

EPSON[®]
ActionDesk[™] 4000

User's Guide



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Important Safety Instructions

1. Read all of these instructions and save them for later reference.
2. Follow all warnings and instructions marked on the computer.
3. Unplug the computer from the wall outlet before cleaning. Use a damp cloth for cleaning; do not use liquid or aerosol cleaners.
4. Do not spill liquid of any kind on the computer.
5. Do not place the computer on an unstable cart, stand, or table.
6. Slots and openings in the cabinet and the back or bottom are provided for ventilation; do not block or cover these openings. Do not place the computer near or over a radiator or heat register.
7. Operate the computer using the type of power source indicated on its label.
8. If you plan to operate the computer in Germany, observe the following safety precaution:

To provide adequate short-circuit protection and over-current protection for this computer, the building installation must be protected by a 16 Amp circuit breaker.

Beim Anschluß des Computers an die Netzversorgung muß sichergestellt werden, daß die Gebäudeinstallation mit einem 16 A Überstromschutzschalter abgesichert ist.

9. Connect all equipment to properly grounded (earthed) power outlets. If you are unable to insert the plug into an outlet, contact your electrician to replace your outlet. Avoid using outlets on the same circuit as photocopiers or air control systems that regularly switch on and off.
10. Do not allow the computer's power cord to become damaged or frayed.

11. If you use an extension cord with the computer, make sure the total of the ampere ratings of the devices plugged into the extension cord does not exceed the ampere rating for the extension cord. Also, make sure the total of all products plugged into the wall outlet does not exceed 15 amperes.
12. Do not insert objects of any kind into this product through the cabinet slots.
13. Except as specifically explained in this User's Guide, do not attempt to service the computer yourself. Refer all servicing to qualified service personnel.
14. Unplug the computer from the wall outlet and refer servicing to qualified service personnel under the following conditions:
 - A. When the power cord or plug is damaged.
 - B. If liquid has entered the computer.
 - C. If the computer does not operate normally when the operating instructions are followed. Adjust only those controls that are covered by the operating instructions. Improper adjustment of other controls may result in damage and often requires extensive work by a qualified technician to restore the computer to normal operation.
 - D. If the computer has been dropped or the cabinet has been damaged.
 - E. If the computer exhibits a distinct change in performance.

Instructions Importantes de Sécurité

1. Lire complètement les instructions qui suivent et les conserver pour references futures.
2. Bien suivre tous les avertissements et les instructions indiqués sur l'ordinateur.
3. Debrancher l'ordinateur de toute sortie murale avant le nettoyage. Utiliser un chiffon humide; ne jamais utiliser un nettoyeur liquide ou une bonbonne aerosol.
4. Ne jamais renverser un liquide d'aucune sorte sur l'ordinateur.
5. Ne pas placer l'ordinateur sur un chariot, un support, ou une table instable.
6. Les events dans les meubles, à l'arrière et en dessous sont conçus pour l'aération; on ne doit jamais les bloquer. Ne pas placer l'ordinateur près d'une source de chaleur directe.
7. Le fonctionnement de l'ordinateur doit s'effectuer conformément au type de source d'alimentation indiquée sur l'étiquette.
8. Lorsqu'on desire utiliser l'ordinateur en Allemagne, on doit observer les normes sécuritaires qui suivent:

Afin d'assurer une protection adequate à l'ordinateur contre les court-circuits et le survoltage, l'installation de l'édifice doit comprendre un disjoncteur de 16 amp.
9. On doit brancher tout l'équipement dans une sortie reliée à la masse. Lorsqu'il est impossible d'insérer la fiche dans la prise, on doit retenir les services d'un électricien ou remplacer la prise. Ne jamais utiliser une prise sur le même circuit qu'un appareil à photocopie ou un système de contrôle d'aération avec commutation marche-arrêt.
10. S'assurer que le cordon d'alimentation de l'ordinateur n'est pas effrité.

