

Leading **EDGE**™

fortiva 5000

*System User's
Manual*

First Edition: August 1994

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Warning: *Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.*

Note: *This equipment has been tested and found to comply with the limits for a Class B digital device pursuant to Part 15 of the FCC Rules. These rules are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.*

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful 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 or relocate the receiving antenna.*
- *Increase the separation between the equipment and receiver.*
- *Connect the equipment into an outlet on a circuit different from that which the receiver is needed.*
- *Consult your dealer or an experienced radio/TV technician.*

Shielded interface cables must be used with this product.

Caution: *This system uses a lithium battery to provide battery backup for the internal clock. There is a danger of explosion if this battery is incorrectly replaced. Replace this battery with either the same or an equivalent type of battery that is recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.*

Attention: *Il y a danger d'explosion s'il y a un remplacement incorrect de la batterie. Remplacer uniquement avec une batterie du même type ou d'un type recommandé par le constructeur. Mettre au rebut les batteries usagées conformément aux instructions du fabricant.*

Caution: *For continued protection against risk of fire, replace the Keyboard/Mouse fuse with the same type and rating of fuse.*

FCC Requirements

This equipment complies with Part 68 of the FCC rules. On the back side of this equipment is a label that contains, among other information, the FCC registration number and Ringer Equivalence Number (REN) for this equipment. You must, upon request, provide this information to your telephone company.

The REN is useful to determine the quantity of devices you may connect to your telephone line and still have all of those devices ring when your telephone number is called. In most, but not all areas, the sum of the REN's of all devices connected to one line should not exceed five (5.0). To be sure of the number of devices you may connect to your line, as determined by the REN, you should contact your local telephone company to determine the maximum REN for your calling area. If your telephone equipment causes harm to the telephone network, the Telephone company may discontinue your service temporarily. If possible, they will notify you in advance. But if advance notice isn't practical, you will be notified as soon as possible. You will be informed of your right to file a complaint with the FCC.

Your telephone company may make changes in its facilities equipment, operations, or procedure that could affect the proper functioning of your equipment. If they do, you will be notified in advance to give you an opportunity to maintain uninterrupted telephone service.

If you experience trouble with this equipment, please contact the following address and phone number for information on obtaining service or repairs.

*Leading Edge Products, Inc.
117 Flanders Road
Westborough, MA 01581
Tel. No. (508) 836-4800*

The telephone company may ask that you disconnect this equipment from the network until the problem has been corrected or until you are sure that the equipment is not malfunctioning. This equipment may not be used on coin service provided by the telephone company. Connection to party lines is subject to state tariffs.

Notice: *The Canadian Department of Communications label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational and safety requirements. The Department does not guarantee the equipment will operate to the user's satisfaction.*

Before installing this equipment, users should insure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single line individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines, and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

Caution: *Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.*

The Load Number (LN) *assigned to each terminal device denotes the percentage of the total load to be connected to a telephone loop which is used by the device to prevent overloading. The termination of a loop may consist of any combination of devices subject only to the requirement that the total of the Load Numbers of all the devices does not exceed 100. Refer to the label placed on the circuit board for Load Number information.*

Leading Edge Help: Where to TURN

Manuals

The following manuals are included with your Fortiva Series 5000 Personal Computer:

- **Leading Edge Getting Started Guide** — Read this guide first. It includes information about unpacking and setting up your computer. It also describes some of the basic hardware and software features of your system.
- **User's Guide** — This User's Guide serves as an introduction to the Leading Edge Fortiva 5000 Personal Computer. It describes the computer in detail, contains information on how to set up your system and get it running, and provides the technical information you will need to add accessories.
- **MS-DOS Manual** — This manual details the technical features of MS-DOS. It includes explicit information on each command available in the operating system. Other chapters include information on batch file processing, system configuration features, the editor, the shell, and other utilities.
- **MS-Windows Manual** — This guide explains how to use the MS-Windows graphical interface. It describes the basic fundamentals of MS-Windows, such as using a mouse to select icons and activate programs. It also describes the other features of MS-Windows including its word processor, drawing program, and communications software.
- **Video Utilities Manual** — This manual explains how to configure and operate your Leading Edge VGA board. It explains how to adjust the resolution setting of your system to work with any monitor you may use with your Leading Edge computer.

NOTE: Some Leading Edge systems come with a combined version of the MS-DOS and MS-Windows manuals.

Technical Support

- **Phone** — Leading Edge provides free phone support for systems under warranty as well as standard phone support for older systems. To find which services are available to you, refer to your warranty certificate as well as your Leading Edge Getting Started Guide. The Getting Started Guide and the Leading Edge Windows Online Help Program also contain Leading Edge's Technical Support phone numbers.
- **Online** — If your computer is equipped with a modem, Leading Edge Technical support can be reached through a number of online services. To find out which services are available to you, refer to your Leading Edge Getting Started Guide and the Leading Edge Windows Online Help Program.
- **On and off Site Repair** — Leading Edge also provides various levels of on site and off site repair service. To find out which services are available for your system, refer to your warranty certificate.

About This Guide

This *User's Guide* is an introduction to the Leading Edge Fortiva 5000 Personal Computer. It explains everything you need to know in order to set up and use the computer. It is organized in the following manner:

Chapter 1 highlights the features of the computer as well as optional devices you can add to your system.

Chapter 2 describes how to connect the components of the computer and how to start the system. Also, a brief introduction to floppy disks and disk drives is provided.

Chapter 3 provides an introduction to MS-DOS, the operating system software program that controls the computer's operations; and MS-Windows, the graphical user interface that makes the computer easier to operate.

Chapter 4 explains how to use the SETUP program to configure your system so that all devices are compatible.

Chapter 5 outlines troubleshooting solutions for situations that may arise during installation or normal use of the computer.

Chapter 6 explains how to move the Fortiva 5000 Personal Computer.

Appendix A provides a basic explanation of how a computer uses memory and address assignments, as well as details the Fortiva 5000 Personal Computer's usage of memory, ports, and interrupts.

Appendix B explains how to install and configure optional and upgrade components including more memory, a CPU, and additional disk drives.

Appendix C lists the features and technical specifications of the Fortiva 5000 Personal Computer.

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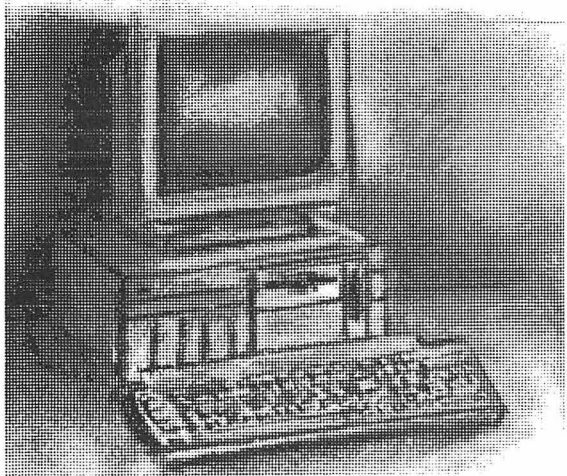
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System Features



*This chapter contains
information about:*

- The standard hardware components of the Fortiva 5000 Personal Computer
- The standard software that comes with your system
- Optional devices available for upgrading the Fortiva 5000 Personal Computer

The first part of the paper is devoted to the study of the asymptotic behavior of the solutions of the system (1.1) as $t \rightarrow \infty$. It is shown that the solutions of the system (1.1) are bounded and converge to zero as $t \rightarrow \infty$. The second part of the paper is devoted to the study of the asymptotic behavior of the solutions of the system (1.1) as $t \rightarrow 0$. It is shown that the solutions of the system (1.1) are bounded and converge to zero as $t \rightarrow 0$.

The third part of the paper is devoted to the study of the asymptotic behavior of the solutions of the system (1.1) as $t \rightarrow \infty$. It is shown that the solutions of the system (1.1) are bounded and converge to zero as $t \rightarrow \infty$.

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The fifth part of the paper is devoted to the study of the asymptotic behavior of the solutions of the system (1.1) as $t \rightarrow \infty$. It is shown that the solutions of the system (1.1) are bounded and converge to zero as $t \rightarrow \infty$.

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The seventh part of the paper is devoted to the study of the asymptotic behavior of the solutions of the system (1.1) as $t \rightarrow \infty$. It is shown that the solutions of the system (1.1) are bounded and converge to zero as $t \rightarrow \infty$.

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The ninth part of the paper is devoted to the study of the asymptotic behavior of the solutions of the system (1.1) as $t \rightarrow \infty$. It is shown that the solutions of the system (1.1) are bounded and converge to zero as $t \rightarrow \infty$.

Before you set up your Fortiva Series 5000 Personal Computer, you should become familiar with its components.

NOTE: Appendix C contains a complete list of the Fortiva 5000 Personal Computer's features and technical specifications. If you have any further questions about your computer's components and capabilities, or operational procedures, consult your authorized Leading Edge dealer. For the name of a dealer in your area, call 1-800-874-3340.

Hardware Components

As illustrated in Figure 1-1, the Fortiva 5000 Personal Computer consists of three main components:

- System unit
- Monitor (display)
- Keyboard

System Unit

The system unit is the electronic center of the Fortiva 5000 Personal Computer, housing all the circuitry and hardware elements that run the computer. Most components of the system unit are modular, making upgrades an easy process.

CPU

At the heart of the Fortiva 5000 Personal Computer is the central processing unit (CPU). It is located on the system board (Figure B-2). This is a 32-bit computer with 32-bit registers and a 32-bit data path, allowing it to process information faster than 16-bit systems. It can accommodate large disk storage capacities, as well as run several programs at the same time (multi-tasking).

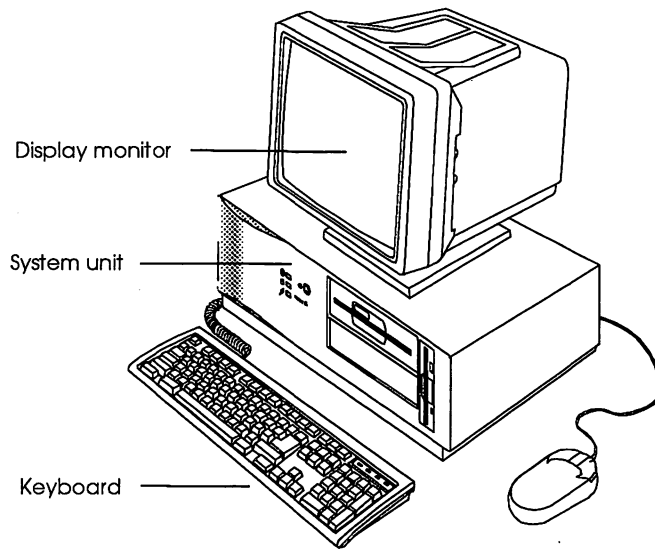


Figure 1-1 Fortiva 5000 Personal Computer

The Fortiva 5000 Personal Computer's CPU is located on the system board and can easily be removed and inserted. This makes upgrading the CPU a very simple process. Options include the 486 processors. Refer to Appendix B to learn how to upgrade the CPU.

Storage Devices

A storage device is used to hold data used or created by the computer. These include fixed-disk drives, floppy-disk drives, tape backup drives, and CD ROM drives. The Fortiva 5000 Personal Computer comes with four drive bays (slots in which a storage device can be inserted).

- **One vertical 3½" (1" height) external bay** — Can hold a 3½" floppy- or fixed-disk drive.
- **Two 5¼" (1.625" height) external bays** — Can hold 5¼" and 3½" fixed- and floppy-disk, CD ROM, or tape back up drives.
- **One 3½" (1" height) internal bay** — Can hold a 3½" fixed-disk drive.

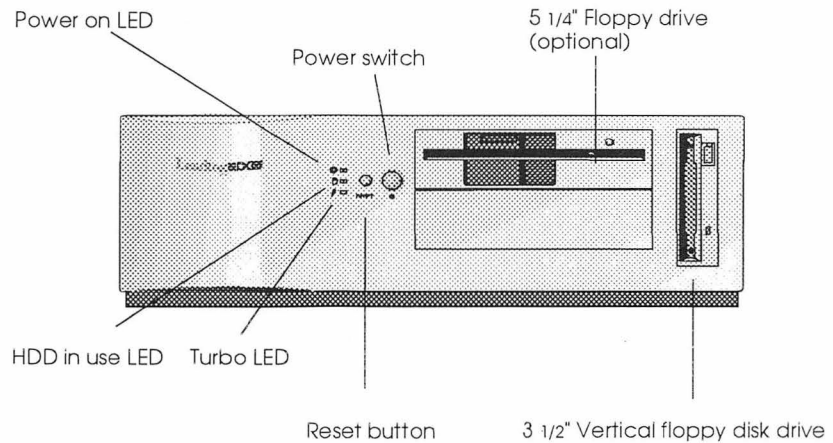


Figure 1-2 Front panel

The Fortiva 5000 comes standard with a 3½" floppy-disk drive in the vertical bay.

Depending on the system you have purchased, your Fortiva 5000 Personal Computer contains one or more of the following storage devices.

- **Fixed disk (also called hard disk)** — A fixed disk is a device on which large amounts of the computer's data can be stored. The amount depends on the capacity of the disk (usually measured in megabytes — MB). A fixed disk's capacity can range from 20 MB up to over 1 gigabyte, with larger fixed disks currently being developed. Refer to the MS-DOS Manual for general information about fixed disks. Refer to Chapter 4 and Appendix B for information about installing a fixed-disk drive.
- **Floppy-disk drive** — A floppy disk is a smaller, portable version of a fixed disk. Information can be copied to and from a floppy disk. The disk can then be removed and inserted into other compatible floppy-disk drives including those on other computers. The Fortiva 5000 Personal Computer can use 5¼" and 3½" floppy-disk drives.

CAUTION: The locking latch on a 5¼" floppy-disk drive will not close unless a disk is in the drive. Attempting to force the latch closed when the drive is empty will damage the drive and void the warranty.

The amount of information that can be stored on a floppy disk depends on the capacity of the disk usually measured in kilobytes (KB) or megabytes (MB). Most floppy disk's capacities range from 360 KB to 1.44 MB. Refer to your MS-DOS Manual for general information about floppy disks and floppy-disk drives. Refer to Chapter 4 and Appendix B for information about installing a floppy-disk drive.

Memory

Information used to run the computer is stored "in memory." The Fortiva 5000 Personal Computer comes with the following types of memory:

- **Main memory** — 4 MB of random access memory (RAM). This memory can be expanded to 64 MB by adding SIMMs (single in-line memory modules) onto the system board (also called the *motherboard*).
- **Internal cache RAM** — 8 KB of internal cache memory.
- **External cache RAM** — Sockets on the system board to add 64, 128, or 256 KB of external (secondary) cache RAM.
- **Shadow RAM** — System BIOS and Video BIOS ROM that can be configured in RAM.
- **Expanded memory** — LIM EMS 4.0 by software.

To learn more about memory, refer to Appendix A and the MS-DOS Manual. For instructions on adding memory to the system, refer to Chapter 4 and appendices A and B.

Power Supply

The Fortiva 5000 Personal Computer can be powered by using either 115 or 230 volts. The default setting is 115. Refer to Chapter 2 for instructions on changing the computer's voltage setting.

Ports

Ports are used to connect electrical power and phone lines, and peripheral devices (printer, external keyboard, external monitor, mouse, etc.) to the Fortiva 5000 Personal Computer.

- **Serial ports** — Located on the back panel (Figure 1-3), the two RS-232C (one 9-pin and one 25-pin male) serial ports can be used to connect accessory devices. Labeled “Serial1” and “Serial2,” they are often used to add external modems, network adapters, serial printers, plotters, and optical scanners. Refer to Chapter 4 and appendices A and B for information about configuring the serial port addresses.
- **Parallel port** — Located on the back panel (Figure 1-3), the 25-pin (female) Centronics parallel port (labeled “Parallel”) can be used to connect the system to a parallel printer, a network, or an external disk drive. Refer to Chapter 4 and appendices A and B for information about configuring the parallel port address.
- **Monitor port** — Located on the back panel (Figure 1-3), the 15-pin (male) VGA monitor port can be used to connect a video display to the Fortiva 5000 Personal Computer. Refer to Chapter 2 for instructions on connecting the monitor to the computer.
- **Keyboard port** — Located on the back panel (Figure 1-3), the 6-pin (female) PS/2 port (labeled “KBD”) can be used to connect a keyboard. The long cord lets you move the keyboard freely around your desktop to a comfortable working position. For instructions on connecting a keyboard, refer to Chapter 2.

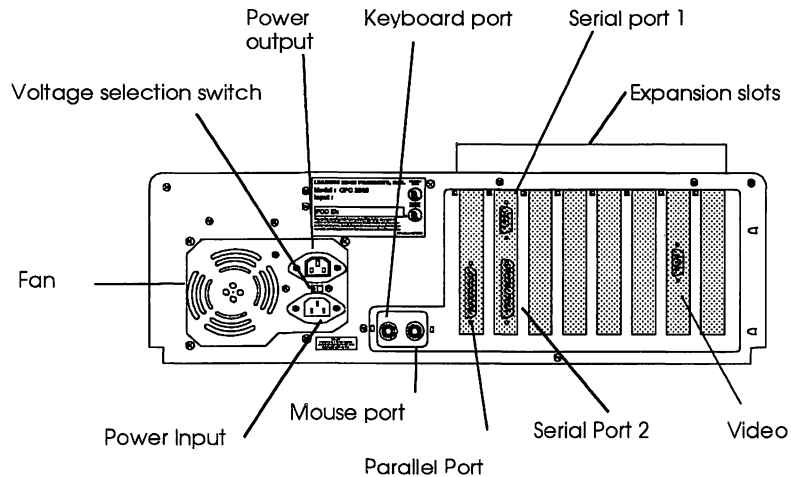


Figure 1-3 back panel

- **Mouse port** — Located on the back panel (Figure 1-3), the 6-pin (female) PS/2 style port (labeled “Mouse”) can be used to connect a PS/2 style mouse. Connecting a mouse to this port saves using a serial port or an expansion slot. For instructions on connecting a mouse, refer to Chapter 2.
- **Power input port** — Located on the back panel (Figure 1-3), the 3-pin (male) port can be used to connect an AC power cord. For instructions on connecting a power cord, refer to Chapter 2.
- **Power output port** — Located on the back panel (Figure 1-3), the 3-pin (female) port can be used as a power outlet for another device (printer, monitor, etc.), allowing you to turn both devices on and off at the same time. For instructions on connecting a power cord from a monitor to the system unit, refer to Chapter 2.

Switches and Buttons

- **Power on/off switch** — The power switch is located to the left of the disk drives (Figure 1-2). It is the main power switch for the Fortiva 5000 Personal Computer. Press the button in to turn on the power, and in again to turn off the power.
- **Reset button** — The system reset button is located to the left of the power switch (Figure 1-2). It is used to clear the computer's memory and re-load MS-DOS without turning the power off and on again. This button is recessed to keep you from accidentally resetting the system. When you need to reset (reboot) the system, press the button. If necessary, use a small, flat instrument such as a pen tip or a pencil eraser.
- **Voltage switch** — The voltage switch is located on the back panel (Figure 1-3). It is used to switch the system between 115 VAC and 230 VAC. For more information about using the voltage switch, refer to Chapter 2.

LEDs

LEDs (light emitting diodes) are small lights that indicate the current status for certain operations on a computer. The LEDs are located to the left of the power and reset switches (Figure 1-2).

- **Power indicator LED** — The power LED indicator is located to the left of the reset and power switches. When lit, it indicates that the computer's power is turned on.
- **HDD (Hard-disk drive) indicator LED** — The HDD LED indicator is located to the left of the reset and power switch and below the power LED. When lit, it indicates that the computer is reading from or writing to the fixed-disk drive.
- **Turbo indicator LED** — The Turbo LED indicator is located to the left of the reset and power switches and below the HDD LED. When lit, it indicates that the processor is operating at its fastest speed.

