylinders to your MS-DOS 2.0 partition by providing FDISK with the starting and ending cylinder numbers. Your system is shipped from the factory with all cylinders allocated to one partition in which MS-DOS 2.0 resides. Other operating systems cannot be installed (exist at the same time) unless the MS-DOS 2.0 partition is deleted and recreated with lesser dimensions, so that there is room for non-DOS partitions.

FDISK options are discussed on the following pages.

6: ADVANCED USE

USING FDISK

The FDISK program is run from the MS-DOS 2.0 Operating System. The phrase "DOS" as used by FDISK and this discussion refers to MS-DOS 2.0. Perform the following steps to run FDISK:

STEP 1 Enter the operating system and obtain the **C>** prompt.

STEP 2 Type "FDISK" and press [Retrn].

The program will then display the following options:

1. Create DOS Partition
2. Change Active Partition
3. Delete DOS Partition
4. Display Partition Data
5. Select Next Fixed Disk Drive

Option 4, **Display Partition Data**, is the safest option; it can be performed without damaging the hard disk contents. Options 1 and 3 are the workhorses of the program; they reconfigure the MS-DOS 2.0 partition. An external hard disk can have an MS-DOS 2.0 partition created on it using Option 5. Option 2 determines which partition, among all MS-DOS 2.0 and non-DOS partitions on the internal hard disk, will be "active" - booted from upon power up. These options are described in detail on the following pages.

All FDISK program options can be aborted (returning to the FDISK main menu) using the [Esc] key.

6: ADVANCED USE

OPTION 1: CREATING THE DOS PARTITION

This option cannot be performed if an MS-DOS 2.0 partition already exists. If no partitions exist, the display will ask whether you want the entire hard disk to be allocated to the MS-DOS 2.0 partition. Answering "No" will prompt the program to ask how many cylinders to allocate.

If after first starting the option there are several non-DOS partitions existing, the program will display their status and data. This information includes the starting and ending cylinders for each partition, and a status of either "A" or "N". "A" indicates the active partition (to be booted from), and "N" indicates non-active. The program will then request the starting and ending cylinders to be allocated to the new MS-DOS 2.0 partition.

After defining the MS-DOS 2.0 partition under either of the situations above, the partition can be made "active" with the second FDISK Main Menu option.

6: ADVANCED USE

OPTION 2: CHANGING THE ACTIVE PARTITION

The active partition is the partition which the computer will boot from power-up or reboot. Only one partition can be designated to be active at one time because only one partition (containing an operating system) can be booted from.

After the second option is selected, the program will display the current partition data and status and request the user to provide the number of the partition which is to be active.

Making a partition active does not automatically put the system under the domain of that partition after exiting the FDISK program. A reboot or boot from power off would have to occur.

For example, the hard disk has several partitions with operating systems installed and the MS-DOS 2.0 partition is currently active, then you could boot the system, run FDISK, change the active partition to another partition, exit FDISK, and then type [Ctrl] + [Alt] + [Del] to enter the new operating system. To return to the MS-DOS 2.0 partition, you must have an "FDISK-like" program in the new operating system to change the active partition back to that of MS-DOS 2.0. If you have the MS-DOS 2.0's FDISK on floppy diskette, then you could also boot off the floppy and run FDISK to select the active partition.

6: ADVANCED USE

OPTION 3: DELETING THE DOS PARTITION

After choosing this option, the program will display the current partition data and status, present a warning about the possible loss of data, and query the user regarding whether he still intends to proceed with the deletion.

The term "delete" in the option name does not correctly describe the function of the option. When this option is chosen, the data in the MS-DOS 2.0 partition is not destroyed. Rather, table entries regarding the starting and ending cylinders for the partitions are changed. It is quite possible to use this option to "delete" the DOS partition and then use the first FDISK option to create a DOS partition - with exactly the same cylinders involved - and have no loss of data.

Deleting an MS-DOS 2.0 partition merely makes available cylinders to be redistributed. If indeed you deleted your MS-DOS 2.0 partition and used its cylinders for a non-DOS partition, you would lose your MS-DOS 2.0 files. Be sure to have backups of your MS-DOS 2.0 software before deleting your DOS partition.

Consider the case where you have used your computer since the beginning just as it came to you - one partition spanning the hard disk, devoted to MS-DOS 2.0, and now you want to install a second operating system in a second partition. To do this you would need to perform the following **general** steps:

6: ADVANCED USE

ADDING A NEW PARTITION

- STEP 1** Backup all the MS-DOS 2.0 files you want to save on diskettes.

- STEP 2** Determine the bytes needed for the second operating system and compare it to the size of your MS-DOS 2.0 files.

- STEP 3** Run FDISK and delete your DOS partition.

- STEP 4** Using FDISK, create a DOS partition of an appropriate size. The MS-DOS 2.0 Operating System uses a minimum of 5 cylinders of a 306-cylinder disk, OR 10 cylinders of a 612-cylinder disk bytes).

- STEP 5** If the MS-DOS 2.0 partition is going to remain the active partition, use FDISK to select it as such. Otherwise exit FDISK.

- STEP 6** Reformat the MS-DOS 2.0 partition (to erase the files so that they can be restored with a more sequential use of tracks and sectors.)

- STEP 7** Restore your MS-DOS 2.0 files to the "new" (smaller and empty) DOS partition.

6: ADVANCED USE

ADDING A NEW PARTITION (CONT'D)

- STEP 8** Boot the new operating system off the floppy disk drive. Run the "FDISK-like" program for that operating system to create the partition boundaries for the new partition.
- STEP 9** Run a program to format the new partition in accordance with the needs of the new operating system.
- STEP 10** Load the new operating system and software into the new partition.
- STEP 11** Use the "FDISK-like" program to select the active partition, if necessary.
- STEP 12** Exit the "FDISK-like" program and begin operations.

6: ADVANCED USE

OPTION 4: DISPLAYING PARTITION DATA

This option displays information for all partitions on the hard disk. The information includes a partition **Number** (so that we can refer to the partition in some way), each partition's **Status** (N or A for non-active and active), the **Type** of partition (whether DOS or non-DOS), **Starting** and **Ending** cylinders, and **Size**. The total number of cylinders on the hard disk is also provided.

The information presented by this option is also displayed with many of FDISK's other options, and in the same format.

6: ADVANCED USE

OPTION 5: SELECTING NEXT FIXED DISK DRIVE

If you attach an external hard disk to your computer, you can partition it as well. Selecting this option will allow you to perform the same FDISK operations on the external hard disk as on the internal hard disk. You can set a partition on the external hard disk to be active, but an active MS-DOS 2.0 partition can only be located on the internal hard disk.

7: WORD ABOUT PRINTERS

INTRODUCTION

The Eagle PC Spirit XL computer can operate the two basic types of printers through the user-programmable communication ports on the rear panel of the computer's main unit. The two types of computer-associated printers, daisywheel and dot matrix printers, differ in the quality of the printed characters, speed, and cost.

This section briefly describes the types of printers you can buy for particular business application, and details steps you should take BEFORE you actually purchase a printer. These guidelines will save you alot of time and frustration later. A general printer installation and setup procedure is included at the end of this section.

7: WORD ABOUT PRINTERS

KINDS OF PRINTERS

DOT MATRIX PRINTERS

Dot matrix printers are high speed printers which form letters by a pattern of dots produced when steel pins strike inked ribbon against paper. The quality of the printed character is not as good as that produced by daisywheel printers. However, the print speed is much faster, and these printers are generally much less expensive. Dot matrix printers are commonly used for programming, accounting and financial work.

Newer printer models have features such as an intelligent carriage return, which prevents the machine from printing beyond the beginning of the next line, and bi-directional dots produced when steel pins strike inked ribbon against paper.