11. Dans le cas où on utilise un cordon de rallonge avec l'ordinateur, on doit s'assurer que la valeur totale d'ampères branches dans le cordon n'excède en aucun temps les ampères du cordon de rallonge. La quantité totale des appareils branches dans la prise murale ne doit jamais excéder 15 ampères.
12. Ne jamais insérer un objet de quelque sorte que ce soit dans les cavités de cet appareil.
13. Sauf tel que spécifié dans la notice d'utilisation, on ne doit jamais tenter d'effectuer une réparation de l'ordinateur. On doit référer le service de cet appareil à un technicien qualifié.
14. Debrancher l'ordinateur de la prise murale et confier le service au personnel de service qualifié selon les conditions qui suivent:
 - A. Lorsque le cordon d'alimentation ou la prise sont endommagés.
 - B. Lorsqu'un liquide s'est infiltré dans l'ordinateur.
 - C. Lorsque l'ordinateur refuse de fonctionner normalement même en suivant les instructions. N'ajuster que les commandes qui sont énumérées dans les instructions de fonctionnement. Tout ajustement inadéquat de tout autre contrôle peut provoquer un dommage et souvent nécessiter des réparations élaborées par un technicien qualifié afin de remettre l'appareil en service.
 - D. Lorsqu'on a échappé l'ordinateur ou que l'on a endommagé le boîtier.
 - E. Lorsque l'ordinateur démontre un changement note au niveau de sa performance.

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Glossary

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Introduction

Your new Epson® ActionDesk™ 4000 computer is a fast, high-performance, all-in-one system offering flexibility and expandability in a compact design. It provides the following features:

- ❑ 486SX/25 MHz, 486DX/ 33 MHz, 486DX2 / 50, or 486DX2/66 MHz microprocessor
- ❑ 4MB of internal memory, expandable to 64MB
- ❑ System and video BIOS shadow RAM
- ❑ 8KB of internal processor cache, with support for 64KB, 128KB, or 256KB of external cache
- ❑ 1MB of on-board video memory, expandable to 2MB
- ❑ Math coprocessor built into the microprocessor on the DX and DX2 systems
- ❑ Local bus video with True Color support, which enables your monitor to display up to 16.8 million colors
- ❑ High-speed, 32-bit local bus IDE hard disk drive interface
- ❑ Built-in VGA port
- ❑ Two built-in serial ports and one built-in parallel port
- ❑ One built-in IBM® PS/2™ compatible keyboard port and one built-in PS/2 compatible mouse port
- ❑ Three 16-bit, full-length and two 8-bit, half-length ISA option slots

- ❑ Support for up to four mass storage devices (two externally accessible and two internal)
- ❑ Password security.

Using the built-in interfaces, you can connect most of your peripheral devices directly to the computer so you do not have to install option cards. You can use the option slots to enhance your system with extra functions such as a modem card, a network controller card, or additional interface ports.

The shadow RAM feature speeds up processing by moving the system and video BIOS into the RAM area of memory.

With the standard 1MB of video RAM, the VGA controller supports the following resolutions:

- ❑ 1280 x 1024 x 16 colors (interlaced)
- ❑ 1024 x 768 x 32K colors (interlaced)
- ❑ 1024 x 768 x 256 colors (interlaced and non-interlaced)
- ❑ 800 x 600 x 64K colors
- ❑ 640 x 480 x 16.8 million colors.

When upgraded to 2MB of video RAM, the system can support 1280 x 1024 in 256 colors and 1024 x 768 in 64K colors.

VGA and IDE Drivers

Your computer comes with special VGA and IDE drivers for use with the integrated local bus VGA interface and the local bus IDE hard disk interface. With the VGA drivers, you can take advantage of the extended VGA features such as high resolutions and 132-column text mode when you run popular application programs. With the IDE drivers, you can take advantage of the high-speed, 32-bit local bus IDE hard disk drive interface. Instructions in Chapter 6 describe how to install the VGA drivers for Microsoft® Windows® 3.1 and how to install the IDE drivers. Other VGA drivers are available from the Epson Electronic Bulletin Board or from our worldwide network of subsidiaries and distributors. To access the bulletin board, call (310) 782-4531.

Optional Equipment

You can easily upgrade your computer by installing additional memory and a wide variety of options, as described below. (Installation instructions are provided in Chapters 4 and 5.)

System Memory

By adding 1MB, 2MB, 4MB, 8MB, 16MB, and 32MB SIMMs (single inline memory modules) to the main system board, you can expand the computer's memory up to 64MB.

Cache Memory

You can increase the cache memory on your main system board to 64KB, 128KB, or 256KB by having additional SRAM chips installed by an Authorized Epson Servicer. Additional cache allows your system to access frequently used data faster.

Video Memory

You can add video memory chips to your system board to increase the video memory to 2MB and support higher video resolutions with more colors.