- **Floppy-disk drive indicator** — Each floppy-disk drive has an LED indicator. Its location depends on the type of drive. When lit, it indicates that the CPU is reading information from or writing information to the floppy-disk drive.

Video Adapter

A video adapter is used to produce the correct output video signal to a monitor. Because different types of computers, software, and monitors sometimes require different types of signals, a video adapter is needed to ensure that the system is compatible.

The Leading Edge VGA (video graphics array) board is essentially several boards in one, because it works with many different monitor types and supports a variety of software modes. It is able to take advantage of state-of-the-art VGA analog and variable frequency monitors (analog), and maintain compatibility with earlier industry standards. In addition, it detects and automatically changes modes to match the configuration of the application software with the monitor being used.

To learn more about the VGA board that comes with your system, refer to your Video Utilities Manual.

Expansion Slots

Expansion slots are used to hold adapter boards. An adapter board is a device that allows the computer to communicate with a peripheral device. Different types of adapter boards include video and multimedia boards, and modems. The Fortiva 5000 Personal Computer has:

- 3 ISA 16-bit slots
- 2 VESA 32-bit slots (VESA local bus-compatible)

NOTE: ISA 16-bit boards can also be inserted into the VESA 32-bit slots.

Refer to Appendix B to learn how to install an expansion board.

Battery

The Fortiva 5000 Personal Computer has a built-in real-time clock chip and a backup battery that keeps the current time-of-day and date, even when the system is turned off. The time and date can be set in the SETUP program (refer to Chapter 4) or using the MS-DOS TIME and DATE commands. (Refer to the MS-DOS manual.)


NOTE: The backup battery keeps time for up to five years. The battery should be changed when the clock slows. For information about purchasing and replacing the battery, ask your authorized Leading Edge dealer.

CAUTION: *There is the danger of an explosion if the battery is incorrectly replaced. Replace the battery with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the battery manufacturer's instructions.*

ATTENTION: *Il y a danger d'explosion s'il y a remplacement incorrect de la batterie. Remplacer uniquement avec une batterie du meme type ou d'un type recommande' par le constructeur. Mettre au re'but les batteries usage'es conformemnt aux instructions du fabricant.*

Keyboard

The Fortiva 5000 Personal Computer keyboard (Figure 1-4) provides the following features:

- Standard 101-key layout in a desktop system keyboard.
- Cursor movement keys.
- A Num Lock key that enables special functions on the numeric/editing keypad.
- A Caps Lock key that locks the keyboard, so that the uppercase letters can be used without pressing the  key.
- A Scroll Lock key that switches the cursor movement keys between two different modes. (**Note:** This key usually works differently for different software programs.)
- Separate cursor control and editing keys.
- Separate LED indicators for Caps Lock, Num Lock, and Scroll Lock.

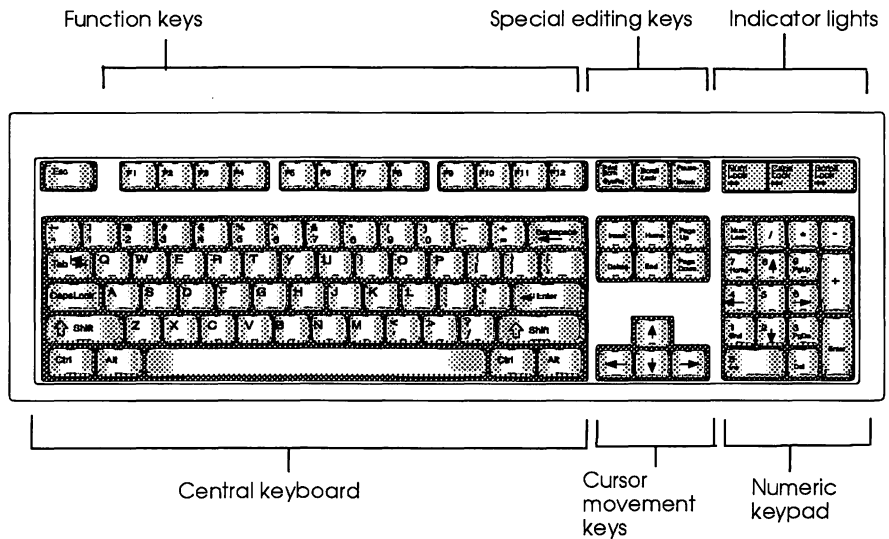


Figure 1-4 keyboard

Central Keyboard

The central keyboard, modeled after a typewriter, contains the letters of the alphabet and punctuation marks. The **[↵Enter]** key works like the return key on a typewriter. It moves the cursor to the next line and also enters commands into the computer.

Cursor Movement Keys

Use the cursor movement keys to move the cursor in the direction of the arrows. The keyboard features two sets of cursor movement keys. One set is located on the numeric keypad, and the other set is located at the bottom of the keyboard between the typewriter keys and the numeric keypad. Use the set that is most convenient for you.

The Numeric Keypad

The numeric keypad is on the right side of the keyboard. Its keys have three functions:

- Operate like the numeric keys on a calculator
- Control cursor movement
- Perform special editing functions

When you boot (start) the computer, the system automatically activates the Num Lock function. Numbers and mathematical symbols can now be accessed from the numeric keypad. Some software programs let you know that Num Lock is on by displaying the word “NUM” on the screen. To turn off Num Lock, simply press **[NumLock]**. This turns off the numeric capabilities and enables you to use the keys for special editing functions such as moving a page up (**[PageUp]**) or down (**[PageDown]**) or moving to the end (**[End]**) or beginning (**[Home]**) of a file and cursor control movement. Be sure to turn off Num Lock if you wish to use the numeric keypad for editing functions. You also have the option of having the computer boot up with Num Lock off (refer to Chapter 4).

Function Keys

The function keys, labeled **F1** through **F12**, are located at the top of the keyboard. These keys carry out functions as designated by software programs, and also perform certain editing operations on the MS-DOS command line. (Refer to the MS-DOS manual.)

Monitor

A monitor is a video screen that displays the computer's output (text being written on a word processor, a graph being produced on a spreadsheet program, etc.).

A variety of color and monochrome monitors can be purchased from Leading Edge. The following features are common to all models:

- **Power switch** — The power switch is used to turn the monitor on and off.
- **Power indicator LED** — The power indicator LED on the front of the monitor illuminates when the monitor is turned on.
- **Brightness Knob** — Increase the brightness of the image on the monitor screen by rotating the brightness knob in a clockwise direction.
- **Contrast Knob** — Increase the contrast by turning the contrast knob clockwise. Depending on the ambient lighting, you can usually attain the sharpest image by setting both controls to an intermediate position.

Mouse

A mouse is used to execute commands, move text and graphics on the screen, and draw pictures. Operating a mouse is both simple and intuitive. The movement of the mouse, as it is moved, corresponds to the movement of the pointer on the screen. You maneuver the pointer on the screen and then press the left button or “clicker” to carry out the particular function.

NOTE: The right button will only be active when using software programs that utilize a right button.

Refer to Chapter 3 for more information about using a mouse.

Software

WARNING: Your Leading Edge Fortiva 5000 Personal Computer comes with MS-DOS and MS-Windows software ALREADY loaded on the system. These programs should ONLY be re-loaded if the currently loaded programs become damaged or accidentally erased. Attempting to load the programs “over” the originally-installed programs will automatically erase important files installed by Leading Edge. To learn how to restore these files, refer to Chapter 3.

MS-DOS

The Fortiva 5000 Personal Computer comes with Microsoft's disk operating system, MS-DOS, pre-loaded. Chapter 3 describes the basics of using MS-DOS. Other important software programs included with MS-DOS include:

QBASIC

QBASIC is a programming environment for the BASIC language.

HIMEM.SYS and EMM386.EXE

HIMEM comes installed with MS-DOS. It is used to access extended memory. EMM386 is used to configure upper memory as LIM EMS 4.0 expanded memory. Refer to Appendix A and the MS-DOS manual for information about HIMEM and EMM386, and refer to Appendix B for instructions on adding more memory.

MS-Windows

MS-Windows, a graphical user interface, is designed to make your computer easier to use. Windows also includes software applications and utility programs. Refer to Chapter 3 and the MS-Windows manual for more information about the program.

Options

Following are some of the optional devices that can be used with the Fortiva 5000 Personal Computer. Some of these items are sold by Leading Edge Products, Inc. For more information, contact an authorized Leading Edge dealer or call 1-800-874-3340.

Memory

The standard amount of memory (4 MB) can be increased to a total of 64MB by installing SIMMs. Refer to Chapter 4, and appendices A and B for instructions on adding memory.

Math Coprocessor

NOTE: 486DX and 486DX2 CPUs have built-in math coprocessors. A math coprocessor is added to a 486SX system by upgrading the CPU. For instructions on upgrading the CPU, refer to Appendix B.

If you are using software that performs complex mathematical problems or graphic displays (spreadsheets, engineering applications, etc.), your computer will need a math coprocessor. A math coprocessor works along with the microprocessor to speed numeric and some graphics calculations.

Printer

Using a printer allows you to create a hard (paper) copy of your computer's output. (example: printing a letter created on your word processor). There are different types of printers (laser, dot matrix, ink jet, etc.), each with different capabilities (speed, print quality, etc.). To learn more about printers and the type of printer that would best meet your requirements, see your dealer.

Tape Backup Drive

A tape backup is a storage device used to quickly backup large amounts of data, usually the contents of an entire fixed disk. Information is copied onto a magnetic tape (resembling an audio cassette). The tape backup unit is an important consideration if you are constructing a network or installing large fixed disks.

Modem, Fax/Modem or Voice Modem

A modem or fax/modem is used to connect a computer to another computer or fax machine via a telephone line. Some Leading Edge systems are delivered with a modem, a fax/modem, or a voice modem already installed. Refer to your Getting Started Guide to learn how to operate your modem device.

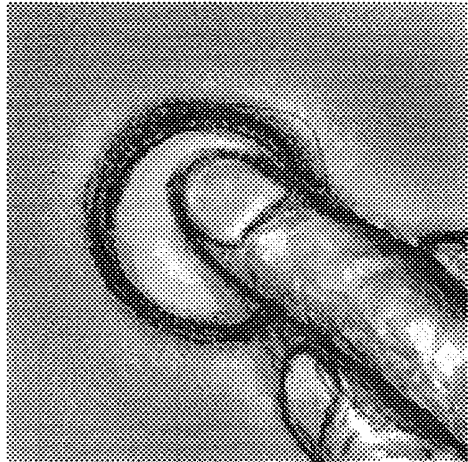
- A fax/modem is used to send text and graphics from a computer to a remote fax machine where a hard copy of the transmission can be printed out.
- A modem is used to transmit and receive executable programs and data files from one computer to another, usually without a paper copy being printed.
- A voice modem adds voice receive capabilities to the fax and file transfer capabilities of fax/modems.

The primary difference between a modem and a fax/modem is that fax transmissions are image files only, and cannot be run as programs or edited data files. Voice modems allow you to use your computer as an answering machine.

CD-ROM Drive

A CD-ROM (compact disk read only memory) drive is a storage device much like a fixed-disk drive. It has the capacity to store vast amounts of information (up to 650 MB) on a single disk. Like a compact disk used in an audio system, information can be read from but not written to the disk. Large amounts of information, such as an entire encyclopedia, can be stored on a single disk.

Starting the System



This chapter contains information about:

- Selecting a site for your Fortiva 5000 Personal Computer
- Unpacking the system components
- Connecting the system components
- Turning the system on
- Self-test diagnostics
- Video display adjustments
- Hot key functions
- Resetting the computer
- Changing the CPU speed
- Floppy-disk drives and floppy disks
- Backing up (making copies of) pre-installed software

Before you begin reading the instructions in this chapter, make sure you have read Chapter 1 to familiarize yourself with the components of the Fortiva 5000 Personal Computer.

Selecting a Site For Your Computer

Before unpacking your computer, spend a few minutes considering where to install it.

- The desktop area should be of adequate size and quite stable.
- The location should be safe from exposure to direct sunlight, extreme cold, dust, or moisture such as an open window.
- The computer should not be located near any equipment that generates a magnetic field.
- The computer should be located near a grounded power source.

Unpacking the System Components

As you unpack the Fortiva 5000 Personal Computer and its components, place each item carefully on the desktop. Keep all boxes and packing materials in case you need to transport your system.

Connecting the System Components

1. Turn off the power switches on the system unit and the monitor.
2. If your system has a 5¼" floppy-disk drive, release the latch by turning the latch up. Then remove the disk-shaped cardboard from the floppy disk drive. Store the cardboard disk with the other packing materials in case you need to transport the system.

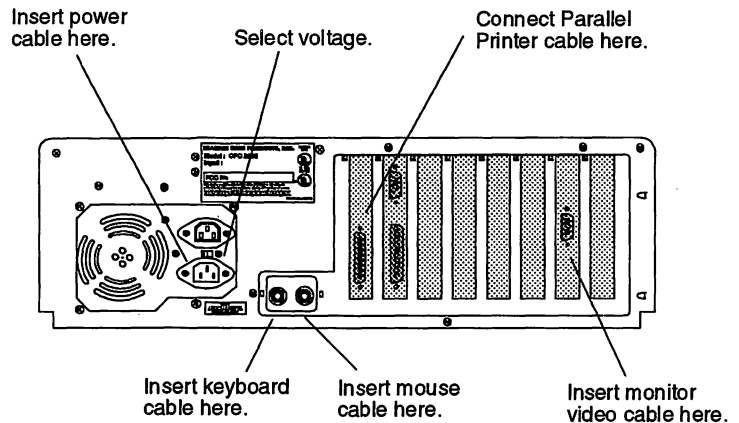


Figure 2-1 Connecting the system components

3. Connect the keyboard cable to the keyboard connector (labeled “KBD”) on the back panel of the system unit.
4. Connect the mouse to the port labeled “Mouse”.
5. Connect the video cord from the rear of the monitor to the 15-pin video connector on the VGA card and tighten the two plastic knurled screws.
6. Attach the monitor power cord to the appropriate connectors as follows:

If the monitor power cord has a standard plug (two flat prongs and one round prong), connect the cord to an individual wall outlet.

If the monitor power cord has a shrouded plug (three flat prongs surrounded by plastic casing), connect it to the power connector on the rear of the system unit.

7. Connect the power cable from the rear of the system unit to a wall outlet.

Connecting a Printer (optional)

This computer works with a variety of printers. On the rear panel of the system unit there are two serial ports and one parallel port labeled accordingly.

Plug your printer cable into the appropriate port (Figure 2-1). If you are using one of the serial ports, notice the difference between Serial 1 (COM1) and Serial 2 (COM2). To set the printer's switches, refer to the manual that comes with the printer. You may also need to change the data transmission settings. Refer to the MODE command in the MS-DOS manual.

Switching the Voltage Setting

The Fortiva 5000 Personal Computer's voltage selection switch can be set to either 115 VAC or 230 VAC. If you are going to operate your system at a location that uses a different AC voltage (example: outside the United States), you may have to change the system's voltage setting. The system's default setting is 115 VAC. To change the setting, move the switch indentation to the proper setting.

Also, make sure that your monitor's voltage level is correct. For some monitors, the procedure for changing the voltage must be performed by a certified technician. Refer to your monitor's installation manual for further information.

Turning the System On

To turn the system on, press the power on/off switch. The power indicator LED (the small light to the left of the power switch) will turn on, and the fixed-disk drive's motor (or floppy-disk drive for systems with no fixed disks) will start up.

CAUTION: If your computer does not do this, it may mean that something is wrong. Turn the computer off immediately, and unplug it from the main AC power outlet. If everything is connected properly and the unit will not start up, contact your dealer or a qualified service technician for assistance.

Self-Test Diagnostics

When the Fortiva 5000 Personal Computer is turned on or reset, it performs a brief self-test of its internal circuitry. The results of these tests will be displayed on the screen. This process takes a few moments to complete.

During these tests, the system compares its internal configuration information with the actual system hardware. If any discrepancies are found, or if the hardware is not operating properly, appropriate error messages will display on the screen.

- If the system displays a message indicating that configuration errors exist, you may have to run the SETUP program to update the CMOS configuration data. Refer to Chapter 4 for information about the SETUP program.
- If hardware errors exist, you will need to correct them before you run the SETUP program. Check all electrical connections before continuing.

Video Display Adjustments

When you turn on your system for the first time, you may have to adjust the monitor's brightness and contrast controls. You can increase the brightness of the image on the monitor screen by rotating the brightness knob in a clockwise direction. To increase the contrast, turn the contrast knob clockwise. Depending on the ambient lighting, you can usually attain the sharpest image by setting both controls to an intermediate position.

Hot Key Functions

Hot key functions (or combinations) are used to perform specific tasks. To activate each function, press the three keys down simultaneously.

Ctrl **Alt** **Delete**

Resets the system

Ctrl **Alt** **S**

Enters the SETUP program

Ctrl **Alt** **↑**

Changes the CPU speed to fast (can also be changed in SETUP)

Ctrl **Alt** **↓**

Changes the CPU speed to slow (can also be changed in SETUP)

NOTE: The hot key combinations may not work while some software programs are active, or if the system is running under Microsoft Windows. To use the keys, exit these programs to MS-DOS.

Resetting the Computer

If your computer system “locks up” (does not respond to keyboard commands), it may be necessary to reset the computer. As the system restarts, it will run through the entire set of self-test diagnostics.

There are three ways to reset your computer:

- **Reset button** — Press the reset button on the front panel and hold for one second.
- **The power switch** — Turn the computer off, wait ten seconds, then turn the computer on again.
- **The hot key combination:** `Ctrl` `Alt` `Delete` — Press these three keys simultaneously

CAUTION: Resetting the computer causes all information stored in the system RAM (random access memory) to be lost. (Data saved on the fixed disk is unaffected.) Also, some software packages may need to be restarted if they are active when the computer is reset. For more information, refer to the instructions furnished with the application software.

CPU Speeds

The Fortiva 5000 Computer is designed to operate at two CPU speeds. Some application programs, notably games, are designed to be operated at a lower speed. This can sometimes lead to problems ranging from games running too fast, to difficulties transferring data to and from disks. In order to avoid these problems, the Fortiva 5000 Personal Computer can be operated at a slower speed. For instructions on changing the power-up speed (CPU speed switching), refer to Chapter 4 and “Hot Key Functions” on page 25.

Floppy-Disk Drives and Floppy Disks

NOTE: To learn more about how fixed and floppy disks work, refer to the MS-DOS Manual.

Floppy-Disk Drives

A floppy-disk drive is essentially a smaller version of a fixed-disk drive. A floppy disk is a thin magnetic disk contained in a plastic case. A floppy disk can be removed and inserted into other compatible floppy-disk drives including those in other computers.

NOTE: You will notice that a fixed-disk drive works faster than a floppy-disk drive. This is because the fixed-disk drive is always rotating while the computer is on, while the floppy-disk drive only rotates when it is being used. Also, since a fixed disk is made out of rigid material, it can spin much faster than a floppy disk.

Floppy Disk Types

The Fortiva 5000 Personal Computer can use either a 5¼", a 3½" floppy-disk drive, or a combination of both. The following are types of floppy disks used by each drive.

3½ Inch Disks

3½" (89 mm) Double Density — Double-sided, soft-sectored, 135 tracks per inch. Each floppy disk holds 720 KB of information, (737,280 characters). This is approximately equivalent to 496 book pages of information.

3½" (89 mm) High Density — Double-sided, soft-sectored, 135 tracks per inch. Each floppy disk holds 1.44 megabytes of information, (1,474,560 characters). This is approximately equivalent to 1,000 book pages of information.