7: WORD ABOUT PRINTERS

DAISYWHEEL PRINTERS

Daisywheel or thimble printers use disk or wheels with the typeface engraved on the spokes of the wheel. As the wheel rotates at high speeds, a hammer presses the wheel spoke and ribbon against the paper, creating the character image.

Daisywheel printers are further divided into precision and non-precision printers. Precision printers can produce book-quality print (proportional spacing). Non-precision printers produce typewriter-like (fixed pitch) print.

NOTE

Contact your dealer if you do not know whether you have a precision or non-precision printer.

A wide range of letter quality printers are available. They range in sophistication from converted IBM Selectrics which run at a mechanically limited rate of 14.9 characters/second to models like Xerox/Diablo, Qume, and NEC Spinwriter printers which run at about 55 characters/second.

7: WORD ABOUT PRINTERS

PRINTER SELECTION

Listed on the following pages are some general guidelines that should be considered before you purchase your printer. We highly recommend that you work closely with the Eagle dealer from whom the system was purchased to ensure that the printer that is purchased will meet your needs. A hands-on demonstration with your particular software and hardware configuration is an absolute must.

1. Determine the initial software that will be used with the Eagle system--particularly word processing, spread sheet, and similar applications software. Check the software manuals for restrictions (if any) on the types and makes of printers that can be used. Some applications software do not support every kind of printer. If necessary, the publisher of the program(s) should be contacted directly to find out if there are restrictions on printers or if special instructions must be used for specific brands of printers.
2. Make certain that the printer chosen is equal to the tasks it will perform. The printer must be intended for use with a computer. If heavy use is to be made of the printer -- for example, stretches of an hour or more of continuous printing -- consider using a heavy-duty business computer printer.

7: WORD ABOUT PRINTERS

3. **DO NOT** use converted electric typewriters (either with manual or electronic key control devices) or teletype machines; Eagle computers will not support them.
4. Check the normal printing speed. A speed of 45 characters per second (cps) or more is characteristic of higher-priced daisywheel printers which yield letter quality output. A speed of 80 cps or more is characteristic of dot-matrix printers, some of which can yield a quality approaching that of daisywheel printers. Consider the difference in price versus needs for quality and quick output for each type of printer.
5. Check whether the printer has a buffer or "spooler" feature. Some printers include an integral buffer which accept and store the data to be printed at a very high rate, so that the computer can be free for other non-printing duties. This feature greatly increases the potential use of the computer. The capacity of the buffer should be judged by a typical document size.
6. Check that the printer offers all of the printing enhancements you require. Determine your need for full underlining (not character-by-character), boldfacing, shadow printing, superscripts, subscripts, proportional spacing (PS), bi-directional printing, etc. Such enhancements should be tested with the applications program(s) and the Eagle computer before the printer is purchased.

7: WORD ABOUT PRINTERS

7. Check that all necessary printer interface cabling is supplied. Some of the serial or parallel printers can be connected to your computer with so-called "standard" RS 232 or IBM PC parallel cables, but not all. The manual for the printer should be reviewed for cable pinouts and compared to the Eagle's. The dealer should be able to supply a cable, either from stock or custom made. The connectors at each end of the cable should be marked "Eagle" and "Printer" to avoid incorrect cabling.
8. Determine all of the correct switch settings for the printer. Most printers have switches which can be set to match the printer to the needs of the computer or applications software. These settings should be supplied by the dealer or by the printer manufacturer. Once the switch settings are known and proven in use, they should be recorded in the printer manual.
9. Check the availability of ribbons, printwheels, accessories, etc. for your printer. Make certain that there is a reliable local source for all needed supplies. The dealer should be able to obtain accessories.
10. Insist on a live demonstration with the printer connected to your Eagle computer model; use the desired applications software which will output to the printer. A word-processing program is best because it places the most demands on a printer for text purposes. Be sure to run a graphics program if that is your need.

7: WORD ABOUT PRINTERS

11. Other questions to consider:
 - a. Do the special enhancements work?
 - b. Does the printer produce margins and indents correctly?
 - c. Can the printer subscript and superscript?
 - d. Does the buffer feature (if present) work as advertised?
 - e. Is the printer quality satisfactory?
 - f. Can print sizes be changed?
 - g. Do all of the above work in the PS and non-PS modes?

7: WORD ABOUT PRINTERS

PRINTER INSTALLATION

- STEP 1** Place the printer near the Eagle computer on a separate, supported work surface to prevent the vibrations from the printer from jarring the computer video screen.
- STEP 2** Follow the unpacking instructions in your printer's user's manual; comply with the recommended electrical requirements.
- STEP 3** Determine whether your printer is "serial" or "parallel" by referring to the printer's user's manual, or by asking your Eagle Dealer.
- STEP 4** If you have a serial printer, connect one end of the printer cable, supplied by your dealer, to Serial Port A or Serial Port B found on the system enclosure rear panel.
- If you have a parallel printer, connect the cable to the Parallel Port. Refer to the following figure for the location of the printer ports.
- STEP 5** Connect the other end of the cable to the interface port on the back of your printer. Refer to your printer manual for the location of the interface port.

7: WORD ABOUT PRINTERS

- STEP 6** If you purchased an automatic paper feeder for your system, install it on the printer following the directions that accompanied the feeder.
- STEP 7** Turn on the printer.
- STEP 8** Set the parameters of the computers output ports to match the printer. Perform a print test.
- STEP 9** Check to see that the sheet feeder (if present) is also powered up. Check that the top-of-form is set correctly.

8: TROUBLESHOOTING GUIDE

INTRODUCTION

This section first outlines general guidelines to follow when you have problems with your Eagle PC Spirit system. Once these steps have been performed, additional information is provided for further troubleshooting in the following order: External Disk Problems, System Boot Problems, Video Problems, Keyboard Problems, and Floppy Diskette Problems. The final two subsections discuss possible solutions to major system failures - perform the EPROM "T-Test", and reinitialize the hard disk.

We strongly recommend that you DO NOT use the hard disk initialization diskette unless you are absolutely sure the hard disk is damaged. You will destroy all the data and programs on the hard disk when you use this diskette.

8: TROUBLESHOOTING GUIDE

STEP 1: REVIEW OPERATION PROCEDURES

When your computer system fails to perform a specific instruction or else fails in a larger mechanical sense, it is important that you review the steps you performed before the failure.

1. Check to see that you have entered all data and commands using the correct spelling and syntax.
2. Check that all necessary instructions have been performed correctly and in the proper order.
3. If the system has displays error message, be sure to look up the meaning in one of your reference manuals.
4. If it is possible to repeat the steps performed which took you to the failure point (without losing your work or having to laboriously reenter everything), then do so. If there is the danger of losing your work when repeating certain steps, try to save your work with a filename not currently being used.
5. The best way to check the correctness of your steps performed up to the failure point is to reboot and try again. (It may be necessary to boot up from the power-off condition.) Heed the above warnings about losing your work and use unique filenames during the retry.

8: TROUBLESHOOTING GUIDE

6. Check that the floppy diskette (if used) is properly inserted and the drive lever is closed.
7. Check whether peripheral equipment (printer, modem, etc.) is indicating an error condition. The device may need to be reset or turned on and off. Check that the device is set up and cabled correctly and all switches and controls on the equipment are correctly set.

NOTE

If the problem has not been located after checking this list, use the following sections to determine where the problem resides.

8: TROUBLESHOOTING GUIDE

EXTERNAL DEVICE PROBLEMS

1. Check the commands which you have entered to the external device. The device name (eg, LPT1) must be used correctly, and the device may need initialization by your system prior to use.
2. Check the external device for error conditions. For instance on printers, check whether the paper has run out, whether the ribbon has run out, or whether there has been a "data" error. Also check whether the printer is switched to local use. If it seems in good shape, perform a "self-test" to determine that it indeed works. For a modem, a "self-test" is usually all that one can do.
3. If the device does not respond at all, check that it is plugged into an AC source (if necessary), that it is switched on, and whether the device's fuse is intact.