Microprocessor

You can upgrade your system with these microprocessors:

- 486SX/33**
- 486DX/33
- 486DX2/50
- 486DX2 /66.

Math Coprocessor

You automatically install a math coprocessor when you upgrade your system with a DX or DX2 microprocessor, because a math coprocessor is built into the 486DX and 486DX2 chips.

Drives

Your system can support up to four mass storage devices, including hard disk drives, diskette drives, a tape drive, or a CD-ROM drive. As your storage needs expand, you can install additional drives.

How to Use This Manual

This manual contains the information you need to get the best results from your computer. You don't have to read everything in this book; see the following chapter summaries to find the sections you need.

Chapter 1 provides simple instructions for setting up your system and connecting peripheral devices such as the monitor and printer.

Chapter 2 describes how to run the SETUP program to define your computer's configuration. You may need to do this the first time you use your computer. If you change the configuration later, you will need to run it again.

Chapter 3 covers general operating procedures, such as resetting the computer, using the password, and changing the processor speed.

Chapter 4 describes how to remove and replace the computer's cover, change jumper settings, and install optional equipment such as microprocessor upgrades, option cards, and memory modules.

Chapter 5 explains how to install and remove disk drives.

Chapter 6 describes how to install the VGA and IDE drivers.

Chapter 7 contains troubleshooting tips.

Appendix A lists the specifications of your computer, the operating environments that have been tested on your system, and options available from Epson.

At the end of this manual you'll find a **Glossary**, an **Index**, and a list of international marketing locations.

Conventions Used in This Manual

This manual uses the following type conventions:

| Example | Meaning |
|----------------------|--|
| Enter | Keys you press on the keyboard |
| Ctrl C | Keys you press at the same time; hold down the key marked Ctrl and press the letter C |
| C:\DOS | Text as it appears on the screen |
| DISKCOPY A: B: | Text that you type exactly as shown |
| <i>path\filename</i> | Words printed in lowercase italics represent optional parameter names; here you would type the actual path and filename, such as \WORK\CONTACT |
| SERIAL 1 | Names of hardware elements |

Where to Get Help

If you purchased your computer outside the United States, please contact your dealer or the marketing location nearest you for customer support and service. International marketing locations are listed at the back of this manual.

If you purchased your computer in the United States, Epson provides the following support services through the Epson Connection™:

- ❑ Technical assistance with the installation, configuration, and operation of Epson products
- ❑ On-site Servicer referral
- ❑ Assistance in locating your nearest Authorized Epson Reseller or Service Center

- ❑ Sales of Epson computers as well as ribbons, supplies, parts, documentation, and accessories for your Epson product
- ❑ Customer Relations
- ❑ Epson technical information library fax service-also available directly by calling the toll number (310) 782-4214
- ❑ Product literature with technical specifications on our current and new products
- ❑ User group locations.

If you need help with any software you are using, see the documentation that came with it for technical support.

Epson Connection: (800) 922-43911

You can also contact Epson at (310) 782-0770 and ask for the Epson Connection.

Chapter 1

Setting Up Your System

This chapter briefly describes how to set up your computer. It includes the following information:

- ❑ Getting started
- ❑ Connecting the computer
- ❑ Turning on the computer
- ❑ Turning off the computer.

Getting Started

Follow the instructions below for choosing a location for your new system and unpacking it.

Choosing a Location

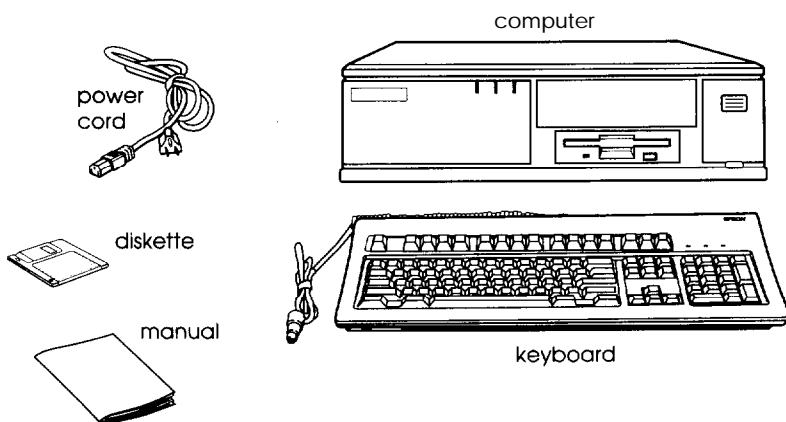
When you are ready to set up your system, choose a safe, convenient location that provides the following:

- ❑ A flat, hard surface. Surfaces like beds and carpets attract static electricity, which can erase data on your disks, damage the computer's circuitry, and prevent proper ventilation.
- ❑ Moderate environmental conditions. Select a cool, dry area and protect your computer from extremes in temperature, humidity, dust, and smoke. Avoid direct sunlight or other sources of heat.