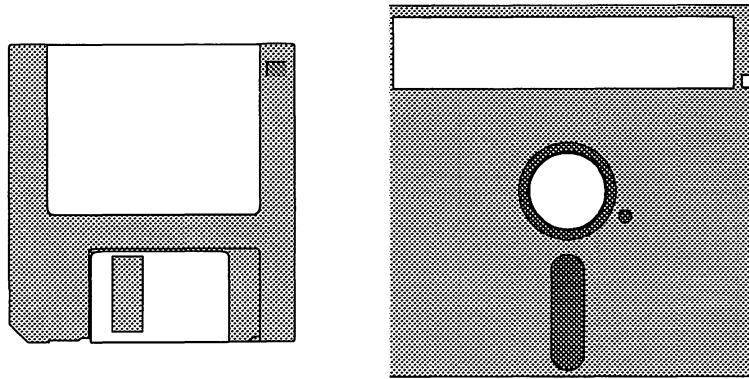


Figure 2-2 3 1/2" and 5 1/4" floppy disks

NOTE: Double and high density floppy 3 1/2" disks look almost exactly alike; the difference being that the high density disk has an additional square notch located in the corner across from the write-protect tab (explained on page 29).

Also, formatted high density disks will not work in a double-density drive. If you insert a high density disk into a double-density drive by mistake and try to use it, an error message will appear. However, you can read and write to a double-density disk in a high density drive.

5 1/4 Inch Disks

5 1/4" (133 mm) Double Density — Double-sided, soft-sectored, 48 tracks per inch. Each floppy disk holds 360 KB (kilobytes) of information (368,640 characters). This is approximately equivalent to 248 book pages of information.

5 1/4" (133 mm) High Density — Double-sided, soft-sectored, 96 tracks per inch. Each floppy disk holds 1.2 megabytes of information, (1,228,800 characters). This is approximately equivalent to 820 book pages of information.

NOTE: Double and high density 5¼" floppy disks look almost exactly alike; the difference being that the center hole of the double density disk has thin (1/8") ring around it.

Write-Protecting a Floppy Disk

Write-protecting a floppy disk prevents the computer from recording any new information on the floppy disk. The floppy disks you create for your system should be write-protected. These are your "master" disks and should only be used to make a working copy.

You should ALWAYS write-protect a floppy disk before you copy from it. This simple task will prevent you from accidentally copying the blank disk onto a disk containing data. After the backup disks are made, make sure to keep all master disks in a safe place.

To write-protect a 3½" floppy disk, slide open the small tab on the corner of the disk (Figure 2-3). To be able to write on the disk, slide the tab closed.

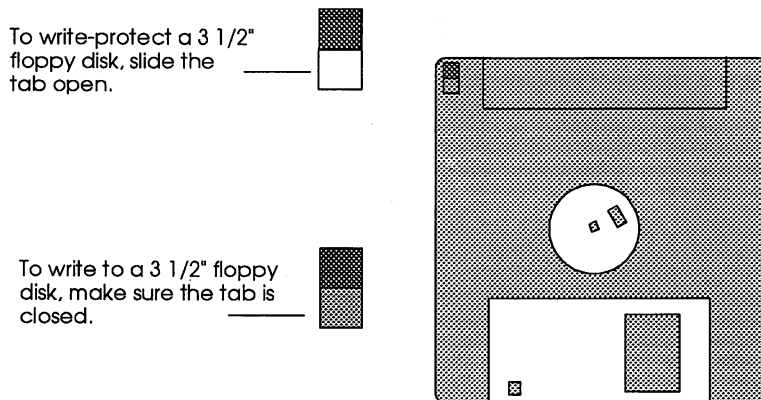


Figure 2-3 Write protecting a 3 1/2" floppy disk

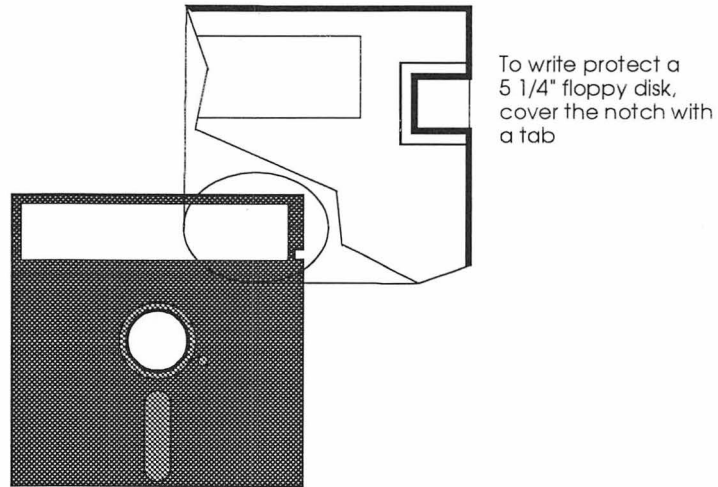


Figure 2-4 Write protecting a 5 1/4" floppy disk

To write-protect a 5 1/4" floppy disk, place a write-protect tab over the notch on the side of the disk (Figure 2-4). The tab must cover the entire notch on both sides. Write-protect tabs are the small gummed rectangular stickers that come with the box of disks.

If you run out of tabs, you can use any kind of tape that is not transparent. If your floppy disk has a notch on each side, the write-protect notch is the one on the right as you hold the disk with the label facing you.

Handling Floppy Disks

In order for floppy disks to work properly, they must be handled with great care.

5¼" Floppy Disks

- Write on the labels **BEFORE** putting them on the disk. The imprint from a pen can damage the disk surface. If you have to write on a label that is already on a disk, use a felt tip pen only. **NEVER USE A PENCIL or BALL POINT PEN.**
- When holding a disk, touch only the corner of the disk. Never touch the exposed magnetic surface.
- When the floppy disk is not in use, keep it in its protective paper envelope.

5¼" and 3½" Floppy Disks

- Do not bend a floppy disk.
- Do not put paper clips or any metal objects near floppy disks.
- Keep floppy disks away from sun and heat.
- Never put a magnet near a floppy disk.
- Never clean a floppy disk.
- **NEVER REMOVE A FLOPPY DISK FROM A DRIVE WHEN THE DRIVE LIGHT IS ON!** The in-use light on the floppy-disk drive indicates that the computer is accessing the disk (reading or writing to it). If you remove the disk from the drive while the light is on, you can seriously damage the read/write heads in the drive and/or the data on the floppy disk.

Backing up your software

The Fortiva 5000 comes with the software installed on the fixed disk. Just turn on the system and it's ready to go.

The installation programs have also been loaded onto the fixed disk (except for the MS-DOS program, which comes with its own installation disks). Leading Edge has included a special backup program that allows you to easily copy them onto floppy disks.

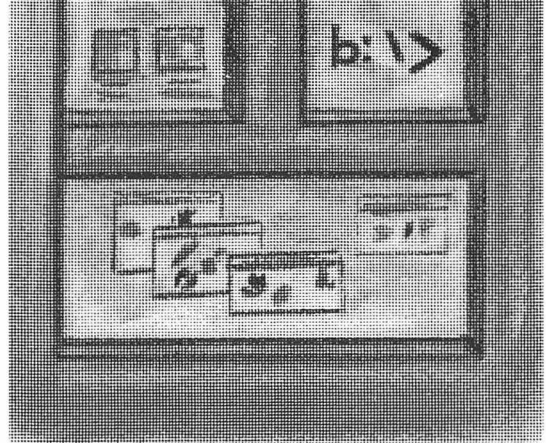
NOTE: The installation files are different from the program files.

To learn how to use the Leading Edge Backup Program, click on the Instructions icon in the Leading Edge Utilities Window. You then can read the file "online" or print it.

NOTE: Backup also refers to MS-DOS "BACKUP" command. This command is different from the MS-DOS "COPY" command. The Leading Edge Backup Program copies the disks. For more information, refer to the MS-DOS Manual.

MS-DOS and MS-Windows

*This chapter contains
information about:*



- How MS-DOS helps control a computer's operations
- Display interfaces — character based and graphical
- Installing the MS-DOS program on your computer
- Starting, resetting, and turning off the system
- How MS-Windows can make your computer easier to use
- Installing the MS-Windows program on your computer
- Using a mouse

This chapter serves as an introduction to MS-DOS and MS-Windows. For a more detailed description of these two programs, refer to the MS-DOS and MS-Windows manuals.

Operating Systems

All personal computers require an operating system. An operating system is a software program that controls the main functions of the computer. These include:


- Management of memory
- Management of data
- Operation of software application programs
- Communication among hardware components (printer, disk drives, microprocessor, etc.)

This computer uses MS-DOS, the disk operating system (DOS) created by Microsoft Corporation (MS) for personal computers. Other types of disk operating systems include OS/2 and UNIX.

A disk operating system is different from a software application program; the software application program must work in an “environment” created by the disk operating system (example: only MS-DOS-compatible programs can run “under” MS-DOS).

Display Interfaces

Information can be displayed (on the monitor screen) and manipulated in different ways. The screen layout for a particular software program is often referred to as the *display interface*.

Some screens are very simple (particularly for older programs). All commands and information are typed in and then entered by pressing the  key. The MS-DOS program works this way. These interfaces are usually referred to as *character-based*.

Another kind of interface that is gaining in popularity is the *graphical user interface* or GUI. One of the most popular types of graphical user interfaces is Microsoft Windows.

Graphical user interfaces often utilize both a mouse and the keyboard to:

- Activate pull-down menus and select menu items
- Activate icons that change screens or start other programs
- Operate scroll bars that allow you to quickly move horizontally or vertically through a document

Which type of display interface is easier to use? It depends.

Experienced computer users often prefer character based interfaces, because they find it easier and faster to type in commands. Others, particularly those who are new to computers, prefer the “Windows environment,” because it is easier to learn; rather than having to learn a list of commands, you can simply position the mouse pointer over a selected command or “click,” the mouse.

This Computer uses Microsoft Windows, a graphical user interface program designed to make MS-DOS more “user friendly.” However, you still have the option of either removing MS-Windows from your system or entering the “MS-DOS environment” by temporarily exiting Windows.

Due to its popularity, many software programs now have versions that run in the MS-Windows environment (Lotus 1-2-3, WordPerfect, etc.). These programs are easier to use for experienced Windows users, because they all share many of Windows’ menus and commands.

In addition to MS-Windows (and other GUI programs available such as Geoworks), MS-DOS also has its own graphical interface program called DOSSHELL. Refer to the MS-DOS Manual for information about using it.

MS-DOS Basics

The MS-DOS Manual provides all the information required to understand and use MS-DOS. The following is a brief explanation of some important and frequently used MS-DOS commands and procedures.

Installing the MS-DOS Program

The Fortiva 5000 Personal Computer comes with the MS-DOS program already installed on the fixed-disk.

The only times you should have to install the MS-DOS program yourself are if:

- You accidentally erase some or all of the MS-DOS files on the fixed disk.
- You install a new fixed disk which does not contain the MS-DOS program.
- You wish to boot (start the system) from the A Drive.

To learn how to install the MS-DOS program on your system, refer to the MS-DOS Manual.

NOTE: Most of the files on the MS-DOS program disks are “compressed.” To use a particular file from one of the program disks, you must first “expand” it. Refer to the **EXPAND** command in the MS-DOS Manual for instructions on decompressing files (or type **HELP EXPAND** and press **↵Enter** at the MS-DOS prompt). The installation program automatically decompresses all of the files.

CONFIG.SYS and AUTOEXEC.BAT

There are two files which have special roles when a computer is started: CONFIG.SYS and AUTOEXEC.BAT. If they exist on the disk that you use to boot your computer, the commands contained in the files will be acted upon automatically.

In general, neither file is required to start the computer, although certain accessories and programs may require them. MS-DOS automatically creates CONFIG.SYS and AUTOEXEC.BAT files when it is installed. If, however, MS-DOS is installed on a fixed disk that already has another version of MS-DOS installed, the installation process automatically creates new CONFIG.SYS and AUTOEXEC.BAT files and renames the old files CONFIG.OLD and AUTOEXEC.OLD; so as not to overwrite and destroy any previous CONFIG.SYS and AUTOEXEC.BAT files that might contain commands you wish to keep. If you have such files, you can use the MS-DOS Editor (refer to the MS-DOS Manual) to merge the files. To learn more about CONFIG.SYS and AUTOEXEC.BAT, refer to the MS-DOS Manual.

Examples of CONFIG.SYS and AUTOEXEC.BAT

Following are examples of the above two files. You can create these files using your favorite editor or word processor as long as they are saved as ASCII files. In the right-hand column are comments that should not be typed. These are the files as set up by the MS-DOS installation program:

CONFIG.SYS

DEVICE=C:\DOS\SETVER.EXE	Allows DOS 6.0 to emulate earlier versions when needed by programs.
DEVICE=C:\DOS\HIMEM.SYS	Provides access to high memory (above 640 KB).

DOS=HIGH	Installs most of MS-DOS in high memory, freeing base memory for other programs.
FILES=10	Specifies the number of files that can be open at the same time.

You can add the following lines to your CONFIG.SYS file by using the MS-DOS EDITOR or a word processor that saves in ASCII:

DEVICE=MOUSE.SYS	Installs a mouse driver.
BUFFERS=20	Increases the number of buffers to 20, speeding up file transfer from disks, but using more RAM to do so.
AUTOEXEC.BAT	
@ECHO OFF	Turns off screen echo so you won't see these commands on your screen. (The "@" means you won't see "ECHO OFF" either.)
PROMPT \$p\$g	Sets the MS-DOS prompt to show the active sub directory along with the drive letter.
PATH C:\DOS	Tells CPU to look for commands in the \DOS directory if they are not found in active directory.
SET TEMP=C:\DOS	Directs that all temporary files created by programs should be stored in the C:\DOS directory.

You can also add to the AUTOEXEC.BAT file lines like these:

C:\WINDOWS\WIN	Starts the MS Windows program (otherwise, you would have to type WIN and press <input type="text" value="↵Enter"/> at the MS-DOS prompt).
MOUSE	Runs the MOUSE.COM program to control a mouse.
MODE LPT1=COM1	Redirects parallel printer output to a serial printer attached to the COM1 port.

Restoring the Leading Edge CONFIG.SYS and AUTOEXEC.BAT Files

Your system comes with MS-DOS already installed. If you attempt to reinstall the same version of MS-DOS “over” it, the CONFIG.SYS and AUTOEXEC.BAT files will be overwritten. The CONFIG.SYS and AUTOEXEC.BAT files created by Leading Edge are different from the ones that are created when MS-DOS is installed. They contain information about other programs like MS-Windows.

Your system comes with a special file (located in the root directory — C:\) that will restore the Leading Edge-created files. Simply type **C:\LEFIX.BAT** and press .

MS-DOS Commands

MS-DOS operates by entering commands into the computer. A command is a set of instructions that the computer interprets.

In MS-DOS, a command is entered by typing the command and pressing .

The following is a list of frequently used commands.

MSBACKUP	The MSBACKUP command saves all the data on a disk or in specified directories to another specified disk. (Note: It is important to regularly back up the data on your computer as a precaution.)
COPY	Use the COPY command to send copies of one or more files (as opposed to moving the original file) to another address.
DELETE	The DELETE command allows you to delete (erase) a file, a group of files, or all the files on a disk.
DIR	Use the DIR command to display a list of files and sub directories in a directory.
FORMAT	Use the FORMAT command to make a fixed or floppy disk compatible with the MS-DOS system. Warning: Formatting a disk will erase all information on that disk.
MKDIR or MD	Use the MKDIR or MD command to create a new directory.
PRINT	Activating the PRINT command sends specified data or data files to a printer connected to the computer where the information can be printed on paper.

A complete list of MS-DOS commands can be found in the MS-DOS on-line HELP program. To activate, type **HELP** at the MS-DOS prompt and press `[↵Enter]`. A list of commands will appear. To view an explanation of one command, type **HELP** and [**the command name**] and press `[↵Enter]` (example: HELP FORMAT).

The MS-DOS Prompt

When you start a fixed-disk system, the C> that appears on the screen is called the MS-DOS prompt. On a floppy-disk system (a system with no fixed disk), the MS-DOS prompt is A>. When you see the A> or C> prompt, you know that MS-DOS is loaded and the computer is ready for you to give it instructions.

NOTE: If the MS-Windows program is automatically activated when the computer is turned on, it is because the line “WIN” is in the AUTOEXEC.BAT file. If you want to configure your computer so that it begins with the MS-DOS prompt, you must remove this line from the AUTOEXEC.BAT file. Refer to the MS-DOS Manual for instructions.

The Active Drive

The letter in the prompt indicates the active drive. It is the drive where the computer looks for the filenames that are entered. When starting the computer from a fixed-disk system, the active drive is automatically C. When booting from a floppy disk, the active drive is automatically A. The computer will always look in the active drive for your files unless you tell it otherwise.

Changing the Active Drive

You may wish to change the active drive. For instance, if you are working primarily with the files on Drive B, it is easier to work directly from Drive B. If you keep drive A as the active drive, you will then have

to type **B:** and the **filename** every time you want to run a program from Drive B.

To change the active drive, simply type the letter of the drive you wish to change to followed by a colon (:), and press `↵Enter` at the MS-DOS prompt. For example, from the A prompt, type **B:** and press `↵Enter` to make Drive B the active drive. The B> prompt will appear on the screen.

Resetting the System

Turning the power off and on (cold booting) every time you want to clear the computer's memory causes unnecessary wear on the system. Instead, it is better to reset the system while it is on.

WARNING: Resetting the system during software operation may cause a loss or damage of data. Whenever possible, try to exit the software program and save the data before resetting the system.

To reset the system, hold down `Ctrl` and `Alt` and press `Delete`. This is called a warm boot; the system's operating speed is not affected by a warm boot.

Turning Off the System

Follow these steps whenever turning off the system:

1. Whenever possible, exit from any application program as described in the manual accompanying the software.
2. Be sure the lights on the disk drives are off and the MS-DOS prompt is shown on the command line on the screen. The prompt indicates that your last command has finished processing.
3. Remove any floppy disks that are in the disk drives.
4. Turn off the system unit.

MS-Windows

Installing MS-Windows

The Fortiva 5000 Personal Computer usually comes with MS-Windows already installed. However, you may have to reinstall MS-Windows if:

- You accidentally erase some or all of the Windows files from your fixed disk.
- You install another fixed disk that doesn't already have MS-Windows installed on it.

To learn how to install the MS-Windows program on your system, refer to the MS-Windows Manual.

NOTE: Most of the files on the MS-Windows program disks are “compressed.” To use a particular file from one of the two program disks, you must first “expand” it. Refer to the EXPAND command in the MS-DOS Manual for instructions on decompressing files (or type **HELP EXPAND** and press at the MS-DOS prompt). The installation program automatically decompresses all of the files.

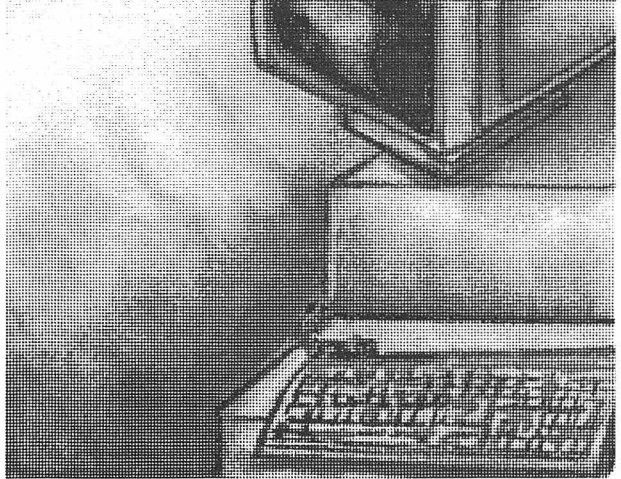
Using a Mouse with Windows

The Windows screen is designed to be used with both a keyboard and a mouse. Most of the actions that are executed with the mouse also can be performed with the keyboard. However, you will quickly discover that using a mouse, in most cases, is easier.

As you move the mouse, the cursor on the screen moves in a corresponding direction. This allows you to quickly position the cursor at any location in the screen.

To activate an item (icon or menu choice) on the screen, use the mouse to move the screen pointer over it and press the left button on the mouse. The item will usually change colors to indicate that it is now active. Click once or twice again to activate a program or to go further into a menu.