WARNING

Before inspecting fuses, all power must be turned off and the device disconnected from the AC source. Check your device's user's guide for further instructions.

8: TROUBLESHOOTING GUIDE

4. Check that cables between your computer and the device, and between other devices (such as phone lines) are connected properly at both ends. The connectors should be tightly mated. Check for bent or pushed-in pins. If there are screws or hold-down clips to ensure that the cables stay attached to the machines, then be sure to use them. Check that a cable has not been severely creased or severed. Replace a suspect cable with a good one.
5. When connecting a cable between your Eagle computer and a serial device for the first time, be sure to compare the pinouts of Eagle's serial ports to that of your device's. The RS-232 interface requires specific signals, so be sure to obtain qualified help if you are unable to devise a satisfactory cable yourself.
6. External devices usually require that the computer and the device communicate with a certain common protocol. For a serial device, check that each machine is set for the same transfer speed (baud rate), and that an appropriate number of start and stop bits are used.
7. Your computer is provided with two serial ports. Try connecting your serial device to the other port; keep in mind that the new port must be set up properly (baud rates, etc.).

8: TROUBLESHOOTING GUIDE

SYSTEM PROBLEMS - SYSTEM WON'T BOOT

If your system does not respond in any way after switching the power on, check the following items:

1. Check that the AC power cord is plugged into an AC source.
2. Check that the fuse is intact.

NOTE

The fuse is located in the slot access area. Use only a 120 Volt, 2 Ampere fuse for replacement, or 220 Volt, 1 Ampere as indicated by the product label on the unit's rear panel.

If the system responds to the AC power, but does not boot, check the following items:

1. If you are using a floppy diskette, check whether it has or needs an operating system.
2. Check the video controls.

If the system was running but cannot be rebooted off either hard or floppy disk drive, reboot from power off. Ordinarily, we recommend running the PD program before switching the power off. That is impossible in this situation, so we recommend to minimize the chance of damaging your hard disk, turn off the power and let the hard disk come to a complete stop before switching the power back on.

8: TROUBLESHOOTING GUIDE

VIDEO PROBLEMS

Because the video components and connections are on the inside of your computer, very little troubleshooting is possible. However, you can try adjusting the Contrast and Brightness controls, and otherwise rebooting. If there continues to be no display, you may try connecting a color monitor (15.75 KHz) to the video board's 9-pin connector. A proper display there would indicate that your computer's CRT is defective. Be aware that from a power off condition, the display takes several seconds to warm up.

8: TROUBLESHOOTING GUIDE

KEYBOARD PROBLEMS

After certain combinations of keyboard activity during disk drive accessing, the keyboard may become "locked up," unable to respond. Generally, this problem occurs when the system has become "hung", and the system requires rebooting.

Sometimes the keyboard will act as if the system is "hung" when a simpler situation exists. Holding down a key will cause that particular character to be repeatedly inputted. At a certain point, the computer's keyboard buffer fills up and it will reject any subsequent input from the keyboard. The computer signals each rejection with a "beep." If this situation develops, wait a few seconds for the computer to digest the characters in its buffer.

If the computer expects this input to be commands, it may take time for the sequence of "bad commands" to process. Using [Ctrl] + [Break] may interrupt such processing. However, if the keyboard does not respond, reboot the system. Remove all diskettes, turn off the power, let the hard disk spin to a stop, and boot from power-off.

8: TROUBLESHOOTING GUIDE

If an optional keyboard is used, be sure that the connector is firmly inserted. If it is not, the keyboard will appear to be malfunctioning; this sometimes appears on the screen as random or strange characters.

WARNING

Never disconnect or reconnect a keyboard while a computer is running. The keyboard electronics are very charge-sensitive and can be damaged simply by being unplugged with the computer on. Only connect or reconnect a keyboard when the computer is turned off.

8: TROUBLESHOOTING GUIDE

FLOPPY DISKETTE PROBLEMS

Various problems can occur with floppy diskettes and floppy drives. When a diskette begins to have read problems, it is time to recover information from it (by DISKCOPY, DISKUTIL, or COPY), or else to clean the floppy drive heads.

Check for these other circumstances:

1. Diskette will not boot. Check to see if an operating system is on it (must have the file COMMAND.COM for MS-DOS).
2. "Disk error reading drive X". It usually indicates that the drive lever is not closed, or that a floppy diskette is not inserted.
3. Misallocated sectors cause loss of information for at least one file. Recover as many files as possible by COPYing to another diskette.
4. If you cannot write on a diskette, check whether the write-protect tab is in place.
5. In CP/M-86, the disk drive status may need to be changed to R/W.

8: TROUBLESHOOTING GUIDE

EPROM T-TEST

Whenever the system has failed, the "T-Test" should be performed to determine if there is a major hardware failure. The T-Test routines are stored in the EPROMs.

The EPROMs on your computer's mainboard contain the "firmware" which commands the system to boot an operating system and other information off of a disk drive. Another responsibility of the EPROM is to initialize the registers on all the programmable chips within the computer.

Therefore, as a variant of the initialization procedures, Eagle has included routines in the EPROM which will test all the programmable chips and all the memory addresses. These tests consist of writing to all the registers and addresses and reading back the information.

To perform the T-Test routines, simply hold down the [T] key while booting or rebooting. No disk drive activity will occur. If a mainboard hardware problem is at fault, then the T-Test routines will produce error messages concerning the 8253 Timer/Counter, the 8237 DMA Controller, the serial port system, or a message about errors found with the RAM chips. Failure of certain chips can prevent the T-Test from being performed.

8: TROUBLESHOOTING GUIDE

NOTE

The message "No RS-232 Loop Back Detected." indicates that the system will not test the serial ports. This is the normal situation, unless you have special cables for such testing.

After the tests begin cycling repeatedly through the Memory Tests (RAM tests), the T-Test can be halted by turning off the system. The T-Test can be halted at any point in this way.

If an error is noted by the T-Test, repeat the T-Test (by turning the power switch off and on and holding down [T]) to verify the problem. If the error persists, contact your Eagle dealer for service, as discussed in the **EAGLE CUSTOMER SERVICE GUIDE**.

8: TROUBLESHOOTING GUIDE

RE-INITIALIZING THE HARD DISK

Eagle has provided a diskette in this User's Guide labelled "Hard Disk Initialization Diskette". The software on this diskette will allow you to regain use of your hard disk in extreme cases when no other solution will work. It is imperative that you try all other methods of troubleshooting your system before using this diskette - all software data on the hard disk will be lost. This is one reason why making timely backups of your files on diskettes is important.

RE-INITIALIZATION PRECAUTIONS

Before using this diskette, verify that your computer works in all other respects, except that the hard disk cannot be accessed or booted from. Try booting from the hard disk. Try booting off the floppy drive and accessing the hard disk. Make sure the operating system on your floppy diskette is compatible with the operating system on your hard disk - for instance, the CP/M-86 diskette provided by Eagle cannot and is not supposed to access the hard disk.

Review the partitioning history of your hard disk to determine whether you may have deleted a partition which your diskettes now cannot access. If you have deleted a partition in this manner, you will have to use another partition's operating system or recreate the lost partition.

8: TROUBLESHOOTING GUIDE

Perform the T-Test and check the external devices attached to your computer.

Given the information above about the operating systems, if you can boot off the floppy drive and the video display works fine, and everything except the hard disk seems to be working correctly, you can consider using the Hard Disk Initialization Diskette.

CAUTION

The Hard Disk Initialization Diskette will destroy all the data on your hard disk. Do not use it, unless you are sure the hard disk definitely has a problem.