- ❑ Good air circulation. Leave several inches of space around the computer so air can move freely.
- ❑ No electromagnetic interference. Do not place your system too close to any electrical device, such as a telephone or television, which generates an electromagnetic field.
- ❑ Appropriate power source. Connect all your equipment with the appropriate power cords for the power source in your area.

Unpacking Your Computer

When you unpack your system components, make sure you have these items:

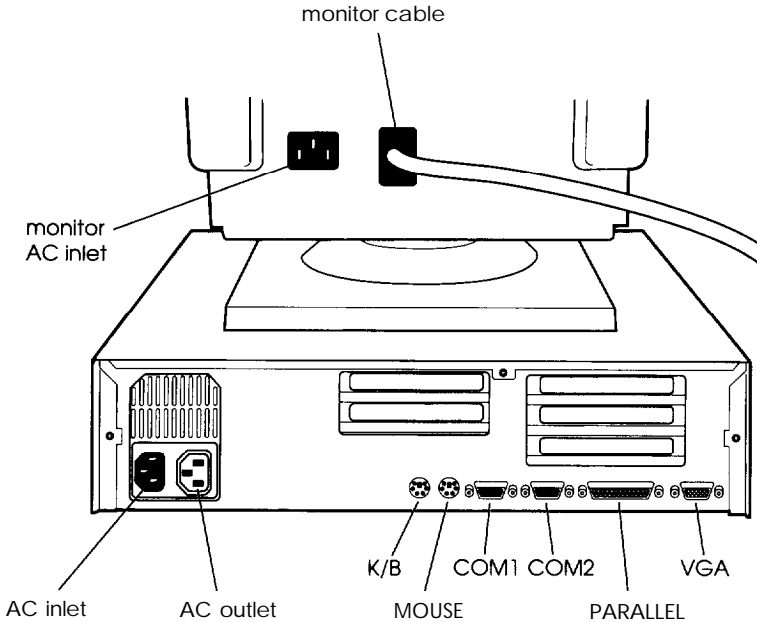


Your system may also include an Epson PS/2 compatible mouse and may come with the operating system and software already installed on a hard disk drive.

If you purchased any optional equipment that wasn't installed at the factory—such as option cards, memory modules, a hard disk, or a diskette drive—you install these options before you connect your computer. See Chapters 4 and 5 for instructions.

Connecting the Computer

Use the illustration below to locate the ports on the back of your system as you connect the keyboard, monitor, printer, and other devices.



Connecting a Keyboard

To connect a keyboard, hold the cable connector so the arrow on the connector faces up. Insert it into the port marked K/B.

Connecting a Mouse

If your system came with an Epson PS/2 compatible mouse, you connect it to the computer's built-in mouse port. To connect the mouse, insert the connector into the port marked MOUSE.

Caution

Although the connectors and ports for the mouse and keyboard are physically identical, they cannot be used interchangeably. Be sure to plug the mouse connector into the **MOUSE** port, or you may damage your system.

If your system has not already been configured, you may need to install a mouse driver. See your mouse manual for instructions. (If you are using Windows 3.1, you don't need a mouse driver.)

Connecting a Monitor

You can connect your VGA monitor to the computer's built-in VGA port as described below. You must use a VGA monitor with this computer.

1. Place your monitor on top of or near the computer. Turn the monitor and computer around so the backs are facing you.
2. There should be two cables provided with your monitor: the monitor cable (to connect it to the computer) and the power cable (to connect it to the power source). On most monitors, the monitor cable is permanently attached to the monitor. If your monitor does not have an attached cable, connect the cable to it now.
3. Examine the connector on the monitor cable and line it up with the VGA port on the computer. Then insert the connector into the port.

Caution

To avoid damaging the connector, be careful not to bend the pins when you insert it.

4. If the connector has retaining screws, tighten them.
5. Plug the monitor's power cord into the power inlet on the back of the monitor.
6. Plug the other end of the power cord into a grounded electrical outlet or into the power outlet on the back of the computer.