SETUP



This chapter contains information about:

- How the SETUP program allows you to configure the functions and devices of your computer
- How to configure each item on the SETUP Menus

Before the computer can operate, it must know what devices are installed in it. These devices include floppy- and fixed-disk drives, video, memory, and a math coprocessor. Taken together, the presence or absence of these devices comprise the system configuration. The SETUP program is used to verify or change the system configuration.

Ordinarily, there should be no need to run SETUP the first time you start your system, since the Fortiva 5000 Personal Computer comes from the factory ready to use. You must, however, run the SETUP program each time you make any changes to your computer's configuration (adding drives, memory, etc.). You can also run it to verify the system configuration.

Running SETUP

The SETUP program is permanently stored in read only memory (ROM) and not contained on disk. It can be activated from the MS-DOS prompt, or while a program that runs under DOS (as opposed to a "graphical user interface" program such as Windows) is running. To activate the program:

1. Start (or boot) the system (refer to Chapter 2).
2. Hold down the **Ctrl** and **Alt** keys, and press **S**. The first of three "pages" of the SETUP Menu (Figure 4-1) appears.

The top of each page of the SETUP program lists the BIOS version. The bottom of each page contains a list of the program's editing keys and their functions (also listed below).

SETUP Program Editing and Function Keys

- Esc** — Activates the SETUP Exit Menu. The following choices can be selected from this menu:
- Esc** — Continue with SETUP.
 - F4** — Save the values currently entered, exit SETUP, and reboot.
 - F5** — Load the system default values for all pages.
 - F6** — Exit SETUP without saving any changes.
- F1** — Help Key — Displays a screen that provides information about the highlighted option.
- F2** — Displays a summary of the system's currently selected settings.
- ↑ ↓** or **← →** — Moves the cursor up or down to the next option entry.
- + -** — Moves through (forward or backward) a highlighted list of options (except in the Password function; refer to page 56).
Note: The space bar works the same way as the **+** key.
- PageUp PageDown** — Moves to the next or previous page of the SETUP program.

Standard System Parameters

System Time

The System Time setting displays the battery-maintained time. The battery can keep the current time (and date) for up to five years with the power off. SETUP displays the time in the following format:

Hour: Minute: Second

Use the or keys to reset the seconds setting to zero.

The System Time parameter uses a twenty-four hour clock. For example, to enter 6:23 p.m. as the time, set the following values into the hour, minute, and second option fields, respectively:

18:23:00

Note: You can also update the clock (as well as the date) using the TIME and DATE MS-DOS commands. Refer to the *MS-DOS Manual* for more information.

System Date

SETUP displays the date in the following format:

Month Day, Year

To change the date, use the and to position the cursor on the parameter to be changed. Then use the and keys to enter the correct date. For example, to enter February 3, 1993 as the date, set the following values:

Feb 3, 1993

Phoenix SETUP Utility (Version 1.00) 00					
(C) Phoenix Technologies Ltd. 1985, 1994 All Rights Reserved					
					Page 1 of 3
** Standard System Parameters **					
System Time:	hh:mm:ss	Boot RECORD Protect:	Disabled		
System Date:	mm-dd-yyyy	Password:	Disabled		
Diskette A:	5.25" 1.2 MB				
Diskette B:	Not Installed	Cyl Hd Pre LZ Sec Size			
Hard Disk 1:	Auto Detect 1	Drive Data Table Unused			
Hard Disk 2:	Not Installed				
Base Memory:	640 KB				
Extended Memory:	3072 KB				
Video Card:	VGA/EGA	Quick Boot:	Disabled		
Keyboard	Installed	Boot sequence:	A→C		
CPU Speed:	Fast	NumLock on at boot:	YES		
Esc	F1	F2	↑↓	+/-	PgUp/Dn
Menu	Help	Sys Info	Field	Value	Page

Figure 4-1 SETUP Screen - System Configuration

Diskette A

This setting is used to designate the type of floppy-disk (diskette) drive that is installed in the A drive. (The designated A drive is always a floppy-disk drive.) Use the + and - keys to scroll through the supported drive types. Errors in formatting may result if this information is not correct. Options include:

NOT INSTALLED

3.5", 1.44 MB (default)

3.5", 720 KB

5.25", 1.2 MB

5.25", 360 KB

Diskette B

The designated B drive is always a floppy-disk drive. Optional drive types include the same as the Diskette A setting.

Hard Disk 1

This setting is used to designate the type of fixed (hard)-disk drive for drive C. (The designated C drive is always a fixed-disk drive.) If no fixed disk is installed, the setting should be *Not Installed*.

If your system has a Leading Edge-installed fixed disk, it comes to you from the factory ready to use. If you have installed an IDE-compatible fixed disk, enter the SETUP program and select *Auto Detect 1* or *Auto Detect 2*. After you have saved the changes and exited the SETUP program, the fixed-disk drive will be configured automatically.

If you have installed a non-IDE compatible fixed disk, select *User Definable 1* or *User Definable 2*. Then move the cursor to Cyl, Hd, Pre, LZ, Sec, and Size by pressing the or keys. Type the desired value into the field. These parameters can be obtained from the documentation that came with the drive or from the dealer.

If you have installed an IDE-compatible fixed disk with a capacity of greater than 528MB on a non-UNIX system, select *Auto LBA 1* or *Auto LBA 2*. This setting allows the BIOS to access an IDE-compatible fixed disk using LBA (Logical Block Address).

The Hard Disk 1 and Hard Disk 2 settings also contain a list of drives supported by the SETUP program. Use the and keys to scroll through the list of drives.

Hard Disk 2

This setting works the same way as the Hard Disk 1 setting. If your system has only one fixed disk, the setting should be *Not Installed*.

Base Memory

The Fortiva 5000 Personal Computer comes with 4 megabyte (MB) of random access memory (RAM) installed on the system board. Of this RAM, 640 KB is used for base (also called “conventional” or “system”) memory. It is not possible (or required) to change this value. If the system detects a number other than 640, the following error message will appear when the system is booted:

Invalid configuration information - run SETUP program

Press the F1 key to continue, F2 to run the setup utility

Entering the SETUP program will automatically correct the memory configuration.

Extended Memory

This setting is used by the power-on self-tests to identify the amount of extended memory available. If this information is not correct, errors will occur when booting. Entering the SETUP program will automatically correct the memory configuration. The Fortiva 5000's standard 4 MB of standard RAM can be expanded to 64 MB.

Video Card

This setting designates the primary type of video adapter board used in your system. The Fortiva 5000 Personal Computer comes standard with a VGA card. Change the display option setting only if you remove the VGA card and install another video adapter card.

Available options include:

VGA/EGA (*system default*)

CGA40

CGA80

MONO

NOT INSTALLED

Keyboard

This option designates the absence or presence of a keyboard. Typically, when the *Keyboard Installed* option is selected, the system tests for it when it powers up. If *Not Installed* is selected, the system will not test for the keyboard when it first boots up.

A practical use of the *Not Installed* setting is if the computer is used as a dedicated file server on a network with no keyboard installed.

The system default is *Installed*.

CPU Speed

This setting designates the CPU power up speed between *Fast* and *Slow*. You may wish to activate the SETUP screen just to confirm the speed you are using, which should seldom be other than *Fast*. Normally, the only reason for slowing down the CPU is to utilize software that does not run properly at a higher speed.

NOTE1: You can also use the **Ctrl|Alt|↓** key combination to select Slow “on the fly” and the **Ctrl|Alt|↑** combination to select Fast.

NOTE2: Your system’s fast and slow speeds (measured in megahertz-MHz) depend on the type of CPU installed in your system. This information can be obtained from your dealer.

The system default is *Fast*.

Boot RECORD Protect

This setting allows users to protect the boot sector of the boot disk from viruses. Many viruses attempt to write bogus information to a disks boot sector to corrupt system routines. Enabling this setting essentially write-protects the boot sector.

The system default is *Disabled*.

Password

The password function allows you control access to the computer. When enabled, only those who know the password will be able to use it. The password function is disabled when you receive your computer.

NOTE: When enabled, the password must also be used to enter the SETUP program.

To set a password:

1. Move the cursor to the password function, and press . “Disabled” changes to “Modify” and a dialogue box appears on the screen and prompts:

Modify Password? (Y/N)

2. If you type , the box changes to:

Enter new password ()

3. Enter a password of up to seven alphanumeric characters and press Enter.

NOTE: The password function distinguishes between uppercase and lowercase letters; be sure you record the password just as you entered it on the keyboard.

The system will then prompt:

Verify new password ()

4. Re-enter the password. If both passwords match, the system will prompt:

Are you sure? (Y/N)

If you type Y, the new password is stored and the security feature becomes active. If the verification fails or you type N, the old password is disabled.

NOTE: If the verification fails, repeat the process beginning at step 1. Also, the system must be rebooted in order for the password to take effect.

CAUTION: ONCE YOU HAVE ENTERED AND ENABLED A PASSWORD, YOU WILL NOT BE ABLE TO USE YOUR COMPUTER WITHOUT THAT PASSWORD. DO NOT LOSE OR FORGET YOUR PASSWORD! WRITE IT HERE:

Phoenix SETUP Utility (Version 1.00) 00 (c) Phoenix Technologies Ltd. 1985, 1994 All rights reserved					
** System Feature Control **				Page 2 of 3 >>:Defaults	
BIOS ROM Cacheable:	>>Disabled	Internal Cache:	>> Enabled		
Video ROM Cacheable:	>>Disabled	External Cache:	>> Disabled		
C800-CBFF Shadow ROM	>>Disabled	NonCache 0 Size:	>> Undefined		
CC00-CFFF Shadow ROM	>>Disabled	NonCache 0 Base:	0000000h		
D000-D3FF Shadow ROM	>>Disabled	NonCache 1 Size:	>> Undefined		
D400-D7FF Shadow ROM	>>Disabled	NonCache 1 Base:	0000000h		
D800-DBFF Shadow ROM	>>Disabled				
DC00-DFFF Shadow ROM	>>Disabled	DRAM Wait State:	>>0 Wait State		
E000-EFFF Shadow ROM	>>Disabled	Parity Check:	>>Disabled		
Keyboard Rate:	>>20.0chr/s				
Keyboard Delay:	>> 0.50 sec				
Esc	F1	F2	↑↓	+/-	PgUp/Dn
Menu	Help	Sys Info	Field	Value	Page

Figure 4-2 SETUP Screen - System Feature Control

Quick Boot

Normally, when a computer is booted (turned on), the system automatically performs a series of tests including memory, keyboard, ROM BIOS checksum, and disk initialization tests. When Quick Boot is enabled, the system will skip these tests, thus allowing the computer to start up faster.

NOTE: Leading Edge recommends that the Quick Boot setting should remain disabled. If, however, you choose to enable Quick Boot, you should regularly disable the setting to test your system's components.

The system default is *Disabled*.

Boot Sequence

This setting allows you to select the order in which the system checks the drives when it is booted. Normally the system first checks Drive A then Drive C. However, changing the sequence so that it first checks Drive C then Drive A will enhance your system's performance.

The system default is A→C.

NumLock On at Boot

This setting allows you to have the system boot up with Num Lock on or off. When set to Yes, the computer will turn on with the numeric keypad active.

The system default is *Yes*.

System Feature Control

BIOS ROM Cacheable

The Fortiva 5000's performance can be improved by switching BIOS and video memory from RAM to cache memory. This allows the system to speed up certain BIOS and video functions by copying their instructions from the RAM memory to the faster cache memory. The "portion" of memory used is the area between 640 KB and 1 MB (referred to as *upper memory*).

NOTE: When active, the *Enabled* setting may cause memory location conflicts with some software programs. If this occurs, it is recommended that the BIOS and Video ROM options be set to *Disabled*.

The system default is *Disabled*.

Video ROM Cacheable

Video ROM Cacheable works the same way as BIOS ROM cacheable.

The system default is *Disabled*.

Shadow Memory Options

In most cases, the settings for these addresses (C800 to E000) should be left disabled. You can, however, enable specific areas of RAM listed. Expert users may wish to do this to configure specific addresses in which certain peripheral ROM can be shadowed to enhance performance. Options include:

- **Disabled** (system default)
- **Enabled** — Information is placed in RAM
- **Cacheable** — Information is placed in RAM and made cacheable in external cache. *Cacheable* works faster than *Enabled* but may cause memory conflicts. This information is write-protected (cannot be overwritten).
- **Into-486** — Information is placed in RAM and made cacheable in external and internal cache. *Into-486* works faster than *Cacheable*, but is not write-protected.

To learn more about shadow and cache memory, refer to Appendix A.

The system default for each address is *Disabled*.

Keyboard Rate

The keyboard rate is the rate at which a keyboard repeats a character. The rate can be set from 2 to 30 characters per second or *Disabled*.

The system default is *20.0 characters*.

Keyboard Delay

The keyboard delay time is the length of time a key press must be held down before it begins repeating. Selecting one of the options from this item allows you to adjust the time. The time can be set from .25 seconds to 1 second or *Disabled*.

The system default is *0.5 seconds*

Internal Cache Enabled

When enabled, the cache inside the CPU holds frequently-accessed code and data in memory, reducing considerably the time it take to make this information available to the processor. The net effect is that the efficiency of the computer increases and the average number of wait states is reduced to nearly zero.

This setting should normally be set to *Enabled*. However, there are some software programs that do not run as well when cache memory is activated. When this happens, the setting should be changed to *Disabled*.

The system default is *Enabled*.

External Cache Enabled

External cache (SRAM) works the same way as internal cache. External cache does not work quite as fast as internal cache but can hold more information.

There are some software programs that do not run as well when cache memory is activated. When this happens, the setting should be Disabled.

The system default is *Disabled*.

NonCache 0 Size

This setting allows you to designate specific areas of RAM that cannot be “cached.” Each selection defines the size of the area to be selected. Use the + and - (or spacebar) keys to select the desired address size from 16 KB to 4 MB.

The system default is *Undefined*.

NonCache 0 Base

This setting allows you to designate the starting (lowest) point of the noncache region. Use the + and - (or spacebar) keys to select the starting point of the non-cache region. To learn more about hexadecimal addresses, refer to Appendix A.

The system default is *0000000h*.

NonCache 1 Size

This setting allows you to select a second area of RAM to designate as uncacheable. Options include the same as Uncacheable Area 1.

The system default is *Undefined*.

NonCache 1 Base

This setting works the same way as NonCache 0 Base.

The system default is *0000000h*.

Phoenix SETUP Utility (Version 1.00) 00 (c) Phoenix Technologies Ltd. 1985, 1994 All rights reserved					
** Peripheral Device Control **					Page 3 of 3 >>:Defaults
Internal FDC:	>>Enabled				
Parallel Mode:	>>Printer`				
Parallel Port	>>378h				
Serial Port 1 (DB-9)	>>3f8h (IRQ4)				
Serial Port 2 (DB-25)	>>2f8h (IRQ3)				
** Power Saving Control					
Hard Disk Standby:	>>5 minutes				
System Standby:	>> 5 minutes				
Esc	F1	F2	↑↓	+/-	PgUp/Dn
Menu	Help	Sys Info	Field	Value	Page

Figure 4-3 SETUP Screen - Peripheral Device Control

DRAM Wait State

The DRAM wait state is the programmed time in which the CPU must wait for the slower RAM to catch up with the faster CPU. The length of wait states depends on the type of SIMM used in the computer. As indicated below, when a system uses fast chips with a speed of 70ns (nanoseconds), the CPU doesn't have to "wait," so the setting should be 0. If a system is using SIMMS that are 80 or 100 ns, the setting should be 1 or 2 wait states.

DRAM access time	Read wait
70 ns	0 Wait
80 ns	1 Wait
100 ns	2 Wait

Options include:

0 (*System default*)

1

2

Parity Check

When enabled, this setting checks the computer's memory for parity errors. If your system does not have memory parity, the setting should be *Disabled*.

The system default is *Disabled*.

Peripheral Device and Power Saving Control

The third BIOS screen, shown in Figure 4-3, allows the user to define operational values for peripheral devices and display power management.

Internal FDC

This setting allows the user to specify whether or not the internal floppy disk controller is enabled.

The system default is *Enabled*.

Parallel Mode

This setting sets the mode for the parallel port. Available options include bi-directional and printer.

The system default is *Printer*.

Parallel Port

This setting allows the user to specify the memory location used by the parallel port. Available options include 378h, 3bch, 278h, and disabled.

The system default is *378h*.

Serial Port 1 (DB-9)

This setting allows the user to specify the memory location and IRQ interrupt setting used by serial port 1. Available options include 3f8h-IRQ4, 2f8h-IRQ3, 3e8h-IRQ4, and disabled.

The system default is *3f8h (IRQ4)*.

CAUTION: Video cards installed by Leading Edge use an I/O port address range from 2E0 to 2EF. This conflicts with systems using ports configured as COM4. Reconfigure any new I/O ports so that they do not use COM4.

Serial Port 2 (DB-25)

This setting allows the user to specify the memory location and IRQ interrupt setting used by serial port 2. Available options include 3f8h-IRQ4, 2f8h-IRQ3, 3e8h-IRQ4, and disabled.

The system default is *2f8h (IRQ3)*.

Hard Disk Standby

Use this setting to specify the length of time before the hard disk goes into standby mode. If the system does not detect hard disk access for this length of time, it automatically reduces its power consumption by spinning down the hard drive.

The system default is *5 Minutes*.

System Standby

Use this setting to specify the length of time before the system goes into standby mode. If the system does not detect keyboard or mouse activity for this length of time, it automatically reduces its power consumption by reducing the CPU clock speed.

The system default is *5 Minutes*.

Error messages

Occasionally, an error message appears at the bottom of the screen while you're using the SETUP program. Follow the recommendation below if you encounter an error message.

ERRORS FOUND

DISK X: FAILED INITIALIZATION

Problem: SETUP configuration information is incorrect.

Solution: Rerun SETUP and enter the correct fixed-disk information.

ERRORS FOUND

INCORRECT CONFIGURATION INFORMATION MEMORY SIZE MISCOMPARE

Problem: SETUP reports that the size of base or extended memory does not agree with configuration information.

Solution: Rerun SETUP and enter the correct memory size.

**HARD DISK FAILURE
STRIKE THE F1 KEY TO CONTINUE**

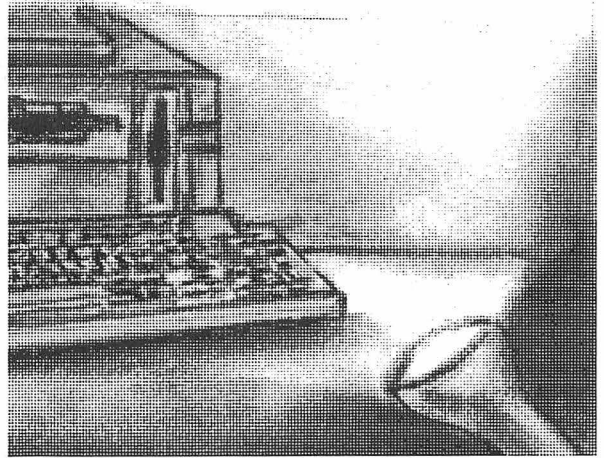
Problem: The system reports a fixed-disk error.

Solution: Press **[F1]** rerun SETUP and enter the correct fixed-disk information.

Ending the SETUP Program

To exit the SETUP program, press **[Esc]**. Then select one of the four choices described on page 50.

Troubleshooting



This chapter contains information about:

- How to identify problems and the steps to take if your Fortiva 5000 Personal Computer is not working properly
- How to prepare your system for servicing

When troubleshooting problems with the Fortiva 5000 Personal Computer, compare the computer's symptoms with those given in the examples described below. Then read the suggestions on how to correct the problem. Be sure to write down any error messages or symptoms, as they can be helpful in identifying the problem.

Hardware or Software?

First try to determine whether the trouble stems from the computer or from the software you are using.

If the computer is exhibiting an obvious hardware problem (example: it won't start up at all), refer to the *General Troubleshooting Check List* in this chapter. If the trouble starts after you load the operating system or an application program, the problem may be traced to the software.

If you are using an application program such as a word processor, check the manual that comes with the program. Look for lists of error messages and sections on troubleshooting.