8: TROUBLESHOOTING GUIDE

USING THE HARD DISK INITIALIZATION DISKETTE

The diskette is simple to use. Simply insert it in the floppy drive and boot from it (from power off).

The diskette will first ask you repeatedly if you wish to perform initialization to test your resolve about initializing the hard disk. You have several chances to cancel out at this point.

After you have demonstrated your determination to proceed, the diskette's software will perform a number of operations in the following sequence:

1. Initialize the hard disk's tables.
2. Run FDISK for the MS-DOS 2.0 partition (you supply input).
3. Format the MS-DOS 2.0 partition.
4. Install the MS-DOS 2.0 Operating System.

It is up to you to restore your MS-DOS 2.0 files, and to format and install your software for any other partitions you used to have.

10: HARDWARE INSTALLATION

INTRODUCTION

The Eagle PC Spirit XL has been designed to operate easily. It can use software based on the MS-DOS (1.1, Eagle 1.25, and 2.0) and CP/M-86 operating systems, and is compatible with many optional hardware devices.

Eagle offers many optional hardware adaptor boards and external devices (as detailed in the previous section) which the user may install himself. Other company's products may also be installed.

The purpose of this section is to describe the procedures necessary for attaching external optional devices and installing internal optional hardware.

10: HARDWARE INSTALLATION

SYSTEM DESCRIPTION

The basic components of the Eagle Spirit XL have already been described in Section 2. Here, we will discuss the implications of the mainboard design and adaptor boards.

The mainboard has four slots in which adaptor boards can be inserted. The procedures for installing optional adaptor boards will follow. On the Spirit XL, there are three adaptor boards in place controlling various onboard devices. The largest board controls the video display. That board and the display are connected together by a 1/4" tubular wire with two connectors at the adaptor board. The next largest board is the Adaptek board which controls the hard disk storage unit. There are two flat ribbon cables connecting the Adaptek board and the hard disk drive. The smallest adaptor board is the floppy-disk drive controller board. One flat ribbon cable connects this board and the floppy disk drive.

The power supply is in the middle of the unit, directly behind the On/Off switch. It is connected to the mainboard, the floppy disk drive, the hard disk drive, the fan, an EMI filter and the video display.

The power cables between the supply and the mainboard, fan, and EMI filters are ones you may need to disconnect. Note the arrangement of the power cables and adapter board cables and the exact position of each connector (ie, so as not to reinstall a connector upside down) before removal for proper reassembly.

10: HARDWARE INSTALLATION

The dynamic Random Access Memory chips (RAMs) are located on the mainboard underneath the disk drives. 128 Kb of RAM comes standard. Through a unique design, either 64Kx1, or 256Kx1 RAM chips can be installed in the U500 and U600 sockets on the mainboard.

If 64Kx1 chips are installed, then the maximum amount of memory which can be on the mainboard is 256 Kb. If 256Kx1 RAM chips are installed in the mainboard U500 and U600 sockets, then up to 640K of RAM can be on the mainboard. Jumper J13 must be connected if 256Kx1 RAM chips are used. The U400 sockets can accept only 64K RAM chips.

It is necessary to set the switches at SW801 to indicate the amount of RAM installed on the mainboard. When the Spirit XL leaves the factory, the switches have been configured for correct initial use. Additional RAM (though no greater than a system total of 640Kb) can be installed on boards in the adaptor slots. With the use of either size RAM chips, the fourth bank of sockets (U601-U608) does not have to be filled.

The mainboard comes with two serial ports and one parallel port. The serial ports are referred to as COM1 and COM2. Their specific I/O addresses (used internally by the system) can be selected to alternatives by changing two jumpers. The parallel port, LPT1, can also be jumpered to a different I/O address if need be. In addition, COM2 can be jumpered for a hardware interrupt level of either 3 or 4 (3 is greater priority).

10: HARDWARE INSTALLATION

EXTERNAL CONNECTIONS

The following connectors are accessible from the outside of the unit to connect external devices:

1. Two 25-pin, male connectors for serial devices.
2. One 25-pin, male connector for parallel devices.
3. One 5-pin female DIN socket for attachment of optional keyboard.
4. One 9-pin female "D" socket for external 15.75 KHz monitor.
5. One female RCA phone jack for external 15.75 KHz composite monitor.

The mainboard allows for a second keyboard to be connected, so that the optional Eagle 105-key keyboard or another manufacturer's may be used.

The video board has two connectors accessed through the slot access area. 15.75 KHz, 640X200 pixel color monitors or home televisions can be connected through either the 9-pin "D" connector or the composite output jack. (Use of a home television requires an RF modulator).

10: HARDWARE INSTALLATION

INTERNAL DEVICE INSTALLATION

OPENING THE MAIN UNIT

STEP 1 Remove diskettes, and if the computer is on, run the PD program.

CAUTION

Because the Spirit-XL has a hard disk, it is important to use the QUIT option, or else run the PD program, to prevent damage to the hard disk storage unit before turning off the power.

STEP 2 Turn off all power to the unit, and unplug the AC cord from the wall.

WARNING

To prevent electrical shock during disassembly, be sure to disconnect your computer from AC power.

10: HARDWARE INSTALLATION

OPENING THE MAIN UNIT (CONT'D)

- STEP 3** Place the system on a clean, level, flat surface with the rear of the system facing you.
- STEP 4** Remove the four screws at the top edge of the rear panel, and two screws at the front edge on the top panel. Place these screws aside in a safe place. Since they are painted, you don't want to use them later during reassembly on the inside of the computer.
- STEP 5** Place one hand along each side panel of the top cover. Gently pull the cover out from under the edge of the system's front bezel. Place the top cover safely to one side.
- STEP 6** At this point, if adaptor boards are to be inserted or removed, no further disassembly is necessary (unless switch settings are affected).

NOTE

A long probe could change the switch settings, if done carefully, without further disassembly.

10: HARDWARE INSTALLATION

OPENING THE MAIN UNIT (CONT'D)

STEP 6 (CONT'D)

However, if mainboard memory is being expanded, an Intel 8087 Numeric Processor is being installed, or certain jumpers or switch settings are being changed, then further work must be performed. Refer to the following pages for further instructions.

10: HARDWARE INSTALLATION

COMPLETE DISASSEMBLY

STEP 1 Perform the steps for **OPENING THE MAIN UNIT.**

STEP 2 Disconnect the following cables:

1. Power supply to main board-- disconnect the end at the main board.

NOTE

These wires attach to the mainboard connectors on the side nearest the power supply.

2. From video unit to adaptor board (in slot)--disconnect at the adaptor board.

NOTE

At the adaptor board, each connector has an empty socket, which should be to the left of all pins.

10: HARDWARE INSTALLATION

COMPLETE DISASSEMBLY (CONT'D)

STEP 2 (CONT'D)

3. Two broad ribbon cables from hard disk drive to adaptor board (in slot)--disconnect the cables at the drive.

NOTE

These ribbons enter the connectors at the drive on the side nearest the power supply.

4. One ribbon cable from the floppy diskette drive to adaptor board (in slot)--disconnect at the adaptor board.

NOTE

The ribbon enters the adaptor board connector from the side nearest the drives.

10: HARDWARE INSTALLATION

COMPLETE DISASSEMBLY (CONT'D)

STEP 3 Remove the nut from the keyboard coiled cable near jumper J16 and disconnect connector at J16. Remove coiled cable from housing.

STEP 4 Carefully turn the main unit on end, so that it is standing on the front bezel.

CAUTION

Be sure to have the area beneath the main unit's front bezel clear of objects which might mar the finish.

STEP 5 Remove the four screws from the bottom cover, along the edge near the front bezel. Place these screws aside in a safe place.