Caution

Before you plug the monitor's power cord into the back of your computer, make sure the monitor's power requirements do not exceed 1 Amp.

Connecting a Printer or Other Device

Your computer has one bidirectional parallel and two serial ports. To connect a printer or other peripheral device, follow the appropriate instructions below.

Using the parallel port

Follow these steps to connect a parallel printer to your computer:

1. Place the printer next to the computer so that the backs are facing you.
2. Align the connector end of the printer cable with the **PARALLEL** port and plug it in. If the connector has retaining screws, tighten them.
3. Connect the other end of the cable to the printer. To secure the cable, squeeze the clips at each side of the printer port and push them into place.

4. Plug the printer's power cord into a grounded electrical outlet.

Using the serial ports

If you have a printer, a modem, or a mouse with a serial interface, you can connect it to one of the serial (RS-232C) ports on the back of the computer. Make sure you have a cable compatible with a DB-9P connector.

To connect a serial device, insert the connector into one of the ports marked COM1 and COM2. If you are connecting only one serial device, use the COM1 port.

Connecting the Power Cord

Follow these steps to connect the power cord:

1. Plug the power cord into the power inlet on the back of the computer.

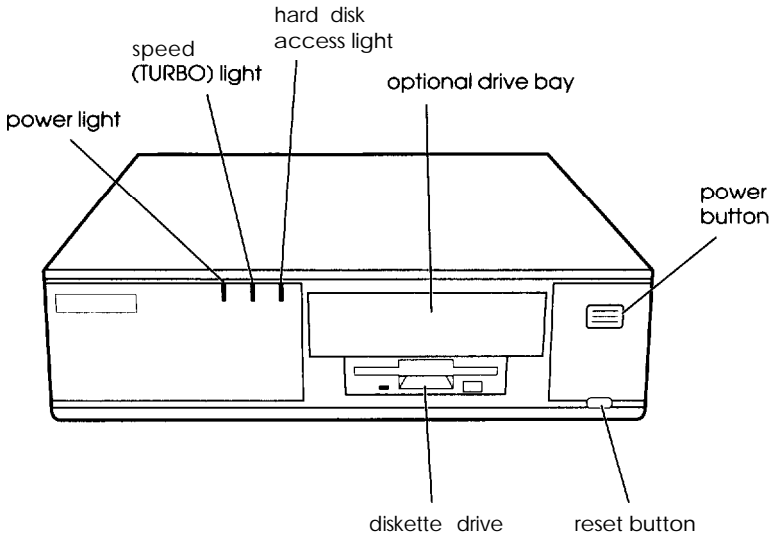
Warning

To avoid an electric shock, be sure to plug the cord into the computer before plugging it into the wall outlet.

2. Plug the other end of the power cord into a grounded electrical outlet.

Turning On the Computer

After you set up your system, you are ready to turn on the power. Use the illustration below to identify the parts of your system.



Before you turn on your computer, check the following safety rules to avoid accidentally damaging your computer or injuring yourself:

- ❑ Do not connect or disconnect any peripheral device cables (including the keyboard or a mouse) or power cables unless the computer's power is off.
- ❑ Never turn off or reset your computer while a disk drive light is on. This can destroy data stored on the disk.
- ❑ Never turn on the computer with a protective card in the diskette drive.

- ❑ Always wait at least 20 seconds after you turn off the power before you turn it on again to prevent possible damage to the computer's electrical circuitry.
- ❑ Do not leave a beverage near your system. Spilled liquid can damage the circuitry of your equipment.

Follow these steps to turn on your system:

1. Turn your computer around so the front panel faces you. Place your monitor, printer, and other devices in a convenient arrangement.
2. If there is a protective card in the diskette drive, remove it.
3. Turn on the monitor, printer, and any other devices connected to the computer.
4. Turn on the computer by pressing the power button on the right side of the front panel.

The power indicator lights up, then the screen displays the BIOS version number and copyright information. The computer performs its power-on diagnostics, which are a series of checks that make sure everything is working correctly. The screen displays several messages during the diagnostics, including the prompt:

Press <F2> to enter SETUP

If the diagnostics indicate a mismatch with the system configuration, you will see an error message followed by this prompt:

Press <F1> to resume, <F2> to Setup

If this happens, press F2 to run the SETUP program and check your system configuration. See Chapter 2 for a complete description of the SETUP program.