Normal Start-up Responses

The computer should respond in the following manner when you turn on the power. Drive A should be empty.

1. The power indicator lights up.
2. The screen displays the computer's ROM BIOS version number and copyright information.

3. After this message, the RAM test starts. In this self-test, the system's RAM is rapidly checked, byte by byte.
4. About five seconds after the RAM test ends, the system loads the operating system from Drive C.

If the computer did not start up properly, continue reading this chapter.

General Troubleshooting Check list

Before proceeding with the list of symptoms and solutions in this chapter, review the following check list. Trouble with the system may result from a problem as simple as a faulty connection. Run through the following steps first.

Check Connections

1. Turn off and unplug the system unit.
2. Remove and reinstall the keyboard cable (refer to Chapter 2).
3. Remove and reinstall the two monitor cables (refer to Chapter 2).
4. Remove and reinstall the power cable from the system unit (refer to Chapter 2).

Check the Power

1. Plug a working appliance, such as a lamp, into the electrical outlets used for the system unit and the monitor to be sure the outlets have power and are working correctly.
2. Plug the system unit and monitor into the same working electrical outlets.
3. Turn on the monitor.
4. Turn on the system unit.

System Troubleshooting

If the computer does not respond normally when you start it, review the list of symptoms and solutions in this chapter to find the one that best describes the computer's performance.

You may have to try one or several of the solutions before the computer operates properly again.

Symptom or Screen Message	Problem	Solution
No response at all: the power indicator and drive indicator do not light up, there's no screen display, and no beep.	The system may not be receiving any power.	<ol style="list-style-type: none"> 1. Run through the section above, <i>General Troubleshooting Check List</i>. 2. Try turning off the system for five seconds, and then on again. If there's still no power, consult an authorized Leading Edge service technician.
The power indicator LED lights up, but there's no screen display, no beep, and the drive indicator LED does not light up.	You may have a system unit malfunction.	<ol style="list-style-type: none"> 1. Turn the system unit off for five seconds and then turn it on again. 2. If any responses other than the normal ones occur, consult a service technician.
	New board installed (example: local bus video) may conflict with system.	<ol style="list-style-type: none"> 1. Check jumper setting. 2. If it still doesn't work, consult a service technician.

Symptom or Screen Message	Problem	Solution
Screen message: ROM Chksum Error.	The system's read only memory (ROM) is faulty.	Refer to <i>Preparing the Computer for Servicing</i> in this chapter
Screen message: Warning! Invalid EMS Install caused by one of the following errors 1. Invalid EMS Memory Map. 2. Insufficient Memory Storage. 3. EMS memory test error. Please re-setup EMS Map by key B/D (Ctrl-Alt-S)!	The installation of expanded memory specification (EMS) memory has not been completely successful.	<ol style="list-style-type: none"> 1. Verify the amount EMS memory in the system. 2. Run the SETUP program to indicate the memory configuration in the system (refer to Chapter 4). 3. Refer to <i>Preparing the Computer for Servicing</i> in this chapter.
Screen message: Keyboard Failure.	There is a keyboard problem.	<ol style="list-style-type: none"> 1. Turn the system unit off, then remove the keyboard cable and reinsert it. (refer to Chapter 2). 2. Check the keyboard to see if a key is stuck. If so, release the key and turn the system back on. 3. If any responses other than the normal ones occur, the problem is probably within the keyboard or the system unit. Consult a service technician.
Keyboard stuck key failure (indicated by repeated beeps)	A key is stuck.	Remove object from keyboard.

Symptom or Screen Message	Problem	Solution
<p>Screen message:</p> <p>Boot failure.</p> <p>or</p> <p>The System Diskette is Bad! Insert the System Diskette and Strike <ENTER> Key</p>	<p>The system is unable to load the operating system.</p>	<ul style="list-style-type: none"> ▪ If starting from a floppy-disk system, be sure you have a working copy of the operating system disk in Drive A. Check to be sure it is correctly inserted. Press any key to try again. If the message persists, the disk may be defective. ▪ If you have a fixed-disk system, it's possible to solve this problem by booting the system from Drive A. However, you still need to backup the system and possibly reformat the disk (refer to The MS-DOS manual). If this does not solve the problem, you should consult a service technician.
<p>Screen message:</p> <p>Write-Protect Error.</p>	<p>You are trying to write information to a floppy disk that is write-protected.</p>	<p>Refer to Chapter 2 to learn how to change a 3½" or 5¼" write-protected floppy disk, so that information can be written to it.</p>
<p>Screen message:</p> <p>Access Denied</p>	<p>On a fixed-disk system, you are trying to write information to a file that is set with a read-only attribute.</p>	<p>Run the MS-DOS ATTRIB program to change the attribute of the file.</p>
<p>Screen message:</p> <p>Fixed-Disk Failure.</p>	<p>You have a problem with the fixed disk or its internal controller.</p>	<ol style="list-style-type: none"> 1. Correct the fixed-disk type in the SETUP menu. 2. Have the system unit serviced.

Other Error Messages

MS-DOS or the application program you are running is unable to perform a requested task.

- If any error messages appear that are not mentioned in this section, refer to the appropriate sections in the MS-DOS manual.

- If you are running an application program when the message occurs, check the manual that came with the program.

Monitor Troubleshooting

Symptom	Problem	Solution
Blank Screen	No power	<ol style="list-style-type: none"> 1. Check monitor power. Note that most monitors have their own power switch, separate from the system unit. 2. Is the monitor turned on? 3. Make sure the system unit's power is turned on. 4. Check the monitor cords. Turn off the monitor and system unit to secure both the video and power cords.
	The screen save function may be activated.	Press any key (or move the mouse) to reactivate the screen.
	The brightness and contrast controls are adjusted incorrectly.	Adjust contrast and brightness controls. If any characters now appear on the screen, the monitor should be in good working order.

Symptom	Problem	Solution
	The system unit is faulty.	1. If the screen still shows no response, remove the monitor's power cord from the outlet. Plug the monitor into an outlet which you have verified is functional using the method described in <i>Check the Power</i> in this chapter. (continued)
Blank Screen (continued)	The system unit is faulty (continued).	2. Turn on the monitor, then turn up the controls to fully increase the contrast and brightness. <ul style="list-style-type: none"> ▪ If a white box appears on the screen, the trouble stems from the system unit and not the monitor. ▪ If a white box does not appear on the screen, the trouble stems from the monitor. See <i>Preparing the Computer for Servicing</i> in this chapter.
Vertical rolling or distorted screen display	The software program being used may require another video mode.	1. Run SETUP to check that the video mode corresponds to the software that you are using. 2. If the procedure above does not solve the problem, consult a service technician.

Printer Troubleshooting

If the following general advice does not solve your printer problem, consult the guide that came with the printer for more in-depth diagnostic procedures.

Always turn off the printer and the system unit before removing the printer cable.

Problem	Solution
Nothing prints at all.	<ul style="list-style-type: none"> ■ Make sure the printer is plugged into a wall outlet. ■ Check the wall outlet where the printer is connected. Try a working appliance in the same outlet to be certain there is power. ■ Make sure the printer cable is properly connected to both the printer and the system unit. ■ Make sure the printer is turned on. ■ Make sure the printer's on-line button is turned on. ■ If the printer uses a ribbon, check to be sure that the ribbon is not at the end of the reel. ■ If you have a serial printer, check to see if the connecting pins on the RS-232C cable are plugged in correctly. ■ If you have a serial printer, you have to run the MS-DOS MODE command to match the settings for the printer with the computer. ■ Check the parallel port function in the SETUP Menu. ■ Starting from the MS-DOS prompt, press <code>[Print Screen]</code>. This should send a copy of what is on the screen to the parallel printer (LPT1) and enable you to determine if the problem stems from the operating system or from the software program (using the MODE command first if you are testing a serial printer). If you do get an accurate printout and the cable connections work properly, you have a problem with the software package. (Refer to the manual that comes with the software package.) If you do not get a printout, there is a problem between the computer and the printer.

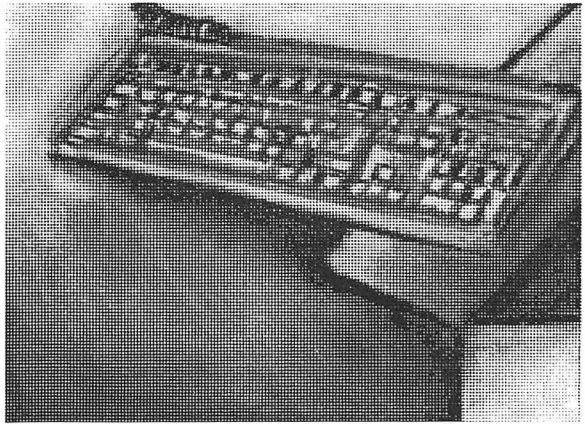
Problem	Solution
Some data not printed	<ul style="list-style-type: none"> ▪ Check to see if the printer power was turned off at any time when the system unit was sending information to the printer. If so, turn on the printer power and try again. ▪ Make sure the ribbon is not at the end of the reel. ▪ If you have a serial printer, you may be using the wrong type of serial cable. Check with your dealer to be sure you have the appropriate cable. ▪ If you have a serial printer, you may need to run the MS-DOS MODE command.
Screen displays printer error messages	<ul style="list-style-type: none"> ▪ Turn the printer off and on again to clear the buffer. ▪ Check the printer cable to be sure it is connected securely. ▪ Be sure the printer's on-line button is turned on. ▪ Be sure the printer ribbon is installed properly. ▪ Be sure the printer has not run out of paper.

Preparing Your Computer for Servicing

Once you decide to have your computer or one of its components serviced, follow these steps:

1. Contact your local dealer and explain the problem. Your dealer may have detailed advice regarding service.
2. Turn off the system unit and all components.
3. Unplug the power cord from the computer.
4. Take your system to the dealer along with your notes describing the computer's performance and any error messages displayed.

Moving the Fortiva 5000



This chapter contains information about:

- Moving the Fortiva 5000 Personal Computer

Moving the System

If you plan to move the computer short or long distances, or if you intend to store it, prepare the equipment as follows:

NOTE: If you have a non-Leading Edge factory-installed fixed-disk drive, you may have to “park” the disk’s heads before moving the computer. A park program positions the read/write heads so they can’t damage the fixed-disk drive when the computer is moved.

If you have a Leading Edge factory-installed fixed-disk drive, it is self-parking. This fixed disk will automatically park the heads in a safe part of the disk whenever the power is turned off. When the system is turned back on, the fixed-disk heads are automatically unparked. To find out if your non-Leading Edge installed fixed-disk drive is self-parking, refer to the dealer from whom you purchased the disk drive.

1. Turn off all components.
2. Disconnect all cords and cables.
3. Coil cables and tape them to the system unit.
- 4a. If you’re moving the computer a short distance:

Clear enough space at the destination site to accommodate all the components when set side by side.

Move the system unit first, then each major component.

- 4b. If you’re shipping the computer a long distance:

Package each component separately.

Pack units in original cartons and use all the original packing materials (foam cushions, plastic sleeves, etc.).

If you don't have the boxes the equipment came in and must use other cartons, make sure you cushion each component carefully.

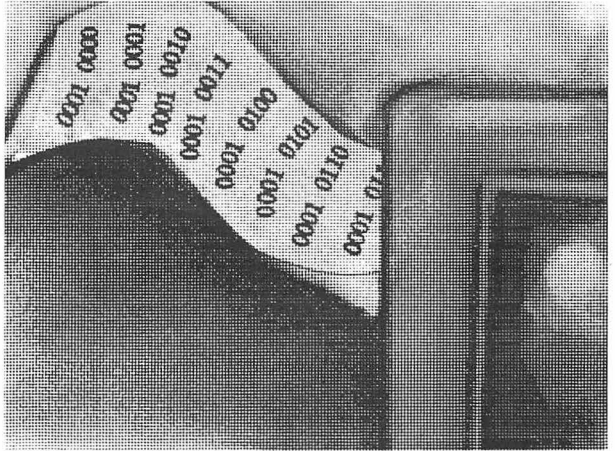
CAUTION: Do not use bubble foam (popcorn, peanut foam) as a cushion.

Setting Up Again

When you're ready to set the computer up again, do the following:

1. Unpack the components with care at the new location, and save the packing materials.
2. Follow the instructions for assembling your system in Chapter 2.

Memory and Device Address Assignments



This chapter contains information about:

- Why computers use the binary system of counting and programmers use the hexadecimal system
- Computer memory
- How to insure your computer's maximum performance by correctly managing memory
- How a computer keeps track of its components by assigning addresses to each device
- How to make sure your device assignments are conflict-free

The purpose of this appendix is to give the reader a basic understanding of how a computer controls information through the management of memory and device assignments. A brief explanation of the binary system is also provided.

The Binary System

Units of memory, as well as the identification of addresses, are measured in *bits* and *bytes*.

Why the Binary System?

A given computer memory location can hold only one *bit* (binary digit) of information (referred to as 1 or 0, on or off, true or false). Each bit is represented in machine code as 1 or 0.

When you type a letter or any other character on the computer keyboard, the computer reads the character as a series of bits. Each set of eight bits is called a *byte*. Some byte values “mean” or represent specific characters, while others direct the computer to perform certain operations.

Hexadecimal System

The hexadecimal system of counting is used to more easily measure bytes. Unlike decimal numbers (base 10), the hexadecimal system is base 16 (0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F). This makes it easier to convert binary (base 2) numbers. Table A-1 shows the correlation between decimal, binary, and hexadecimal numbers.

Table A-1 Decimal, binary, and hexadecimal numbers.

Decimal	Binary	Hex	Decimal	Binary	Hex
0	0000 0000	00	16	0001 0000	10
1	0000 0001	01	17	0001 0001	11
2	0000 0010	02	18	0001 0010	12
3	0000 0011	03	19	0001 0011	13
4	0000 0100	04	20	0001 0100	14
5	0000 0101	05	21	0001 0101	15
6	0000 0110	06	22	0001 0110	16
7	0000 0111	07	23	0001 0111	17
8	0000 1000	08	24	0001 1000	18
9	0000 1001	09	25	0001 1001	19
10	0000 1010	0A	26	0001 1010	1A
11	0000 1011	0B	27	0001 1011	1B
12	0000 1100	0C	28	0001 1100	1C
13	0000 1101	0D	29	0001 1101	1D
14	0000 1110	0E	30	0001 1110	1E
15	0000 1111	0F			

Memory

All information used to run a computer is stored “in memory.” This can be confusing at times, because the term memory is often used in different ways.

NOTE: For the purposes of this discussion, the following explanation of memory pertains only to computer systems that are controlled by the MS-DOS operating system, versions 6.0 and later.

Active Memory

Active memory or RAM (random access memory) is used by the computer to process data. It works only when the computer is turned on. When the computer is turned off, all the data in RAM disappears. Therefore, if you wish to save the information it must be written to a storage device (a floppy or fixed disk). The computer looks for information on the storage device and then “brings it into memory” to work with it.

NOTE: Since information stored on storage devices is measured by the same units (bytes) as RAM, it is sometimes referred to as “storage memory.”

Memory Requirements

Different computers and software have different memory requirements. In general, the first personal computers required less memory than systems used today. However, as systems and software have become more sophisticated, the need for more memory to run the systems and software has increased. For example, many of the first personal computers required only 64 KB (kilobytes) of memory to run. But a system today that runs with MS-Windows requires at least 2 MB (megabytes).

Read Only Memory

When a computer is turned on it looks for some simple instructions that tell it how to activate the rest of the computer. These instructions, located in a special chip, do not disappear when the system is turned off. This type of memory is called *read only memory* (ROM). Unlike random access memory, read only memory cannot be changed. Other computer components (system BIOS, system video, etc.) can also have their own chips that contain information in ROM.

Memory Mapping

Random access memory is used for various tasks (run software programs, control and keep track of the computer's components, store video information, etc.). Computers designate sections of memory for various tasks (Figure A-1). This is referred to as memory mapping. How a system's memory is mapped depends on the amount of memory the system has, the devices it is using, and how the user decides to configure it.

The Fortiva 5000 Computer comes with 4 MB of RAM on the system board and can be expanded to 64 MB. The first 1 MB is normally used to run MS-DOS and other system components.

Conventional Memory

Of this first megabyte of RAM, the first 640 KB is used by the MS-DOS program. This is referred to as *conventional* or *base memory*.

Upper Memory

The remaining 384 KB is referred to as the *upper memory area* (or *upper memory block*). Memory from this area is normally used by other computer components such as the video display or network board.

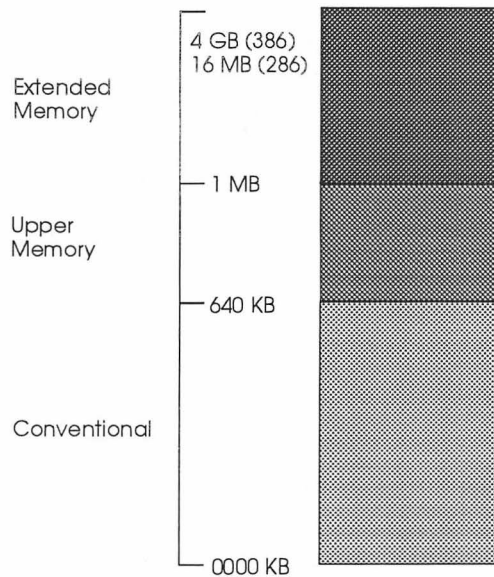


Figure A-1 System memory

Extended Memory

Memory addressed above 1 MB is referred to as *extended memory*. Most of this area is usually used by software application programs (word processors, spread sheets, etc.), which are placed in extended memory through the use of memory managers (described on the next page).

Memory Managers

Special software programs and hardware have been created to allow the user more flexibility in managing the computer's memory.

Expanded Memory

Expanded memory was developed before extended memory. It first allowed computers to go beyond the 1 MB barrier. A 64 KB segment of

RAM (located in the upper memory area for current systems) is used to swap information to and from expanded memory. Information can be worked on, and then another 64 KB block is swapped, or substituted. Expanded memory increases storage capacity dramatically, yet only 64 KB is active at any time. Expanded memory can only be used by certain types of software. Special circuitry on the system board (for the computer) or a separate option board and a software program (this computer supports LIM EMS 4.0.) are required to use expanded memory. Refer to the MS-DOS Manual for more information about expanded memory.

NOTE: “Simulated” expanded memory can be created by using memory managers such as EMM386. Expanded memory can then be accessed from either extended memory or unused upper memory blocks (UMB). Therefore, the area that this expanded memory occupies cannot be used for extended or upper memory.

HIMEM.SYS

HIMEM (High Memory) is a MS-DOS feature that allows MS-DOS and other software application programs to be run in the extended memory area (the area over 1 MB). The advantage of doing this is that it conserves conventional memory, thus making the computer run more efficiently. Refer to the MS-DOS manual for more information about HIMEM.SYS.

Shadow Memory

Certain computer operations performed in ROM (BIOS, video, etc.) can be speeded up if they are performed in RAM. Shadow memory sets aside space in RAM. The Fortiva 5000 Computer allows you to designate which operations you wish to be performed in RAM in the SETUP menu (Chapter 4). Keep in mind, though, that by doing this, you decrease the amount of space available in RAM.