STEP 6 Remove the two screws attaching the front bezel to the upright extensions of the main unit bottom cover.

STEP 7 Remove the bottom cover (with main-board) and place to one side. The front bezel will have video components, power supply, and disk drives attached.

10: HARDWARE INSTALLATION

MEMORY INSTALLATION

The mainboard has four banks of RAM. Each bank consists of eight locations for RAM chips. Each chip in a bank stores one bit per address. Thus, a bank of eight chips stores a byte of data for a range of addresses. The lowest order bit for any byte is in the UX01 location and the highest is UX08, where X designates 3, 4, 5, or 6.

The U300 sockets (U301-U308) are soldered in and represent the lowest 64K. The U400, U500 and U600 banks have sockets for memory installation. U400 is the 64-128K bank. U401-U408 can accept only 64Kx1 chips.

U500 and U600 banks can accept either 64Kx1 or 256Kx1 chips. The U500 bank are the lower addresses (starting at 128K) and U600 are the higher. For either type of chip for these two banks, if only one bank's worth is to be used, they must be installed in the U500 bank. Jumper J13 must be set if 256Kx1 chips are used. 64Kx1 and 256Kx1 chips cannot both be used in these banks at the same time.

10: HARDWARE INSTALLATION

After memory chip installation, the SW801 switches must be set to indicate the total amount of RAM memory installed on the mainboard. Table 2 below shows the appropriate switch settings.

TABLE 2: MEMORY SWITCH SETTINGS

SWITCH POSITIONS				MAX ON	CHIPS	
1	2	3	4	MAIN BD	USED	J13
ON	ON	ON	ON	64K	64Kx1	OUT
OFF	ON	ON	ON	128K	64Kx1	OUT
ON	OFF	ON	ON	192K	64Kx1	OUT
OFF	OFF	ON	ON	256K	64Kx1	OUT
OFF	ON	OFF	ON	384K	256Kx1	IN
OFF	ON	ON	OFF	640K	256Kx1	IN

10: HARDWARE INSTALLATION

INSTALLATION OR REMOVAL OF FLOPPY DRIVES

Table 3 indicates the switch settings for switches 5 and 6 in SW801 if additional floppy disk drives are used or if drives are removed.

TABLE 3: FLOPPY DRIVE SWITCH SETTINGS

SWITCH POSITIONS		NO. OF FLOPPY DRIVES
5	6	
ON	ON	1
ON	OFF	2
OFF	ON	3
OFF	OFF	4

10: HARDWARE INSTALLATION

VIDEO DEVICE INSTALLATION

Switches 7 and 8 in SW801 are used to specify the initial display mode used when booting. Use Table 4 to select the appropriate settings if you change your video system. (Factory setting is for 80 x 25 "color".)

TABLE 4: VIDEO SWITCH SETTINGS

SWITCH POSITONS		DISPLAY @ POWERUP
7	8	
ON	ON	No Display
ON	OFF	Color 40X25
OFF	ON	Color 80X25
OFF	OFF	Monochrome 80X25

10: HARDWARE INSTALLATION

OTHER JUMPERS

The mainboard allows for other hardware changes or attachments as indicated in Table 5. Do not alter the setting of these jumpers (except possibly J13) without consulting with your Eagle dealer.

TABLE 5: JUMPER SETTINGS

JUMPER	PURPOSE
J6	Speaker Connector
J7	Ground Connector
J8	Power Connector
J9	Configuration for COM1 and COM2 (reverse pin 2,3 definition)
J10	COM1 I/O address 3F8 or 3E8.
J11	IRQ3 or IRQ4 for COM2.
J12	COM2 I/O address 2F8 or 2E8.
J13	256Kxl RAM chips used.
J14	Parallel Port I/O address 378 or 278.
J15	Parallel Port Enable
J16	Second Keyboard connector

10: HARDWARE INSTALLATION

REASSEMBLY

Perform reassembly in reverse order of the disassembly. Place bottom cover around front bezel, and begin wiring the cable back to the components. When cabled, screw the bottom cover to the bezel. Then attach the top cover.

**EAGLE PC SPIRIT XL
TECHNICAL SPECIFICATIONS**

DIMENSIONS W x H x D (inches)

Closed System 19.38 X 8.38 X 15.9

Open System 19.38 X 8.38 X 15.5

Keyboard 18 X 7.4 X 1.5

System Weight 33 lbs

HARDWARE

Microprocessor Intel 8088 @ 4.77 MHz

RAM 128 Kbytes on mainboard standard.
Supports up to 640 Kb.

Storage
Devices 10 Megabyte internal hard disk.

1 48 tpi, double-sided, double-density,
floppy diskette drive (360/320 Kbytes
formatted storage).

Interface
Capabilities 2 RS-232 serial ports. 1 parallel port
(25-pin).

Keyboard 84 key stations. 10 Function keys,
keypad and cursor controls.

Video
Display 9", P31 green phosphor.
Medium resolution graphics, 640 X 200
pixels, text mode 80 columns by 25 rows.

APPENDIX A

EAGLE PC SPIRIT-XL TECHNICAL SPECIFICATIONS (CONT'D)

SOFTWARE

Operating Systems	MS-DOS 2.0	(Standard)
	CP/M-86	(Standard)
	MS-DOS 1.25	(Optional)
Programming Language	GWBasic	(Standard)

ENVIRONMENTAL REQUIREMENTS

Temperature	System OFF	50-110 F
	System ON	60-95 F

Humidity	System OFF	20-80%
	System ON	8-80%

Maximum Altitude	System OFF	12,000 ft
	System ON	8,000 ft

Voltage Requirements	Nominal	120 Volts/60 Hz
		220 Volts/60 Hz
	Minimum	90 Volts/60 Hz
180 Volts/60 Hz		
Maximum	135 Volts/60 Hz	
	260 Volts/60 Hz	

COM1, COM2 SERIAL PORT PIN SPECIFICATIONS

The two serial ports, COM1 and COM2, on the rear panel of the main unit, use the EIA RS-232 interface standard. Female connectors are necessary to mate with the serial ports.

The following table indicates the signal names used for each pin by your Eagle, as set up at the factory.

PIN	SIGNAL NAME
2	Transmitted Data
3	Received Data
4	Request to Send
5	Clear to Send
6	Data Set Ready
7	Signal Ground
8	Carrier Detect
20	Data Terminal Ready
22	Ring Indicator

APPENDIX B

LPT1 PARALLEL PORT PIN SPECIFICATIONS

The parallel port LPT1, on the rear panel of the main unit, uses a 25-pin connector. A male cable connector must be used to mate with the port.

The following table indicates the signal names associated with the pins.

PIN	SIGNAL NAME
1	Strobe (-)
2	Data Bit 0 (+)
3	Data Bit 1 (+)
4	Data Bit 2 (+)
5	Data Bit 3 (+)
6	Data Bit 4 (+)
7	Data Bit 5 (+)
8	Data Bit 6 (+)
9	Data Bit 7 (+)
10	Acknowledge (-)
11	Busy (+)
12	Paper End (+)
13	Select (+)
14	Auto Feed (-)
15	Error (-)
16	Init Printer (-)
17	Select Printer (-)
18-25	Ground

PATHNAMES AND TREE STRUCTURES

There is an analogy between personal addresses and tree-structured directories as used in MS-DOS 2.0. When our country was first formed, it was sufficient to address mail to John Doe, in the New World. As the country grew, the form of addressing mail had to change. There were John Does in every city. Mail was then addressed to John Doe of Virginia City in the New World.

As the population grew (or as more disk files are added to your hard disk), a more detailed address was needed.

Today, an address typically consists of a country name, name of state, name of a city, zip code within the city, street name, street address, and ultimately, the name of the individual.