When the computer completes its testing, it displays a screen describing the system's configuration. If necessary, press the Pause button on the keyboard to view the configuration screen. After viewing the screen, press any key to continue the startup process.

5. If necessary, use the controls on your monitor to adjust the brightness and contrast until you can easily see the characters on the screen. If your monitor has horizontal and vertical hold controls, you may need to use them to stabilize the display.

If your system is configured to automatically load a program (such as Microsoft Windows or a word processing program), you see the first menu or screen display of that program. If not, you may see the operating system prompt, such as `C:\>orA:\>`.

If there is no operating system installed on your computer, you see an error message. Ignore the message for now; once you install the operating system, you will not see this message.

Now you need to run the SETUP program to make sure your computer is configured properly. First turn off the computer, as described below, then see Chapter 2 for instructions. When you finish running SETUP, be sure to see "Post-SETUP Procedures" on page 2-12 for guidelines on what you need to do next.

Turning Off the Computer

Whenever you turn off your system, follow these steps:

1. Save your data and exit any application program you are using.
2. Check the hard disk drive light and the diskette drive light(s) to make sure they are not on. Do not turn off the computer if a drive light is on, because you can damage the drive or lose data.
3. Remove any diskette(s) from the diskette drive(s).
4. Press the power button to turn off the computer.
5. Turn off the monitor, printer, and any other peripheral devices.

Running the SETUP Program

You may need to run the SETUP program the first time you use your computer. If your system came unconfigured, you need to define how it is set up. If your system was configured for you, you may still need to set the date and time. You also may need to run the program again later if you change your configuration.

The SETUP program is stored in the computer's ROM BIOS (read-only memory, basic input/output system). SETUP lets you verify or change the following:

- Current date and time
- Type of video display adapter
- System memory
- Type of diskette drive(s) and hard disk drive(s)
- External cache
- Shadow and memory mapping options
- Chipset register options
- System booting sequence
- Password security.

The configuration information is stored in an area of memory called CMOS RAM. This memory is backed up by a battery, so it is not erased when you turn off or reset the computer.

Starting the SETUP Program

Whenever you start your computer, you see the following message:

Press <F2> to enter SETUP

If the system detects an error in your system configuration, you will see an error message followed by this message:

Press <F1> to resume, <F2> to Setup

In either case, press F2 to run the SETUP program to verify or change your configuration.

The SETUP program displays the Main Menu. From this menu, you can select the various SETUP options to identify your system's configuration and then save your new values to CMOS. If you change your mind, you can ignore any changes you have made and restore the default values stored in ROM or load the values previously stored in CMOS.

The table below lists the keys you can use to perform SETUP operations.

SETUP function keys

| Key | Function |
|-------------------------|---|
| ↑ ↓ ← → | Move the cursor to the next or previous modifiable option |
| + - | Change the values in the field |
| Home End | Move the cursor to the top or bottom of the menu |
| F1 or Alt H | Displays a help screen describing the option currently selected |
| F5 or - | Selects the previous value |
| F6 or + or Space bar | Selects the next value |

SETUP function keys (continued)

| <i>Key</i> | <i>Function</i> |
|--------------|---|
| F9 | Supplies the factory default values for the SETUP options on the current screen |
| F10 | Ignores any changes you have made on the current screen |
| Enter | Selects the current option or value |
| Alt R | Refreshes the current screen |
| Esc or Alt X | Exits the current menu |

Whenever you are in the SETUP program, the bottom of the screen lists the keys you can press to perform specific functions.

The System Setup Option

When you select this option, you see the System Setup screen. From this screen, you can set the system time and date, define your video display type, check system memory, and define the diskette drives.

Use \uparrow , \downarrow , \leftarrow , or \rightarrow to move the cursor to the value you want to change. Then press + or - until you see the value you want.

Setting the Time and Date

The real-time clock in your computer continuously tracks the date and time—even when the computer is turned off. Once you set the System Time and System Date options using SETUP, you should not need to change them, unless you adjust the time for daylight savings or other seasonal adjustments. (The computer automatically changes the date for leap years.)

Setting the Video Display Type

The **Video System** option allows you to define the type of adapter you are using. Because you connected your monitor to the computer's built-in VGA port, select **EGA/VGA**.

You must use a VGA monitor with this computer; therefore, always select a video display type of **EGA/VGA**.

Note

You cannot install an optional video card in this computer.