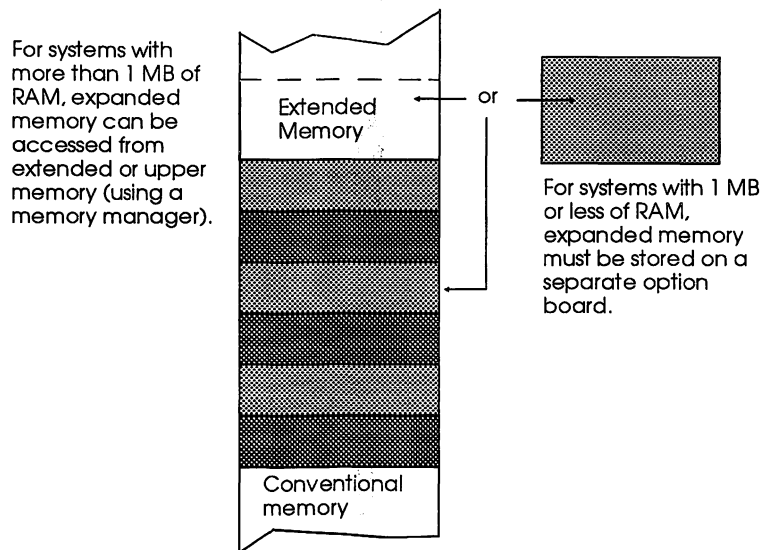


Figure A-2 Expanded memory

Cache Memory

Cache memory is a special and separate section of RAM set aside for frequently used codes and data. This area of memory uses its own cache controller chip and static random access memory (SRAM) chip. When cache memory is utilized, the computer speed improves, because the CPU doesn't have to wait for the normally slower dynamic random access memory (DRAM) chips to catch up. The Fortiva 5000 Computer uses three types of cache memory.

- **Primary cache** — The fastest type of cache memory. Primary (or internal) cache is contained in the CPU. CPUs currently used by the Fortiva 5000 Computer contain 8 KB of primary cache memory.
- **Memory cache** — The second fastest type of cache memory. Secondary (or external) cache is located between the CPU and the main system memory. It must be enabled in the SETUP program (Chapter 4) and it can be increased by adding memory chips.

The Fortiva 5000 Computer comes with sockets on the system board that can hold 64, 128, or 256 KB of cache memory.

- **Hard disk cache** — Cache memory can also be set up in extended or expanded memory using MS-DOS' SMARTDRV.SYS function. This is called *hard disk cache*. This type of cache will not run as fast as primary or memory cache, but will run faster than normal RAM. You would normally use SMARTDRV.SYS if you were using a computer that does not have a separate memory cache. Refer to the MS-DOS manual for more information about SMARTDRV.SYS.

Memory Addressing

Computer systems that use the MS-DOS operating system divide memory space into 64 KB sections called segments. Each segment is reserved for a specific purpose, and its address is identified by a hexadecimal number. (Figure A-3).

Conventional Memory

User RAM (00000 to 9FFFF) — The first 10 segments equal 640 KB and are designated for user RAM. This is the familiar 640 KB of base memory that MS-DOS and other software application programs use.

NOTE: These programs can also be run in extended memory by using an MS-DOS program like HIMEM.SYS. This will increase the amount of conventional memory available to your system, improving its efficiency.

Upper Memory

Segments A and B (begin at locations 0A0000 and 0B0000) — Video BIOS is held in these two addresses. Although the VGA board contains more than 128 KB, only 64 KB of memory is active at any time.

Segments C and D (begin at locations 0C0000 and 0D0000) —

These addresses are used to hold installable ROMs like the video ROM and the fixed-disk controller ROM. The VGA board extension ROM begins at C0000, while the fixed-disk controller ROM starts at C8000. The PageFrame that accesses expanded memory can also be located in either of these two addresses.

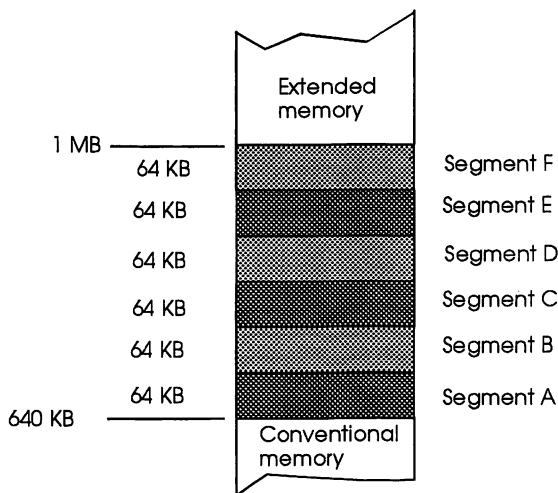


Figure A-3 Upper memory addresses

Segments E and F (begin at locations 0E0000 and 0F0000) —

These addresses are used to hold the system BIOS ROM. The PageFrame can also be located in these addresses.

NOTE: Expanded memory can be stored (using a memory manager like EMM386) in any of the segments A-F if they are not being used.

Extended Memory

Extended Memory — Memory addressed above 1 MB. The first 64 KB of extended memory starting at 1 MB is called HMA (high memory area).

Addresses

In order for a computer to work properly, the devices in it must be able to communicate with each other. For instance, if a printer is connected to your system, the system must know the location or “address” of the printer and be able to transmit data to it. Only then can the computer communicate with the printer.

A computer controls and keeps track of its devices through the use of *ports* and *interrupts*.

Ports

Ports are used as doorways (PORTals) to pass data among the various devices. Each port is assigned a unique address, expressed as a hexadecimal number.

This computer orchestrates the use of many devices in the system, maintaining a tracking system to keep strict control over them. Whenever you install an expansion board in your computer, there is a possibility that it will cause a conflict in memory, ports, or interrupts (explained below). Most problems encountered during system expansion can be traced to one of these.

Two devices cannot share the same port address. The system will not be damaged, but the devices will not work properly. To make sure your system is configured correctly, check the information below, and any documentation that came with the option board.

Ports 000 (hexadecimal) through 0FF (hexadecimal) are reserved for the system board. Through these ports the CPU talks to the other chips on the system board. Other common port assignments are listed in Table A-2.

Table A-2. Common port addresses

Port address Hex	Device
000-0FF	Reserved for system board
170-177	Fixed-disk controller 2
1F0-1F7	Fixed-disk controller 1
200-20F	Game controller
278-27F	LPT2
2E8-2EF	Reserved for ATI video adapter (8514A)
2F8-2FF	COM2 (address of built-in serial port)
370-377	Floppy disk controller 2
378-37F	LPT1 (address of built-in parallel port)
3B0-3DF	Video adapter
3E8-3EF	COM 3
3F0-3F7	Floppy-disk controller 1
3F8-3FF	COM1 (address of built-in serial port)

Interrupt Requests

Processing can be interrupted by a device, or controller, through the use of interrupt request lines (IRQ). When a device needs immediate attention, usually to perform some task, it signals the CPU through the IRQ that has been assigned to it. The CPU receives the request, stops its current processing, and performs the task for the device. The CPU then resumes its previous operation.

Interrupt requests become important when adding option boards. Two devices can not share the same interrupt line. This conflict will not cause any damage to the system, but will prevent the devices from working properly.

Refer to the information below and any documentation that came with the devices. Often times, option boards provide switches or jumpers to change the interrupt line and/or port address.

Computer IRQ assignments

This computer uses two interrupt controller chips, sometimes described as a master and a slave, for a total of 15 IRQs. Eight devices are handled by the slave, and seven are handled by the master. (The eighth line is used by the slave to signal the master that it has an interrupt to process.)

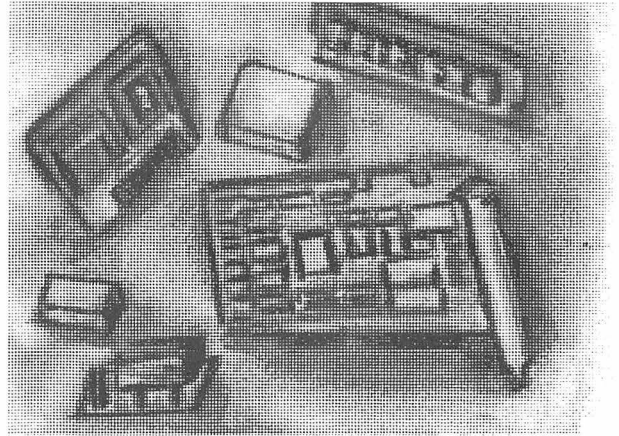
The devices assigned to the Fortiva 5000 Computer's IRQ areas are as follows:

Table A-3. Interrupt request lines

Master	Slave	Device
IRQ0		System timer
IRQ1		Keyboard
IRQ2		Interrupt from slave
	IRQ8	Real-time clock
	IRQ9*	Redirected IRQ
	IRQ10	Open
	IRQ11	Open
	IRQ12	PS/2 mouse
	IRQ13	Coprocessor
	IRQ14	Fixed-disk
	IRQ15	Open
IRQ3		COM2
IRQ4		COM1
IRQ5		LPT2
IRQ6		Floppy disk
IRQ7		LPT1

* Any add-on board that is configured to use IRQ2 will be automatically switched by the system to use IRQ9. The user does not have to make any changes

Options



This chapter contains information about:

- Location of components, jumpers, and switches
- Adding system memory
- Upgrading the CPU
- Adding cache memory
- Adding an expansion board
- Adding an I/O Port
- Adding Storage Devices

Consult your authorized Leading Edge dealer for information about purchasing any of the options discussed in this appendix. For the name of a dealer in your area, call 1-800-874-3340.

Configuration Jumpers

Whenever you add or change a device on a computer (example: installing a modem board), you must configure the system so that it will be compatible with the rest of the computer. In most cases this is done by making changes in the SETUP program (Chapter 4), or by using special software programs supplied by the maker of the device.

Sometimes, however, it is necessary to change the settings on the computer's circuitry or the actual devices. Configuration jumpers (Figure B-1) are used to change these settings.

A jumper is a row of one or more pins that can be connected by a jumper cap in a variety of positions to change the configuration of the computer. Jumpers on the system board have two or three pins.

A jumper cap, a small piece of wire enclosed in plastic, connects and completes a circuit between two jumper pins. When the cap is installed,

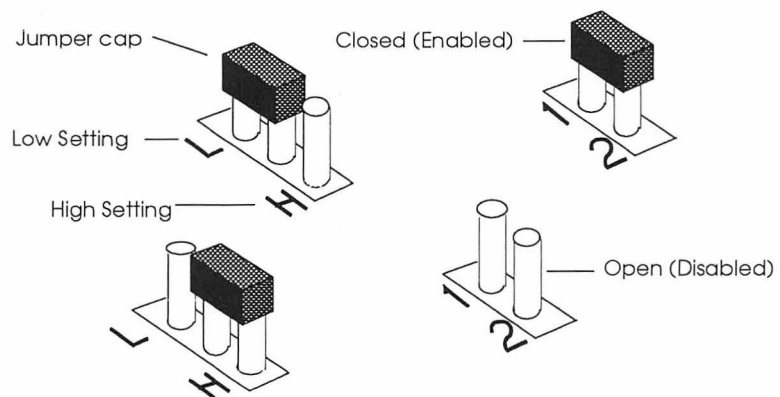


Figure B-1 Configuration jumpers

it bridges two pins and enables a specific function. When the cap is removed, it disables a specific function.

On a two-pin jumper, the jumper cap is placed over pins 1 and 2. This is referred to as “closed.” A two-pin jumper with no cap is referred to as “open.” On a three-pin jumper the jumper cap can be placed over pins 1 and 2 (low) or over pins 2 and 3 (high).

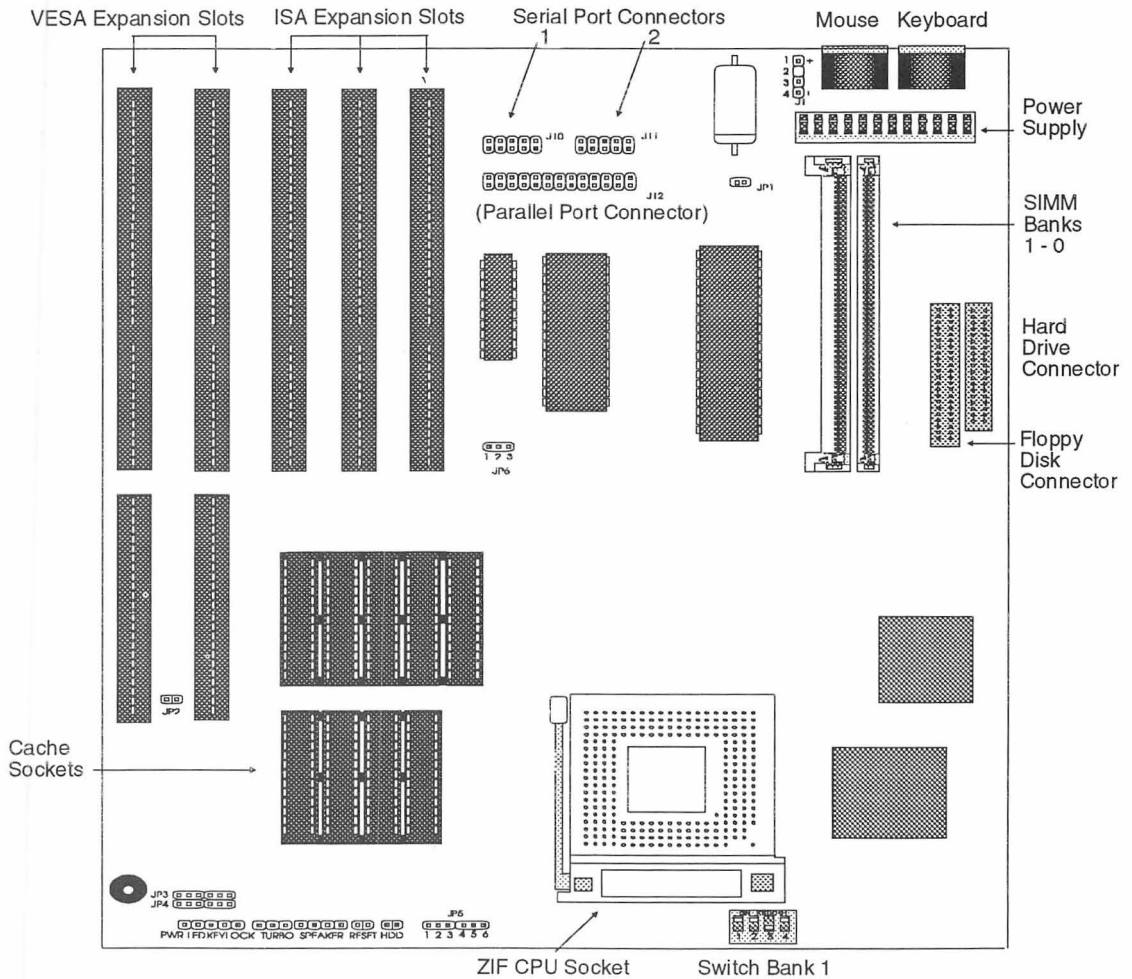


Figure B-2 System board

Figure B-2 shows the system board and the jumper and switch locations (labeled JP1, JP2, etc.). Tables B-1, -2, -3, and -4 list the system board's jumper and switch functions and settings.

System Board Jumper Settings

Table B-1 System board jumpers

Jumper	Function	Setting
JP1	Tests the battery current	Always closed
JP2	Selects the VESA clock	Closed - 33M < CPU clock Open - 33M > = CPU clock
JP6	Selects Activity type	1-2 - Video, HDD, VESA Slot Activity 2-3 - HDD Activity

Table B-2 CPU selection jumpers

CPU-type	JP5
486SX	2-3
486DX	1-2, 3-4, 5-6
486DX2	1-2, 3-4, 5-6

Table B-3 Oscillator Selection Switches (SW 1)

Clock Speed	Switch 1	Switch 2
25 MHz	Off	Off
33 MHz	On	On
40 MHz	On	Off

Table B-4 Additional Function Settings (SW1)

SW 1 Switch Number	Function
Switch 3	Clock Down 8 MHz On - Yes Off - No
Switch 4	On-Board I/O Enable/Disable On - Enable Off - Disable

Table B-5 External cache selection jumpers

Cache Size	JP3	JP4
0 KB	All Open	All Open
64 KB	1-2	1-2
128 KB	2-3, 5-6	1-2, 3-4
256 KB	1-2, 4-5	1-2, 3-4, 5-6

WARNING: Changing the settings of any other jumper on the system board can cause severe damage to the computer. These jumpers should only be changed by an authorized service technician.

Connectors

Connectors (located on the system board) are used to connect peripheral devices to the system. Figure B-2 shows the location of the Fortiva 5000 Personal Computer's connectors. Table B-6 lists and describes the connectors.

Table B-6 System board connector functions and settings

Connector	Function
J1	Battery connector
J9	Power connector
J10	Serial Port 1 connector
J11	Serial Port 2 connector
J12	Parallel port connector
J13	FDD connector
J14	HDD connector
J20	Power LED (pins 1-3) (pins 4 and 5 are for the keylock)
J21	Turbo LED
J22	Speaker
J23	Reset
J24	HDD inuse LED

WARNING: Normally, there should be no reason to make any changes to any of the current connector settings. If, however, a connector is accidentally detached, refer to Table B-6 for reference.

Adding System Memory

Memory is usually added to computer systems to meet the ever-increasing requirements of new and updated software, and to make computer systems run faster and more efficiently.

Adding Memory Using SIMMs

Memory can be increased in the Fortiva 5000 Personal Computer by adding SIMMs (single in-line memory modules). A SIMM is a small board or chip that is inserted into a slot on the system board. Different SIMMs contain different amounts of memory and different computers can hold different amounts of SIMMs. The Fortiva 5000 Personal Computer comes with 4 MB of standard memory and can be expanded up to 64 MB.

To upgrade the memory on the system board, add, remove, or replace SIMMs in the banks (located to the left of the power source on the right side of the system board — Figure B-2) so as to arrive at one of the following configurations (Table B-7). Make sure that all of the SIMMs are of the same speed and specifications.

Table B-7 Memory (SIMMs) configurations

Total	Bank 0	Bank 1
4 MB	4 MB	
8 MB	4 MB	4 MB
8 MB	8 MB	
12 MB	8 MB	4 MB
16 MB	8 MB	8 MB
16 MB	16 MB	
20 MB	16 MB	4 MB
24 MB	16 MB	8 MB
32 MB	16 MB	16 MB
32 MB	32 MB	
36 MB	32 MB	4 MB
40 MB	32 MB	8 MB
48 MB	32 MB	16 MB
64 MB	32 MB	32 MB

Removing the System Unit Cover

To gain access to the system board (as well as the rest of the inside of the system unit), you must first remove the system unit cover.

1. Make sure the system unit is not receiving power. Disconnect the power cord and all peripheral devices.
2. Remove the bezel by simultaneously pressing in on each side of the bezel and pulling it away from the system unit. Refer to Figure B-3.
3. Remove the two screws that secure the system unit cover to the chassis from the front and back sides of the system. Refer to Figure B-4.

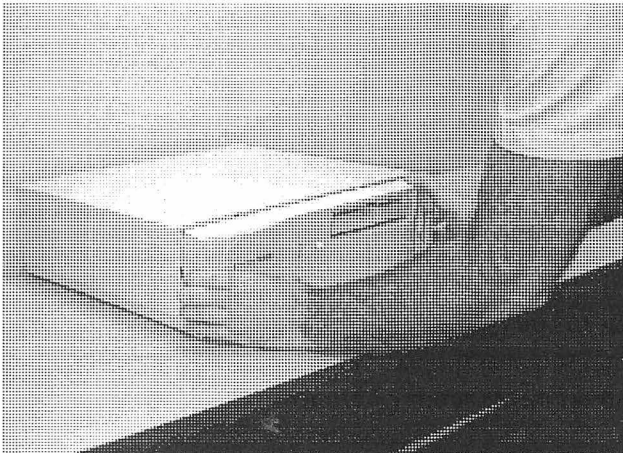


Figure B-3 Removing the Bezel

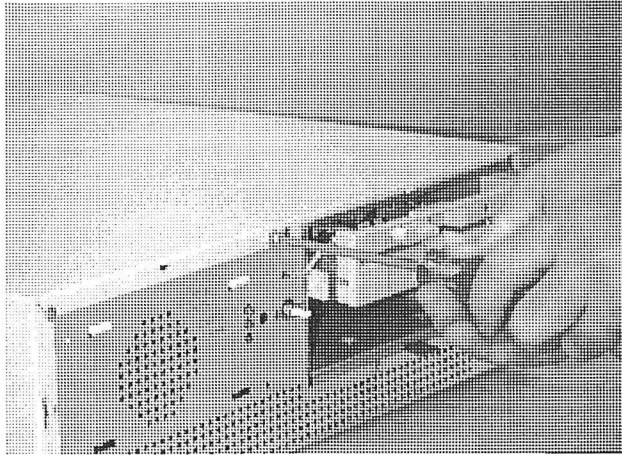


Figure B-4 Unscrewing the case

4. Slide the cover approximately one inch forward.
5. Lift the cover directly upwards until it clears the system unit. Refer to Figure B-5.