Now we can talk about John Doe of the USA residing in California, in the city of Irvine, with the zip code of 92714, on Deere Street, at address 16C and know for certain which John Doe we are talking about. We could in short-hand notation refer to this John Doe as:
\`USA` \`California` \`Irvine` \`92714` \`Deere Street` \`16C` \`John Doe`. The above pathname uniquely identifies this particular John Doe (analogous to a particular file).

To refer to another person (file), say John's wife Kim, in the same country, state, city, zip code, street, and street address, we could use the same basic pathname, substituting the new name:
\`USA` \`California` \`Irvine` \`92714` \`Deere Street` \`16C` \`Kim Doe`.

If another John Doe existed in Irvine, but at a different address, we could identify him with the following:
\`USA` \`California` \`Irvine` \`92715` \`Main Street` \`123` \`John Doe`.

APPENDIX C

If we consider the people's names in the above examples as files, and the other entries in the pathnames as subdirectories, consider the following shortcut. In MS-DOS 2.0, the symbol ".." is used to identify the parent subdirectory of the current directory. If we are in the subdirectory corresponding to the 16C address, then to get to the subdirectories with the John Doe at 123 Main Street, we need to back up three levels (from the 16C subdirectory to the Irvine subdirectory) and down another three. This can be accomplished from 16C, as follows:

```
CD ..\..\..\92715\Main Street\123
```

Then the subdirectory corresponding to 123 would contain the file for the other "John Doe."

The analogy above should be amended such that any level subdirectory can have files as well as subdirectories below it. Thus the city of Irvine could have a file "Post Office", "Police Department", etc with no need for additional "addressing" via subdirectory hierarchy.

The ability to organize one's files can produce any addressing scheme imaginable, subject to certain constraints regarding the length of pathnames (usually limited to 64 characters at a time, except when backing up a hard disk).

CHARA

VALUE		
HEX	DEC	SYMBOL
00	0	(NULL)
01	1	☺
02	2	●
03	3	♥
04	4	♦
05	5	♣
06	6	♠
07	7	(BELL) •
08	8	(BS) •
09	9	○
0A	10	•
		(LF)
0B	11	♂
0C	12	♀
0D	13	♪ (CR)
0E	14	♫
0F	15	☼
10	16	▶
11	17	◀
12	18	⋮
13	19	!!
14	20	¶
15	21	§
16	22	■
17	23	⤵

VALUE		
HEX	DEC	SYMBOL
18	24	↑
19	25	↓
1A	26	→
1B	27	← (ESC)
1C	28	└
1D	29	↔
1E	30	▲
1F	31	▼
20	32	BLANK (SPACE)
21	33	!
22	34	~
23	35	#
24	36	\$
25	37	%
26	38	&
27	39	'
28	40	(
29	41)
2A	42	*
2B	43	+
2C	44	,
2D	45	-
2E	46	.

VALUE
HEX
2F
30
31
32
33
34
35
36
37
38
39
3A
3B
3C
3D
3E
3F
40
41
42
43
44
45
46
47
48
49
4A

ER SET

SYMBOL
/
0
1
2
3
4
5
6
7
8
9
:
;
<
=
>
?
•
A
B
C
D
E
F
G
H
I
J

VALUE		SYMBOL
HEX	DEC	SYMBOL
4B	75	K
4C	76	L
4D	77	M
4E	78	N
4F	79	O
50	80	P
51	81	Q
52	82	R
53	83	S
54	84	T
55	85	U
56	86	V
57	87	W
58	88	X
59	89	Y
5A	90	Z
5B	91	[
5C	92	\
5D	93]
5E	94	^
5F	95	_
60	96	`
61	97	a
62	98	b
63	99	c
64	100	d
65	101	e
66	102	f

VALUE		SYMBOL
HEX	DEC	SYMBOL
67	103	g
68	104	h
69	105	i
6A	106	j
6B	107	k
6C	108	l
6D	109	m
6E	110	n
6F	111	o
70	112	p
71	113	q
72	114	r
73	115	s
74	116	t
75	117	u
76	118	v
77	119	w
78	120	x
79	121	y
7A	122	z
7B	123	{
7C	124	
7D	125	}
7E	126	~
7F	127	Δ

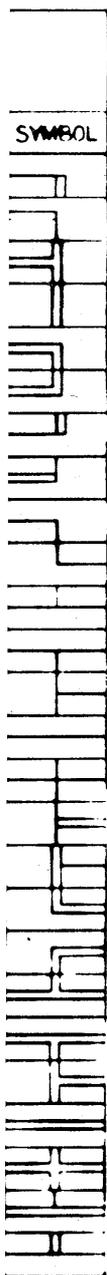
CHARA

VALUE		SYMBOL
HEX	DEC	
80	128	ç
81	129	ü
82	130	é
83	131	â
84	132	ä
85	133	à
86	134	ã
87	135	ç
88	136	ê
89	137	ë
8A	138	è
8B	139	ï
8C	140	î
8D	141	ï
8E	142	Ä
8F	143	Å
90	144	É
91	145	æ
92	146	Æ
93	147	ó
94	148	ö
95	149	ò
96	150	û
97	151	ù
98	152	ÿ
99	153	ö
9A	154	ü

VALUE		SYMBOL
HEX	DEC	
9B	155	ç
9C	156	ç
9D	157	¥
9E	158	£
9F	159	f
A0	160	á
A1	161	í
A2	162	ó
A3	163	ú
A4	164	ñ
A5	165	Ñ
A6	166	ä
A7	167	o
A8	168	o
A9	169	┘
AA	170	┘
AB	171	½
AC	172	¼
AD	173	ı
AE	174	<<
AF	175	>>
B0	176	1/2 1/2 1/2 1/2
B1	177	1/2 1/2 1/2 1/2
B2	178	1/2 1/2 1/2 1/2
B3	179	
B4	180	
B5	181	
B6	182	

VAL
HEX
E7
B8
B9
BA
BE
BC
BD
BE
BF
C0
C1
C2
C3
C4
C5
C6
C7
C8
C9
CA
CB
CC
CD
CE
CF
DD

ER SET



VALUE		
HEX	DEC	SYMBOL
D1	209	
D2	210	
D3	211	
D4	212	
D5	213	
D6	214	
D7	215	
D8	216	
D9	217	
DA	218	
DB	219	
DC	220	
DD	221	
DE	222	
DF	223	
E0	224	α
E1	225	β
E2	226	γ
E3	227	π
E4	228	Σ
E5	229	σ
E6	230	ι
E7	231	τ
E8	232	φ
E9	233	⊖
EA	234	Ω
EB	235	δ

VALUE		
HEX	DEC	SYMBOL
EC	236	∞
ED	237	♣
EE	238	€
EF	239	∩
FO	240	≡
F1	241	±
F2	242	➤
F3	243	◀
F4	244	∫
F5	245	∫
FG	246	+
F7	247	≈
F8	248	○
F9	249	●
FA	250	•
FB	251	√
FC	252	π
FD	253	2
FE	254	■
FF	255	BLANK

INTRODUCTION

This section contains a glossary of commonly used computer terms. The glossary is intended to provide you with a greater general knowledge of computers and computer terminology. Two books were used as references in compiling the definitions, the Computer Dictionary by Charles J. and Roger J. Sippi (Howard W. Sams & Co., Inc., Indianapolis, Indiana) and The Good Computing Book for Beginners, by Dennis Jarrett (ECC Publications, Ltd., London).

- Access** To read or write from a memory location or a stored record on disc or tape.
- Address** A specific storage location in a computer's memory.
- Alphanumeric** Information that consists of letters of the alphabet, numbers, and other symbols like arithmetic signs and punctuation marks.
- Analog Computer** An electronic or mechanical device that uses a variable quantity, such as a voltage or rotation, to represent a numerical quantity. Common examples of simple analog computers include the slide rule and tachometer in your car. Most computers are digital.
- Application Software** Software programs which enable the computer to do something - create a letter or worksheet, keep accounts, etc.