Checking System Memory

Your computer comes with 4MB of RAM on a SIMM. MS-DOS[®] and application programs that run under MS-DOS use the first 640KB of memory. You can use the memory above 1MB as extended memory.

When you boot your system, the system BIOS detects the type of RAM and updates the total memory size automatically. You see the memory configuration displayed in the System Memory and **Extended Memory** fields on this SETUP screen.

You cannot change these values; if they are not what you expect them to be, check your jumper settings as described in Chapter 4. Also, check that the SIMM(s) are securely seated in their sockets.

Setting the Diskette Drive(s)

On your system, diskette drive A is the 3.5-inch high-density drive installed in the lower drive bay on your system. You may also have another drive of a different size or capacity; this is drive B. Check the settings for both drives and correct them if necessary.

The Fixed Disk Setup Option

When you select this option, you see the Fixed Disk Setup screen. From this screen, you select Disk 0 or Disk 1.

Your computer comes with a hard disk auto-sensing feature. If you press Enter when the Autotype **Fixed Disk** option is highlighted, the system detects the type of hard disk drive and fills in the remaining fields on the screen.

If you are using an older drive or a preformatted drive, it may not support the auto-sensing feature. If you press Enter when the **Autotype Fixed Disk** option is highlighted and the drive parameters do not match your drive, you need to define your own drive type or reformat the disk. See the next section for instructions on how to define your own drive type.

Defining Your Own Drive Type

If the parameters for your hard disk do not match the parameters detected by the auto-sensing feature, or if you want to use your drive with parameters other than the defaults, you can define your own type. (See Appendix A for a list of hard disk drive types and their parameters.)

To define your own drive type, follow these steps:

1. Move the cursor to **Type** and select User.
2. Type the appropriate values for your hard disk.
3. After entering the appropriate values press Esc to exit this screen.

See Appendix A for a list of standard hard disk drives and Epson hard disk drives and their specifications.

Note

If you are going to install NetWare® 286, version 2.2, and you plan to assign a user-defined drive type for your drive, you must install the NetWare IDE drivers (IDE.DSK and IDE.OBJ). You can obtain these drivers by downloading IDE286.ZIP from Netware in CompuServe.® Alternatively, you can select one of the predefined hard disk drive types that most closely matches the drive you are installing.

The Advanced System Setup Option

When you select this option from the Main Menu, you see the Advanced System Setup screen. From this screen, you can select the options that allow you to configure the computer's cache memory and shadow memory, and define options that control the advanced chipset.

Note

The Advanced System Setup options can be automatically configured by system. to avoid malfunctions, let the system configure these options.

Configuring Cache Memory

You use the Memory **Cache** option to enable or disable automatic configuration of your external cache memory. Enabling cache memory improves system performance, especially in large data retrieval and processing environments.

If you choose to configure your cache memory (rather than let the system automatically configure it), you can define the burst wait states and two non-cacheable areas of memory. However, it's a good idea to let the system automatically configure your cache memory.

Configuring Memory Shadow

You use the **Memory Shadow** option to enable or disable shadowing of your system and video memory as well as specific blocks of ROM.

Your computer can access RAM faster than ROM. The options on this screen allow your system to copy the contents of its system and/or video ROM into RAM. When you use shadowing, your system can perform certain operations faster. This provides a significant increase in performance.

Note

For the best system performance, always set the **System shadow** and the **Video shadow** options to **Enabled**.

If you enable shadowing for specific regions, the ROM located in this region is copied to the shadow area.

Configuring Chipset Registers

You use the **Advanced Chipset Control** option to change the values in the chipset registers and optimize your system's performance. Setting these values correctly will increase your system performance; however, setting these values incorrectly may cause your system to malfunction or shut down. Be sure to set the **Auto Configuration** option to **Enabled** to let the system automatically configure these options to avoid problems.

The options that the system automatically configures for optimum performance are listed below:

- Memory remapping
- Refresh cycle
- DRAM wait state
- CPU clock selection
- Keyboard clock selection
- AT clock selection
- DRAM type
- NPU ready delay
- Divider of refresh frequency
- Hold PD bus

Setting the Boot Options

When you select this option from the Main Menu, you see the Boot Options screen.

The **Disk drive boot sequence** option determines the order in which the computer checks the drives when it looks for the operating system.

If you select **A : then C :**, each time you turn on the computer, it tries to load the operating system from drive A. If drive A doesn't contain an operating system, the computer loads the operating system from drive C. If you select **C : then A:**, the computer tries to load the operating system from drive C first. If drive C doesn't contain an operating system, the computer tries to load it from drive A. If you select **C : only**, the computer tries to load the operating system from drive C only.