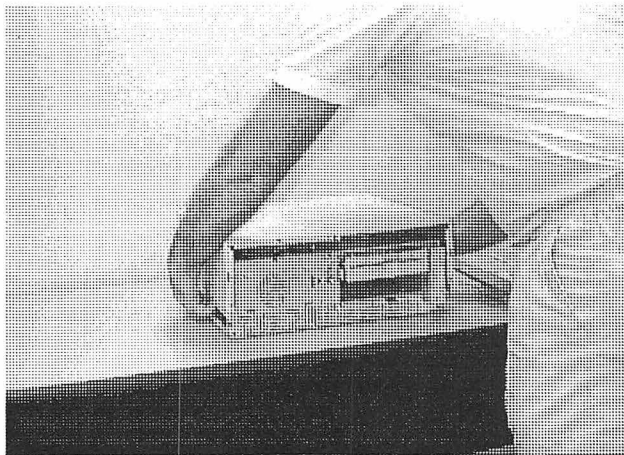


Figure B-5 Removing the case

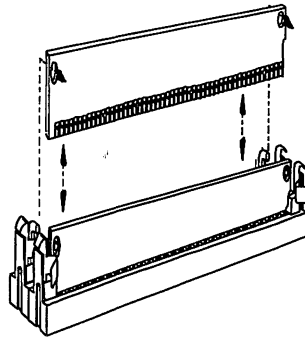


Figure B-6 Installing a SIMM

Adding the SIMMs

1. If you are replacing SIMMs, carefully remove each old SIMM by gently pushing outward on the holding clips and pulling the SIMM toward you to free it from the socket. Refer to Figure B-6.
2. Insert new SIMMs in the same orientation as those you've removed. Gently press SIMMs down and then backward until they snap into the holding clips. Fill the banks as per Figure B-2 and Table B-6, for the desired amount of memory.

NOTE: All SIMMs should be the same speed and made by the same manufacturer.

3. Reassemble the system unit, run the SETUP program, and indicate the new memory amount as described in Chapter 4.

Upgrading the CPU

The Fortiva 5000 Personal Computer's CPU can be easily upgraded by installing another CPU chip and resetting the oscillator jumpers (if required).

The CPUs currently available for the Fortiva 5000 Personal Computer include 486 Processors.

To upgrade the CPU:

1. Discharge static electricity. To do this, you must “ground” yourself, or equalize any difference in the charge between you and the system. This can be done by touching the chassis (metal frame) of the system.

WARNING: Components on the system and CPU boards are very sensitive to electrostatic discharge and can be ruined by such a discharge. In this case, Leading Edge will not be responsible for the replacement of the components.

2. Disconnect the power cable, and any attached peripherals (printers, monitors, or external modems, etc.). This should be done for safety and to insure that stray electrical charges do not damage the system or components.
3. Remove the system unit cover (see page 109).
4. If installed, remove the existing CPU. The CPU chip is inserted in a ZIF socket. Raise the handle next to the socket (Figure B-7). This releases the CPU chip. Then carefully lift the chip out of the socket.

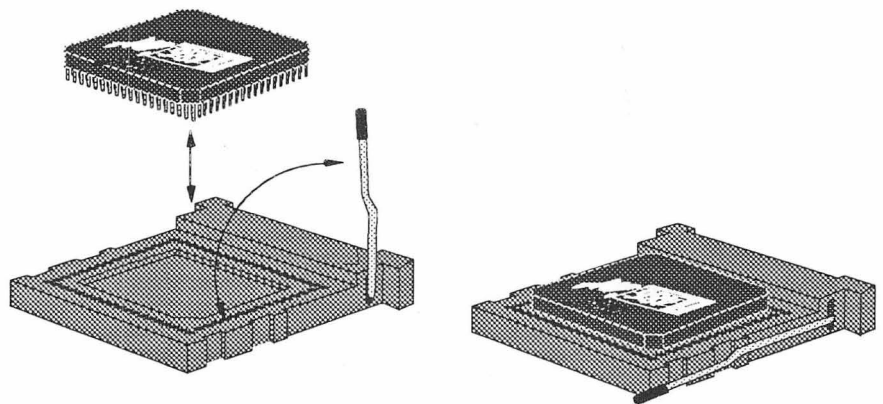


Figure B-7 Removing the CPU chip

5. Install the CPU chip. Place the chip on top of the socket, matching the white spot and/or beveled corner of the chip with the similar marking on the socket. Align the pins with the holes in the socket. Check the alignment by looking at the chip and socket from all sides, under a bright light.

CAUTION: Every one of the pins must be in the proper hole; otherwise, the chip will not function.

6. Lower the chip into the socket and secure the chip by lowering the ZIF handle.

CAUTION: Pressing the chip into place will bend any pins that are not properly seated; this bending (or straightening a pin once bent) may damage or destroy the chip.

7. Set the jumpers (refer to Table B-2).
9. Reconnect the cables.
10. Replace the system unit cover.

Adding Cache Memory

Adding External (or secondary) cache memory can improve the performance of your Fortiva 5000 Personal Computer. This is done by inserting “static RAM” chips. The sockets for the chips are located on the system board (Figure B-2). You can add chips to increase the amount of cache in configurations of 64, 128, and 256 KB. Refer to Table B-7 for the correct chip configuration. Ask your Leading Edge dealer for information about purchasing cache chips.

Table B-7 Cache configurations

Size	U22-U25 Cache SRAM	U29-U32 Cache SRAM	U26-TAG SRAM	Cacheable Range
64KB	8K x 8bit x 4	8K x 8Bit x 4	8K x 8bit	16 MB
128KB	32K x 8bit x 4		32K x 8bit	32 MB
256KB	32K x 8bit x 4	32K x 8bit x 4	32K x 8bit	64 MB

** TAG RAM is the part of cache that keeps track of memory addresses stored in cache.

Leading Edge recommends using the following chips*

8 KB Chips		32 KB Chips	
Manufacturer	Part number	Manufacturer	Part number
Micron	MT5C6408-20	Micron	MT5C2568-20
IDT	IDT7164S-20-TP	IDT	IDT71256-20-TP
Cypress	CY7C185A-20PC	Cypress	CY7C199-20PC
UMC	UM6164BK-20	Performance	P4C1256-20PC

*SRAM chips - 20ns, TAG RAM chips-15ns

To add or change cache memory:

1. Remove the system unit cover (see page 109).
2. Press the new chips into place into the sockets on the system board. Refer to the orientation displayed in Figure B-2). Be sure that every pin is correctly seated in the appropriate hole. It usually helps to seat one row of pins, then press the chip slightly backward against them while lowering the other row of pins into place.
3. Set the system board jumpers (Figure B-2) in accordance with Table B-5.
4. Reconnect the cables.
5. Replace the system unit cover.
6. Restart the system, then enter the SETUP program and change the Cache Enable function to *Enabled* (refer to Chapter 4).

Adding an Expansion Board

The Fortiva 5000 Personal Computer has three 16-bit and two 32-bit expansion slots for adding adapter boards.

To add an expansion board:

1. Discharge static electricity. To do this, you must “ground” yourself, or equalize any difference in the charge between you and the system. This can be done by touching the chassis (metal frame) of the system.
2. Remove the system unit cover (see page 109).
3. Remove the screw and slot cover from an empty slot (Figure B-8). Keep the screw and the bracket.
4. Hold the expansion board by its top edge and insert it into the slot. Make sure the expansion board is firmly seated in the slot.
5. Reinsert the screw removed in step 1.
6. Reassemble the system unit.

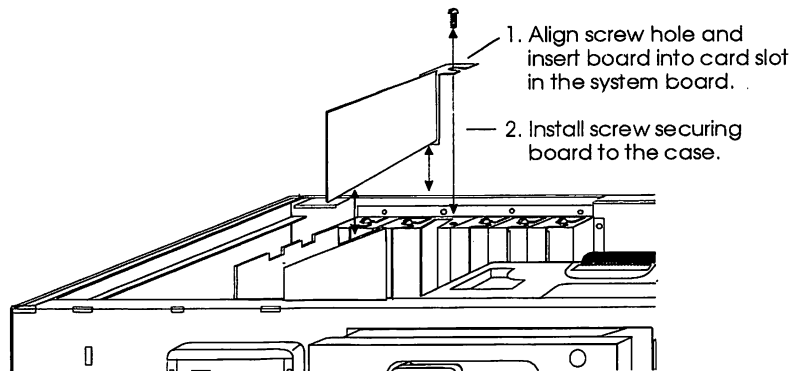


Figure B-8 Installing an expansion board

Configuring an Expansion Board

When adding an expansion board, you may experience some address conflicts, as no two devices can share the same port address or interrupt request line. No damage will occur to the devices, but they will not function properly.

The Fortiva 5000 Personal Computer is designed so that the standard parallel port and serial ports can be enabled, disabled, and changed via the settings in the CMOS Setup program (Chapter 4).

Before setting up the ports, refer to Appendix A for more information. Then consult the manuals that came with the expansion boards for instructions on making the necessary hardware adjustments.

Adding an I/O Port

This computer has three standard I/O ports (not including the keyboard). One is a parallel port with the address LPT1 (hex 378-37F). By changing the configuration in the CMOS Setup program, you can change the address to LPT2 (hex 278-27F) or disable the port. The two serial ports, occupying addresses, COM3 (hex 3E8-3EF) and COM2 (hex 2F8-2FF), can be disabled in the same manner. If you want to preserve the two standard serial ports, when adding another serial device, make sure the system runs the new device starting at COM1 (hex 3F8-3FF). On most expansion boards, you can assign a non-conflicting port address to the board you want to install. Consult the manual that accompanies the board for instructions on making the necessary hardware adjustments to the expansion board.

Adding Storage Devices

The design of the Fortiva 5000 Personal Computer makes it easy to add storage devices, such as floppy- and fixed-disk drives. A total of four can be used at one time.

- The vertical bay can hold a 3½" floppy- or fixed-disk drive.
- The two horizontal bays can each hold a 5¼" and 3½" floppy-disk or fixed-disk drive, a CD-ROM drive, or a tape backup drive.
- The internal bay can hold a 3½" fixed-disk drive.

To add or replace a storage device:

1. Disconnect the system unit power cable from the electrical socket.
2. Remove the system unit cover (see page 109).
3. Remove all cables connecting existing storage devices (Figure B-9).
4. Remove the drive bay rack by simultaneously raising the catch under the rack and pulling the rack out of the system unit (Figure B-10).

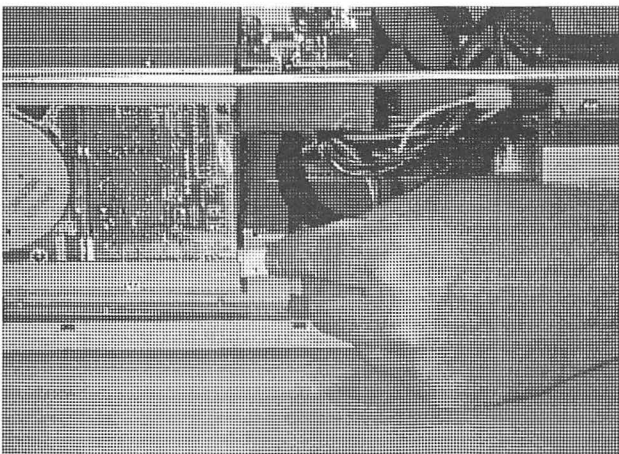


Figure B-9 Disconnecting the drive cables

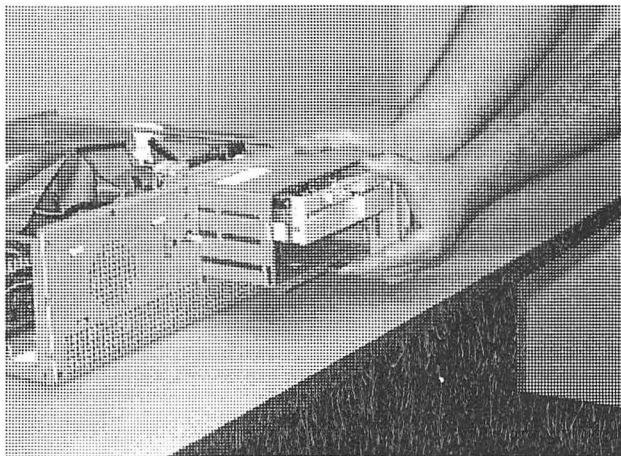


Figure B-10 Removing the drive bay rack

5. Verify that the drive you are adding is configured properly; that the switches and jumpers are set properly for Drive A, B, etc. Refer to the documentation that comes with the drive. It's easier to take a few minutes and confirm this before installing the drive in the computer.

To add or replace a horizontal storage device:

6. If necessary, remove the horizontal drive bay's cover from the bezel. Turn the bezel over and carefully bend the catch with a slothead screwdriver until the cover is free (Figure B-11).
7. Attach the rails and/or mounting bracket to the device. If available, refer to the instructions in your upgrade kit.
8. Slide the device in until the rails on each side snap into place (Figure B-12).
9. Replace the drive bay rack.

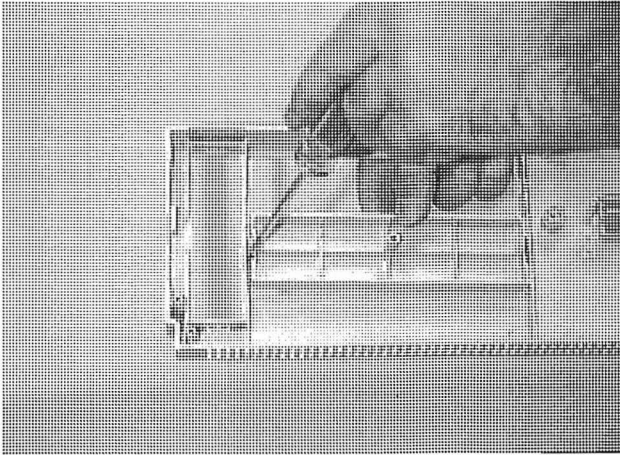


Figure B-11 Removing a bezel panel

10. Connect the disk drive controller cable to the drive and the connector on the motherboard. A second floppy-disk drive is connected to the second connector on the existing floppy-disk controller cable.
11. Connect one of the available power cables to the disk drive.

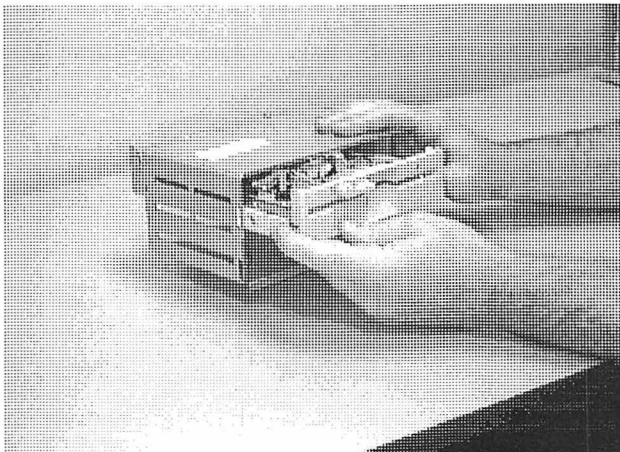


Figure B-12 Using rails in the drive bay rack

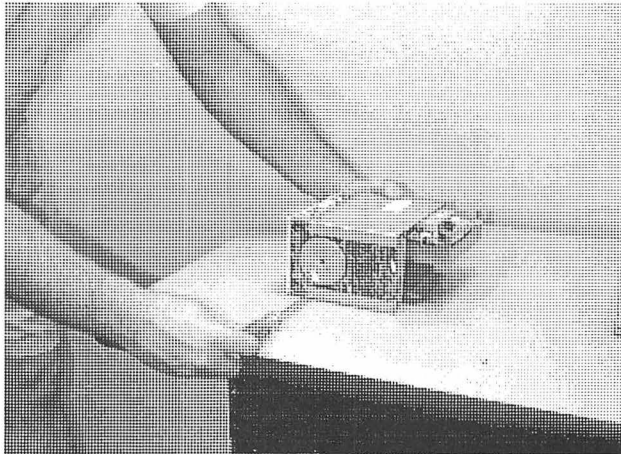


Figure B-13 Unscrewing a 3 1/2 drive

12. Replace the system unit cover.
13. Run SETUP to configure the system to recognize the new drive.

To add or replace a vertical storage device:

1. Follow the above steps 1 through 5.
2. If needed remove the currently installed vertical drive by removing the screws that hold it to the drive bay rack (Figure B-13).
3. Slide the device in and attach the screws.
4. Follow the above steps nine through thirteen.

Replacing or installing an Internal Disk Drive

The Fortiva 5000 Personal Computer comes with the fixed disk installed in an internal drive bay located on top of the power supply (Figure B-14).

To remove or install a new fixed disk:

1. Follow the above steps 1 through 3 for installing a horizontal drive.
2. Unscrew the two screws on each side of the fixed disk (Figure B-14).
3. Disconnect the disk drive controller cable and the connector to the motherboard. Then remove the fixed disk.
4. If needed, insert the new fixed disk. Then re-insert the two screws along each side.
5. Connect the disk drive controller cable to the drive and the connector on the motherboard.
6. Follow the above steps 11 through 13 described in *Adding a Horizontal Drive*.

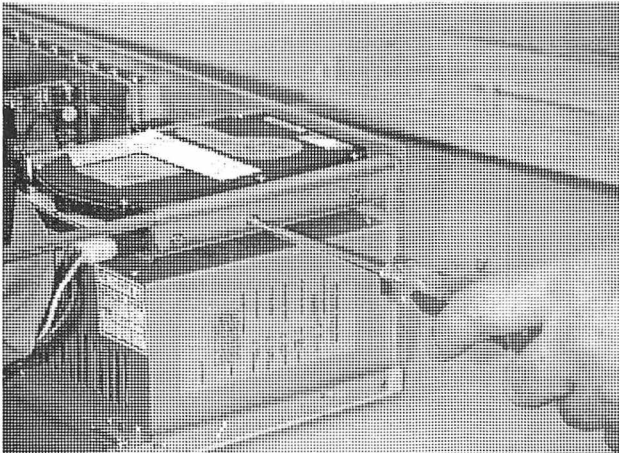
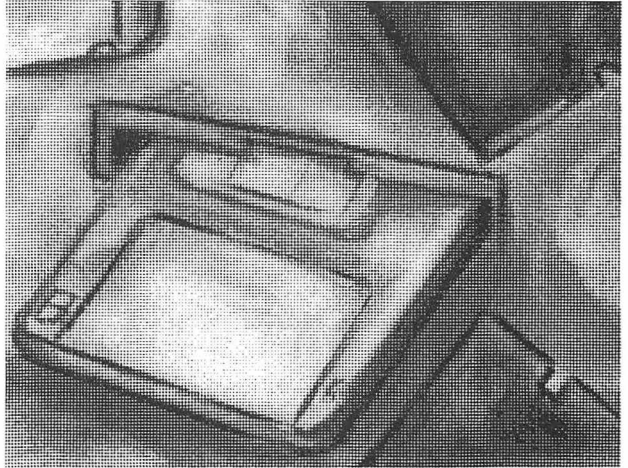


Figure B-14 Unscrewing a hard drive

Fortiva 5000 Features

*This chapter contains
information about:*



- The features and specifications of the Fortiva 5000 Personal Computer

The following features and specifications are for a standard Fortiva 5000 Personal Computer. Your computer's features may be different, depending on the configuration you have purchased.