APPENDIX E

Application Software	Software programs which enable the computer to do something - create a letter or worksheet, keep accounts, etc.
Arithmetic Logic Unit (ALU)	The portion of the central processing unit (CPU) that performs arithmetic and logical operations.
ASCII Code	An acronym for American Standard Code for Information Interchange. ASCII is a code for representing alphanumeric characters. ASCII permits computers to manipulate words as well as numbers.
Assembly Language	A computer language of a microprocessor which uses convenient mnemonics in place of machine language (binary) commands.
Asynchronous	A mode of computer operation in which the completion of the previous operation signals the next operation to begin. It is a mode of working which does not depend upon timing requirements.
Backup	To copy information (all or part) from one storage medium to another: hard disk to floppy and vice versa, disk to tape, etc.

- BASIC** An acronym for Beginner's All Purpose Symbolic Instruction Code. BASIC is an easily learned higher level programming language that is used by most personal and business computer manufacturers. No two BASIC interpreters are completely alike, although recoding from different computers is straight-forward; once you have learned one computer's BASIC you can easily adapt to another.
- Baud rate** The rate at which information is transferred, measured in bits per second.
- Binary** The binary system is a way of representing numbers in base two. It uses only the numbers 0 and 1 to represent numbers. Computers use this number system internally to represent an "on" or "off" condition.
- BIOS** An abbreviation for Basic Input/Output System. The BIOS contains all operating system programming that is machine dependent. It also contains all input/output programs for the console device (keyboard and CRT), disk controller interface, and list device (printer ports).

APPENDIX E

- Bit** An abbreviation for Binary Digit. It is the basic unit of information storage in a computer. A bit can represent a 0 or a 1.
- Boot up** To load the resident instruction program into the computer. This operation is activated by the ON/OFF switch and/or the RESET button.
- Buffer** A temporary storage area between one part of the computer and another.
- Bug** A term for an error, defect or problem. Software bugs are errors in programs or instruction manuals. Hardware bugs are malfunctions in equipment.
- Bus** A group of electrical wires or conductors that interconnect the various sections of a computer. Different computers that use the same bus can often make use of the same peripherals.
- Byte** A unit of information, a byte is a series of eight bits. Information storage (memory) is represented in kilobytes (1024 bytes).

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Central Processing Unit (CPU)	The electronic nerve center of a computer. The CPU contains the arithmetic logic unit as well as the control sections that retrieve program instructions from the memory, decode them, and then execute the instructions.
Character	Usually used in reference to a character of the alphabet but can be used to mean any symbol, punctuation mark, letter or number that can be entered into a keyboard or displayed on a video screen.
Chip	A tiny wafer of silicon measuring a few tenths of an inch square on whose surface is etched and imprinted the components that comprise the integrated circuit (IC) of a microcomputer. The actual chip is enclosed within a plastic or ceramic package for protection.
Clock	An electronic circuit that emits a regulated sequence of electrical pulses synchronizing the operation of a digital computer.
Code	A system of symbols for representing data or instructions in a computer.
Command	An instruction to the computer, given through the keyboard or software, to initiate, modify, or terminate operations.

APPENDIX E

- Compatible** The ability of a computer to handle something designed for another computer - programs, data, or peripherals.
- Compiler** A specialized program within the memory of a computer that converts a high level computer language such as BASIC into the binary machine language that a computer understands.
- Controller** A device (usually one or more PCB's) that runs a peripheral like a printer, video monitor or disk drive.
- CP/M** Abbreviation for Control Program/Micro-computer. CP/M is an operating system software program developed by Digital Research, Inc. The purpose of CP/M is to provide the user with a flexible and manageable means of control over the resources of the computer.
- CRT** An abbreviation for cathode ray tube, which is the video display tube used in television sets, radar displays and video computer terminals.
- Cursor** A means of indicating on the video screen where the next character will appear. The cursor is a blinking block or underline on the EAGLE computer screen.

APPENDIX E

- Data** Usually refers to numerical information, but can mean any kind of information fed into, stored and read out of a computer.
- Data-base** A large pool of data organized into records for access by different applications. When organized for the convenience of user's with different purposes, a database needs a large backup memory and a sophisticated filing system.
- Debugging** Errors in software or hardware are called bugs. Finding and correcting bugs is the sometimes lengthy and often tedious procedure known as debugging.
- Decision** An internal computer operation that compares two pieces of information or verifies the status of a single piece of information, and then takes a specified action.
- Default** The original or retained condition.
- Diagnostic** A software program designed to detect faults in the computer hardware or software.

APPENDIX E

- Digit** A single character or number.
- Digital Computer** A system using discrete signals to represent data numerically with two state binary numbers. Opposite of analog.
- Directory** A list of files (or documents) stored on a disk or other storage medium.
- Disc, Disk** A circular metal plate coated with magnetic material on which data can be recorded. Disks are fixed or removable. Hard disks are fixed, permanently sealed from the outside, with permanently inserted read/write heads. Removable disks perform the same function as fixed disks, although the access is slower and the storage capacity is much less. See also **Hard Disk, Floppy Diskette**.
- Diskette** A removable disk. See also **Floppy Diskette**.
- Disk Drive** An electromechanical device on which a disk is used. The disk drive records data from the computer onto a recording medium, a hard or floppy disk.
- Documentation** Operating instructions, applications information, service information, programs, and other forms of software supplied with a computer or available separately.

APPENDIX E

Double Density	As opposed to single density disks, disks which can store twice the number of bits per inch in a direction tangential to the disks circumference. Double density disk drives are needed to read and write these disks.
Downtime	The period of time a computer is not in operation due to either a mechanical or software failure or due to routine maintenance.
Enhance	To highlight a character from the rest of the text by boldfacing, underlining or capitalizing.
EPROM	Erasable Programmable Read-Only Memory. PROM is normally not alterable. EPROMs can be erased with ultraviolet light and reprogrammed with a special "EPROM burner" device.
Erase	To remove or clear information stored in a computer's memory or on a storage device.
Execute	To perform a specified operation listed in a program, or to run an entire program.
Exit	To leave a program or mode of operation in order to move to another.

APPENDIX E

- File** A collection of data or operating instructions. Also known as a program, document, or worksheet.
- File Server** A network peripheral used in conjunction with an EAGLE computer to provide networking capability for up to 64 CPU's.
- Floppy Disk** Or Floppy Diskette. A removable disk which resembles a flexible 45 RPM record. It is a circular piece of mylar plastic coated on one or both sides with a magnetic material. EAGLE computers use standard 5-1/4" floppy diskette to load programs and store information.
- Format** Before any information can be stored on a disk, it must be formatted. Formatting divides concentric tracks of the disk into sectors and inserts special reference points so that information can be stored and later retrieved.
- Also refers to the page layout of printed text.
- Function** A set of programmed instructions which will perform an operation similar to a command.

APPENDIX E

- Function Key** A key which initiates a function. For example, the [PRINT] key initiates the command to print a file displayed on the screen on the connected printer.
- Graphics** Pictorial representation of information, figures, graphs, pictures, charts on either a video display or on paper. To print out exact, smooth replications of on-screen graphs, you need a graphics plotter.
- Hard Copy** Computer programs, information, results, and other data printed on paper by a printer connected to the computer.
- Hard Disk** A fixed disk consisting of concentric layers of magnetic coated plates or platters. The platters act like a record on a stereo turntable, sitting on a rotating spindle inside the disk drive.
- Hardware** The electronic and mechanical components of a computer: keyboards, fans, video monitors, electronic circuits, etc.
- Hexadecimal** A numeric system based on 16 digits (base 16). The hexadecimal system uses the numbers 0-9, and the letters A (for 10) to F (for 15). It is used to simplify the binary number expressions and machine language program instructions.

APPENDIX E

- Increment** To increase the value of a number by one.
- Inhibit** To prevent something from happening.
- Initialize** To reset a system to its starting condition. Also to check a new disk for flaws.
- Input** Information or data entered into a computer. Also used as a verb, as to enter information or data into a computer.
- Integrated Circuit (IC)** A miniature electronic circuit that is imprinted and etched on the surface of a silicon chip. Sometimes referred to as a chip.
- Interface** A boundary between two systems. It is used to denote communication connections such as a plug, socket, cable, or software interface. It is also used as a verb to mean to interact.
- Interpreter** A language environment whereby commands and programs are executed on an immediate basis, without storage of the machine language coding. See compiler.

APPENDIX E

- Interrupt** A temporary, often brief, suspension in the execution of a program so that a digital computer can handle or service an external event such as the printing of a character or the sampling of a keyboard command.
- I/O** Abbreviation for input/output. Refers to the transfer of information between a computer and a peripheral. An I/O port is a plug or socket connection for a peripheral device.
- K** A common way of describing the memory capacity of a computer. K is derived from kilobytes and corresponds to 1024 information units.
- Keyboard** A device containing alphanumeric keys and control keys in a typewriter-like layout that permits program instructions and data to be manually entered into a computer.
- LAN Adapter** Local Area Network. A PCB installed in a computer slot to interface with other computers.
- Language** An organized system of words, phrases, symbols, characters, and numbers that permits a human operator to communicate with a computer.

APPENDIX E

- Line Printer** A computer printer that produces a complete line of print at one time as opposed to a serial printer which produces one character at a time.
- Load** To transfer data from memory to a storage medium, and vice versa. Also to insert a disk into a disk drive, or to insert paper into a printer.
- Logic** The circuitry which performs the logical operations of comparing, selecting, referencing, sorting, matching, merging, etc., of data in binary form.
- Machine Language** The internal binary language into which more advanced programming languages must be converted before a computer can process a computer program.
- Macro** A specific set of instructions designed to implement a group of commands.
- Magnetic Tape Memory** A form of computer storage memory that records binary information on magnetic recording tape, similar to recording tape used in tape decks and cassettes.
- Memory** Internal storage for data and software programs.

APPENDIX E

- Menu** A selection of program commands or operations within a program.
- Microprocessor** A small integrated circuit that contains the complete central processing unit for a small digital computer.
- Mnemonic** An abbreviated or shorthand version of a word; a memory aid. Mnemonics are commonly used to express various machine language program instructions. For example, CLR, meaning the CLEAR command (equaling machine code AATS).
- Mode** A state of operation. Also an operating system command.
- Modem** An acronym for Modulator/ Demodulator. A device which allows a computer to communicate with another computer or other peripheral device, often over telephone lines.
- MS-DOS** Abbreviation for Microsoft Disk Operating System. An operating system software program developed by Microsoft, Inc.
- Network** A system of interconnecting points. Refers to a number of computers connected together that can access each other's local storage peripherals.

APPENDIX E

- Nibble** A common reference to a binary number or word composed of four bits; half a byte.
- Operating System** System software which controls the handling of data and the interaction between software instructions and hardware operation.
- Output** What you get from a computer, the results, such as answers to mathematic problems, text, etc. Typical output devices are printers and video display units which allow you to see the written or displayed results.
- Parallel** Type of data transfer where all bits of information are sent simultaneously. A parallel interface must have enough wires going into and from the port/socket connection to send and receive all the bits at once. Parallel transfer is usually used with printers.
- Pathname** Used in operating systems which allows a hierarchical directory structure. A sequence of directorynames which leads from the roof directory to the directory of interest or from the current directory to the directory of interest.

APPENDIX E

- PCB** Abbreviation for printed circuit board. A printed electronic circuit or pattern with components mounted on an insulating base.
- PD** Power Down program. When run, it retracts hard disk read/write heads to a safe location in preparation for turning the system power off.
- Peripheral** In general terms, any input or output device connected to a computer: video display terminal, printer, additional storage units (File 10/40), phone modems, etc.
- Pixel** Definable elements on a display screen that are used to form elements on the screen. Also referred to as **picture port**.
- Port** Or communication port. A socket on the computer into which you can plug a terminal, printer, or other peripheral.
- Port Pinouts** The reference designation of the pins or wires within a connector plug or cable.
- Power Supply** An AC-to-DC electricity adapter that converts the power from the wall socket into a form a computer can use.

APPENDIX E

Printer	A peripheral device that prints programs, results of programs, and other information from a computer on either individual sheets or continuous strips of paper. Impact printers print by striking an embossed mechanism or array of pins against a carbon ribbon onto the paper. Nonimpact printers print by applying heat or electricity to specially treated paper.
Program	The list of instructions in a programming language that instructs a computer what to do and how to do it.
Quit	To exit or leave a program. To prepare to turn off the computer for the day.
Random Access Memory	Computer memory that stores information entered into the computer. It is also known as read/write memory.
Read	To copy, transfer, or extract information from one type of computer memory to another.
Read Only Memory (ROM)	A computer memory, often a solid state integrated circuit, that stores permanent information which cannot be changed, like instructions for starting up the computer.

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Read/write Head	A small electromagnetic unit used for reading, recording, or erasing magnetically imprinted data.
Reboot	To cause the computer to reload the operating system and start anew.
Reset	To restore a computer to its initial operating condition. Means the same as initialize.
Restore	To copy or read data back onto the original storage medium.
Run	To execute or follow a computer program.
SASI	Abbreviation for Shugart Associates System Interface. A type of communication interface.
Save	To store or copy information from the temporary computer memory to a more permanent form of storage, like a hard or floppy disk.
Screen Prompts	Messages on the video display which remind or tell you to do something.
SCSI	Abbreviation for Small Computer System Interface Port.

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Sector	A triangular section (or wedge) of a disk that is a location for a block of data.
Serial	Type of data transfer where bits of information are sent or received one at a time in sequence. Opposite of Parallel.
Software	Computer programs, information, and operating instructions.
Spreadsheet	An application software program utilizing rows and columns to define mathematical relationships among data and locations.
Subdirectory	In a hierarchical directory structure, a subdirectory refers to directories in levels below a particular directory, or to all directories which are not the roof directory.
Synchronous	A mode of computer operation in which the parts of process are kept in step by an internal timing mechanism. In synchronous transmission the sending and receiving devices operate at the same time interval between information bits sent and received.

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System Parameter	An item of information which can be changed according to what you want - a constant with variable values. For example, you might have a parameter called printer baud rate, which you would give different values depending on the type of printer.
System Processor	The part of the computer that contains the CPU which processes instructions.
Terminal	The point of communication between the user and the computer. A simple terminal consists of a keyboard, video display and/or printer connected to a computer
TPI	Abbreviation for tracks per inch. The measurement of the amount of storage space on a disk.
Track	The channel on a disk along which data is stored.
Turnkey	A complete and ready-to-go computer. The user turns on the system and is automatically running applications software.
Utility Programs	A collection of programs that perform routine operations like assigning system parameters and copying disks.

APPENDIX E

- VCR Adapter** Video Cassette Recorder Adaptor. A PCB to be installed in a computer's slot to enable interfacing a VCR to the computer. Such an arrangement might be used to backup a hard disk on video tape.
- Video Monitor** Or video display. An output device that displays information on a CRT.
- Word Processing** A software program package for the handling or processing of text. It consists of a text editor program for creating and editing the text and an output program for formatting and printing the text.
- Worksheet** The file which spreadsheet application software uses.
- Write** To store information into memory, or storage medium like punched tape, magnetic tape or floppy disk.

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