Microprocessor

- | | |
|------------------|---------------------------------------|
| Processor | ■ 32-bit |
| Data path | ■ 32-bit |
| CPU types | ■ 486 Processors |
| Math coprocessor | ■ Contained in 486DX and 486DX2 chips |

Memory

- RAM — 4 Megabytes (MB) of standard memory expandable to 64 MB using SIMMs (2 SIMM sockets on the motherboard)
- Internal Cache — 8 KB
- Secondary Cache — Expandable to 64, 128, or 256 KB
- Shadow RAM — System BIOS, video BIOS and option ROM
- Expanded — LIM EMS 4.0 by software

- Video
- 32-bit VESA Local Bus Accelerator
 - Video memory — Refer to your video manual
 - Resolution — Refer to your video manual
- I/O Ports
- One serial port (9-pin male RS-232)
 - One serial port (25-pin male RS-232)
 - One parallel port Centronics compatible (25-pin female)
 - One PS/2-type mouse port
 - One video analog port (15-pin female)
 - 6-pin din PS/2 connector for keyboard
 - Power input
 - Power output
- Fixed disk Drive
- One internal 3½" fixed disk (with embedded AT-IDE interface) with various capacities available
- Floppy-disk drive
- One 1.44 MB 3½" floppy disk drive
- Expansion slots
- Three 16-bit ISA slots
 - Two 32-bit VESA slots

Keyboard	<ul style="list-style-type: none">■ Enhanced 101/102 key at keyboard IBM PS/2 style interface connector
Mouse	<ul style="list-style-type: none">■ PS/2-type
LEDs	<ul style="list-style-type: none">■ Power indicator■ HDD access indicator■ Turbo indicator
Power supply	<ul style="list-style-type: none">■ 150 Watts 115/230 VAC. 50/60 HZ. 4.0/2.0 amperes Switch selectable UL/CSA/TUV approved
Software	<ul style="list-style-type: none">■ Microsoft DOS operating system■ QBASIC programming language■ MS Windows graphical interface (optional)
Dimensions	<ul style="list-style-type: none">■ W- 15 7/8" x D- 16 5/8" x H- 5 3/8"
System Weight	<ul style="list-style-type: none">■ 22.06 lbs

Time and Date

- A built-in date and time-of-day circuit with battery backup

Options

- Memory (up to 64 MB)

Glossary

A

active drive The disk drive that the operating system searches when a filename or command is typed. The active drive letter is displayed as part of the MS-DOS prompt. For example, if the prompt is A>, the active drive is A. MS-DOS looks for the files on the active drive unless a different drive name is specified.

adapter card A circuit board that enables the computer to communicate with a peripheral device.

application program A software program that consists of coded instructions for the computer. Application programs are usually distributed on floppy disks and are sometimes called software or software application programs i.e., word processing, database, spreadsheet.

ASCII (American Standard Code for Information Interchange) A coding system used by computers that recognizes letters, numbers, and symbols. It provides a standard format for exchange of data between software programs.

B

backup To make a copy of files in order to protect data periodically.

backup disk A reserve copy of a data or system disk that can be used in case the current disk is damaged. See *working copy*.

bank switching A technique used by expanded memory to move information into and out of an unused 64 KB segment of memory, thereby substantially increasing available memory.

base memory 640 KB of computer memory used for MS-DOS and its application programs.

BASIC (Beginners' All-purpose Symbolic Instruction Code) A general-purpose and widely used computer language. See also *QBASIC*.

BIOS (Basic Input-Output System) Operating system software permanently stored in the computer system's ROM (read-only memory). The BIOS interacts with the MS-DOS command processor program, COMMAND.COM, enabling the computer to be controlled by MS-DOS commands.

board See *circuit board*.

boot To turn on the computer's power and load the operating system (MS-DOS).

bootable disk A disk used to start the computer and load MS-DOS. Also called a system disk.

buffer A section of the computer's memory used as a temporary holding area.

byte A binary unit of measurement used by computers. For example, when the MS-DOS DIR command is executed, MS-DOS displays file names and their size in bytes.

C

cache A hardware or software method of increasing processing speed by moving information from slower storage to faster storage so that it can be accessed more quickly.

cancel To stop the computer's current activity, usually by pressing the **Esc** key or simultaneously pressing **Ctrl** and **Break**.

card See *circuit board*.

CD ROM A read only optical storage technology that uses compact disks.

CGA (color graphics adapter) A medium resolution video adapter that works with RGB monitors.

character A letter of the alphabet, number, punctuation mark, symbol, or space.

chassis The metal frame that contains the system board and other components inside the system unit.

circuit board A board made of insulated material that contains electrical circuits.

CMOS memory (Complimentary Metal Oxide Semiconductor)
Battery-powered memory in which the computer stores data from the SETUP program.

command A short program that tells MS-DOS how to do a specific task.

COMMAND.COM In MS-DOS, the file that contains MS-DOS internal commands. This file must be present in order for MS-DOS to run. Also called the command processor.

command line Where instructions for MS-DOS are typed.

command processor See *COMMAND.COM*.

Computer Virus A program or subroutine (program fragment) that attaches itself to the code of other programs in the same way a biological virus infiltrates the cells of an organism. It then executes its instructions whenever the infected program is accessed.

configure To prepare either hardware or software to work in a certain way. For example, the computer's hardware is configured by entering the correct information (devices connected to the computer, memory, port addresses, etc.) in the SETUP program. The SETUP program then communicates this information to the computer.

controller card A circuit board that governs the operation of a device. For example, a fixed-disk controller card controls a fixed disk. Also called controller board.

copy protection A security feature of some software programs that prevents users from making illegal copies of the software.

CPU (Central Processing Unit) The micro processing chip where most of the software instructions are processed. Examples of modern CPUs are the Intel® 8086, 8088, 80286, 80386, 80386SX, and 80486.

current drive See *active drive*.

cursor A movable marker that shows the current position on the screen.

cursor movement keys The keys that move the cursor around on the screen in certain programs.

D

data Any information (letters, numbers, symbols, etc.) that the computer can process, store, or produce.

data disk A disk that contains data files (rather than program files).

daughterboard an auxiliary circuit board attached to the main system board.

default drive See *active drive*.

device Something connected to a computer. Examples of devices are printers, disk drives, and monitors.

DIP switch packet (Dual In-line Package) A set of small switches used to configure hardware. Differing combinations of switch settings configure the printer, modem, or other devices.

directory A listing of filenames, subdirectories, and related information.

disk A storage medium consisting of a magnetic surface on which data is stored, similar to the way sounds are recorded on tape. See *fixed disk* and *floppy disk*.

disk drive A hardware component that stores and retrieves information on a disk. It can be either a fixed-disk drive or a floppy-disk drive.

Disk Operating System (DOS) The software that controls the overall operation of the computer system.

display A visual presentation of information on the screen.

drive See *disk drive*.

drive name The letter that identifies the drive such as Drive C. The drive name tells MS-DOS on which drive to look for programs and files.

dual floppy-drive system A computer that has two floppy-disk drives. The drives are referred to as Drive A and Drive B.

E

echo printing When the printer types what's on the screen as it appears.

editing keys Keys used to edit MS-DOS command line (when the MS-DOS program is active).

editor A program in which data is entered by typing text into the computer. Editors typically allow you to insert, delete, and add text. Some editors manipulate one line of text at a time (*SEE EDLIN*). Other editors provide full access to all text on the screen (see *word processor*).

EDLIN A line-oriented editor that is provided with MS-DOS. See *editor*.

EGA (Enhanced Graphics Adapter) A video adapter that works with several types of monitors but is designed to make best use of enhanced RGB monitors. It usually provides better resolution and more colors than CGA does.

80386 processor An advanced microprocessor chip. It is capable of processing data in 32-bit sets. The 80386SX is a similar chip with 32-bit processing capability and a 16-bit bus.

EMS (Expanded Memory Specifications) A standardized method (Lotus-Intel-Microsoft) of reconfiguring systems to use up to 32 MB of expanded memory.

end-of-file mark A control character that appears at the end of some MS-DOS files, usually ^Z.

enhanced RGB monitor A monitor with a display resolution of 640 dots (horizontal) by 350 lines (vertical) or better. It can display up to 16 colors at a time from a palette of 64 colors. See also *RGB monitor*.

error message An on-screen message that MS-DOS or a software program displays when a problem occurs with the hardware or software.

execute To perform a SOFTWARE operation or command. A command is usually initiated by typing its name and pressing the key (also referred to as in other applications).

expanded memory A method by which a 64 KB segment of RAM, located in the upper memory area, is used to swap information to and from a specially configured area of RAM located above 1 MB expanded memory. Information can be worked on, and then another 64 KB block is swapped, or substituted.

extended memory A method of allowing MS-DOS to access memory above 1 MB. Works differently from expanded memory. RAM configured as expanded memory cannot be used as extended memory.

extension An optional name added onto the end of a filename or subdirectory name. It can have up to three characters and is separated from the filename or subdirectory name by a period.

external command An MS-DOS command that must be read from MS-DOS disk in order to run. It is not resident in the computer's memory.

F

fax (or facsimile) The transmission of an image (as opposed to a digital signal used by a modem) between two locations via a telephone line.

file A collection of information (data) with an identifying name. Programs and commands are stored in files.

filename The characters that identify a file. In MS-DOS, a filename can be from 1 to 8 characters long and can have a filename extension. Certain file names are reserved by MS-DOS. See *reserved filenames*.

filename extension See *extension*.

fixed disk A disk composed of magnetic coating applied to a rigid aluminum or ceramic plate. Unlike a floppy disk, it is not removable, but has more storage capacity and faster access speed than a floppy disk.

fixed-disk drive A drive that reads and writes on a fixed disk. See *fixed disk*.

floppy disk A plastic disk with a magnetic coating, in a square protective cover, used for storing programs and files.

floppy-disk drive A drive that reads and writes on a floppy disk. When a floppy disk is inserted into a floppy-disk drive, the drive can read the magnetic surface of the disk. It can also write on the floppy disk. This is how information passes between a disk and the computer's memory.

format To prepare a disk to receive and store information by dividing the tracks on the surface of the disk into sectors. Formatting erases any previous data stored on the disk.

function keys The **F1** through **F12** keys across the top of the keyboard. The **F1** through **F6** keys perform certain editing operations on MS-DOS command line.

G

Graphical User Interface (GUI) A method of interacting with the computer which relies on selecting icons and words with a pointing device (such as a mouse) rather than typing commands on a command line. Popular examples of GUIs are Microsoft Windows, DOSSHELL (provided with MS-DOS), and Microsoft Windows.

H

hardware The physical parts of the computer (for example, the central processing unit or the disk drives).

hidden files The system files IO.SYS and MSDOS.SYS. "Hidden" means that they are not displayed as directory entries when the DIR command is used. They are hidden so that they can't be changed.

high memory area (HMA) The first 64 KB of extended memory. Using MS-DOS' HIMEM.SYS, part of MS-DOS can be loaded into this area, thus freeing up more space in conventional memory.

I

IDE (Integrated Drive Electronics) Type of fixed-disk drive with controlling circuitry built into the drive; does not require controller board taking up a slot if it has a special IDE interface on the system board.

indicator lights The lights on the front of the computer. These lights indicate ON/OFF and the operating status of the disk drives. Also referred to as *LEDs*.

input Information entered into a program, rather than information produced by a program.

internal command An MS-DOS command that is resident in the computer's memory after MS-DOS has been loaded. Internal commands run even when the MS-DOS disk has been removed.

interrupt controller Internal controller that manages requests to the microprocessor chip from I/O devices.

interrupt request (IRQ) A signal by a device that it needs the attention of the CPU.

I/O (Input/Output) Communication of data in and out of the central processor.

I/O mapping A means of coordinating the work of a device (such as a modem) with that of the computer's system board. The device is assigned one of the system board's input/output ports as its address. The computer and device then exchange information through this address.

I/O port A hardware connector through which a device receives and/or transmits information.

IO.SYS One of the two MS-DOS hidden system files.

J

jumper A row of pins on a circuit board that can be set to perform a specific function.

jumper cap A small piece of wire enclosed in plastic that is used to connect and complete a circuit between two jumper pins.

K

keyboard An input device similar in appearance to a typewriter keyboard that is used to enter data and execute commands.

kilobit 1,024 bits

kilobyte (K or KB)— 1,024 bytes.

L

label See *volume label*.

load To read information from a disk, or other storage device, into the memory of the computer.

logic board See *circuit board*.

M

mapping See *I/O mapping*.

megabyte (M or MB) 1,024 kilobytes or 1,048,576 bytes.

memory The work area of the computer that temporarily stores programs and data while the computer is on. The computer can quickly access what is currently in memory. When a program is run, the program is transferred from a floppy disk or fixed disk to the computer's memory. Memory is measured in kilobytes or megabytes (see *byte*).

menu A list of choices displayed on the screen. Selecting a choice can activate a program or move the user to another screen.

message See *error message* or *screen message*.

MDA (Monochrome Display Adapter) A video adapter that works with TTL monochrome monitors.

MFM A standard method of formatting fixed disks with 17 sectors per track. See also *RLL*, *IDE*.

microfloppy A 3½ inch disk that is characterized by a hard plastic or metal case and a storage capacity of 720 KB or 1.4 MB, more often simply called "floppy disk."

microfloppy drive A disk drive that accepts 3-inch disks. Such drives are available in low capacity (720 KB) and high capacity (1.44 & 2.88 MB) models.

modem A device used to transfer computer information over phone lines. It converts computer output (which is digital) to analog form so it can be transmitted over telephone lines (which can transmit only analog information). At the other end, it converts the analog signal from the telephone lines back to digital form for computer use.

monitor The computer screen. It can be either monochrome or color.

monochrome display A monitor that displays all information in a single color (usually white, green, or amber).

motherboard See *system board*.

MS-DOS.SYS One of the two MS-DOS hidden system files.

MS-Windows (or Windows) A graphical user interface (GUI) that makes the MS-DOS environment more “user friendly.” Devices such as pull-down menus and icons are used to activate programs and change screens.

multimedia Information displayed on a computer through the use of text, graphics, video, animation, and sound.

N

numeric keypad The set of numbered keys and the decimal point key on the right and upper portion of the keyboard.

O

operating system See *DOS, OS/2*.

OS/2 An alternative operating system to MS-DOS that can be used to control 80286 and 80386 series microprocessors.

output Information produced by a program.

P

parallel port A hardware connector that transmits data to an external device, typically a printer. The data is sent eight bits at a time. See also *serial port*.

partition An area of a fixed disk that is reserved for the use by an operating system.

path A specified set of directories in which MS-DOS searches for .BAT, .COM, and .EXE files.

path name The syntax that precedes a filename and tells MS-DOS which directory to go through to get to the desired subdirectory.

peripheral Any device connected to the computer.

pixel A unit of measurement used to describe space on a display monitor. Several pixels may comprise an actual dot.

port Used as a passageway for information between devices and the CPU.

power-on diagnostics Diagnostic tests that the computer runs each time the system is booted.

printer A device that prints data from a computer.

program A series of coded instructions that tell the computer what to do.

program disk A disk that contains program files.

prompt An on-screen indicator that indicates MS-DOS is waiting for instructions. The standard MS-DOS prompt consists of the active drive letter (usually A, B or C) and > (the greater than symbol) i.e., A>. The prompt can be changed using the MS-DOS PROMPT command.

Q

QBASIC A Microsoft version of BASIC.

R

RAM (random access memory) See *memory*.

RAM test A start-up test that checks the random access memory (RAM) installed on the system board.

read When a disk drive retrieves data from a disk, the computer is said to be “reading” information.

reboot To clear the computer’s memory and reload MS-DOS. This can be done by turning the power off and on again, or by performing a system reset. See also system reset.

reserved filenames Filenames reserved by MS-DOS for communication with devices attached to the system. They are AUX, CON, LPT, COM, LST, PRN, and NUL.

reset See *system reset*.

resolution The number of pixels that can be displayed on a monitor’s screen at one time. For example, a monitor with a resolution of 640x200 can display 640 pixels horizontally by 200 pixels vertically.

RGB monitor (Red, Green, Blue monitor) Monitor with a maximum resolution of 640 by 200. It can display up to 4 colors at a time from a palette of 16. The R, G, and B refer to the primary colors (red, green, and blue) that make up the 16 colors displayed by the monitor. See also *enhanced RGB monitor*.

RLL (Run Length Limited) Enhanced method for formatting fixed disks, allowing a relatively dense 26 sectors per track.

ROM (read-only memory) Permanent memory installed on the system board or controller board. The ROM chips, located on the system board, contain the BIOS interface for MS-DOS.

root directory The first level in the directory structure.

S

SCSI (Small Computer System Interface) Versatile parallel-type interface capable of supporting up to 8 devices with one “host adapter”; for instance, a printer and several disk drives via one SCSI disk controller board. Also delivers faster performance.

screen message A message sent to the screen by the computer or software that provides the user with information or instructions.

scrolling The way information is displayed on the screen. Text rolls off the top of the screen as more information appears at the bottom.

self-test See *power-on diagnostics*.

serial port A hardware connector that transmits data to an external device such as a modem or printer. The data is sent one bit at a time. See also *parallel port*.

SIMM (Single In-Line Memory Module) A small circuit board that is used to add RAM to the system. It is generally easier to install than a large number of individual RAM chips.

software Programmed instructions for the computer to follow. Both programs and operating systems are considered software.

source disk The disk from which data is being copied. See also *target* disk.

spreadsheet A software program used for manipulating numbers.

status report A report produced by the MS-DOS CHKDSK command that displays certain information about a disk, such as bytes available, number of directories, and files; including hidden files. It also reports any errors in the directory, and displays the total and available RAM.

subdirectory A directory within a directory.

system board The computer's main circuit board that contains the central processor and related circuitry such as interfaces for the parallel and serial ports, and floppy- and fixed-disk controllers.

system disk See *bootable disk*.

system files The files required to make a disk bootable (the command processor and two hidden files).

system keylock The lock on the computer. When activated, this lock disables the keyboard and/or mouse port and may also prevent the cover from being removed from the computer.

system reset A process that clears the computer's memory and reloads MS-DOS without turning the power off and on. Sometimes called a *warm boot*.

T

target disk The disk that receives the results of the current operation. See also *source* disk.

text file A file that contains only ASCII-coded letters, numbers, and symbols.

U

upper memory The 384 KB area of memory between 640 KB and 1 MB. This area is normally used by other computer components such as the video display, installable ROM, and the ROM BIOS.

V

variable frequency monitor A monitor that adjusts to the different screen scanning frequencies of the various video standards. The ability to adjust to different frequencies makes these monitors quite versatile.

VGA (Video Graphics Array) A video display adapter that works with several types of analog monitors. It usually provides better resolution and more colors than EGA does. VGA is backward compatible and, in addition to the VGA standard, it supports software written for EGA, CGA and MDA adapters.

VGA monitor A monitor with a display resolution of 640 dots (horizontal) by 480 lines (vertical) or better, displaying up to 16 colors at a time.

video memory The memory used by the video circuitry used to display text and graphics. This memory cannot be used for other purposes. Also called *video RAM*.

virus See *computer virus*.

volume label A name the user designates for a disk. This is done when the disk is formatted, or by using the VOL command. Refer to the FORMAT and VOL commands in the MS-DOS manual for more information.

W

warm boot See *system reset*.

wildcard characters (? and *) Substitute characters that allow greater flexibility in manipulating MS-DOS files.

windows See *MS-Windows*.

word processor A program that creates and edits text and/or data. It allows the user to type text and then reformat it.

working copy The copy of a disk made for daily use in order to protect the original. See also *backup disk*.

write The process that occurs when the computer records data on a disk.

write-protect To guard a disk from being written to or changed so that data already on it can't be destroyed. 5 1/4" disk is write-protected by affixing a write-protect tab on it. A 3 1/2" microfloppy is write-protected by sliding the plastic tab so that the square hole is open.

write-protect notch A square cut on the upper-right side of a 5 1/4" floppy disk.

write-protect tab A small adhesive tab used to cover a write-protect notch on a 5 1/4" floppy disk; or a small sliding tab used to write-protect a 3 1/2" microfloppy.

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