If you set the **Disk drive boot sequence** option to **c : only**, you can disable the **Floppy seek option**. This will speed up your boot time.

You can also enable or disable the system summary screen that the system displays during system startup. Disabling the System Summary screen speeds up system startup.

The System Security and Anti- Virus Option

When you select this option from the Main Menu, you see the System Security and Anti-Virus screen.

You can enable both a Supervisor and a User password to control access to your system and prevent unauthorized users from accessing the diskette drives. To specify a User password, you must first specify a Supervisor password. The passwords can be up to eight characters.

If you enable the **Password on boot** option, you must enter the Supervisor or User password each time you turn on the system. If you do not enable the **Password on boot** option, you must enter the password each time you start the SETUP program.

When you start SETUP, the password you enter (either Supervisor or User) determines the options available on the Security and Anti-Virus screen. If you enter the User password, the Supervisor options are not displayed.

You can restrict use of the diskette drives by specifying that either the Supervisor or User password be entered before the drive can be accessed. If you enter **Supervisor** for the **Diskette Access option**, you can access the diskette drives only if you enter the Supervisor password during system startup. If you enter **User** for the **Diskette Access option**, you can access the diskette drives whether you enter the Supervisor or User password during startup.

By controlling access to the diskette drives, you can prevent unauthorized users from accessing the drives and possibly introducing a virus to your system.

To delete your passwords, follow these steps:

1. **Set the Password on boot option to Disabled.**
2. Delete the User password.
3. Then delete the Supervisor password. You must delete the User password before SETUP will allow you to access the Supervisor password.

The System Summary Option

When you select the System Summary option from the Main Menu, the SETUP program displays a summary of the configuration settings for your system. This is the same screen you see during system startup.

Disabling this screen during system startup speeds up the startup procedure. You enable or disable this screen using the Boot Options described on page 2-8.

Exiting the *SETUP* Program

When you leave the *SETUP* program, you can save your settings and reboot your system, or exit *SETUP* without saving your settings. You can also return all values to the factory defaults.

To leave the *SETUP* program, press *Esc* from any *SETUP* screen. From the *SETUP* Main Menu, you can perform the following functions:

| | |
|------------------------------------|---|
| Load ROM Default Values | Loads the factory default settings stored in ROM back into CMOS. If you change your system configuration using the <i>SETUP</i> program and then have problems, you can load to ROM values to boot the system and start over. |
| Load Values from CMOS | Loads the current values stored in CMOS for all <i>SETUP</i> options. This ignores any changes you have made through <i>SETUP</i> . |
| Save Values to CMOS | Saves the changes you have made to your configuration to CMOS. |

Now press *Esc* to restart your computer.

Post-SETUP Procedures

After you run SETUP for the first time, you may need to install the operating system on your computer (if it is not already installed). See your operating system manual for instructions.

Once you have installed your operating system, install any software you plan to use. See your application program manuals for instructions.

You may also want to install the optional extended video drivers for some of your application programs. See Chapter 6 for more information.

Chapter 3

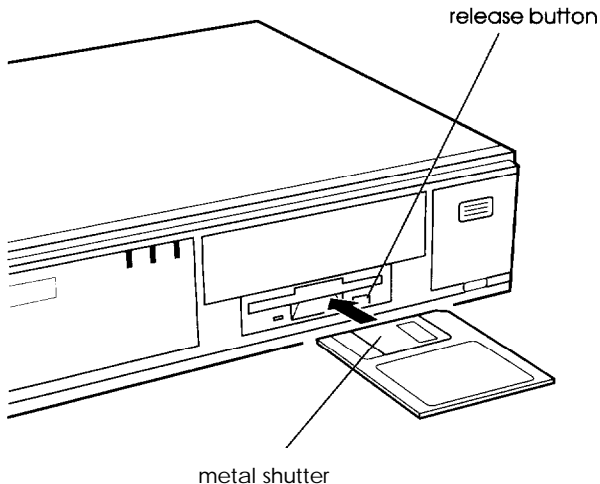
Using Your Computer

This chapter briefly describes the following operations:

- ❑ Inserting and removing diskettes
- ❑ Stopping a command or program
- ❑ Resetting the computer
- ❑ Using the password
- ❑ Changing the processor speed.

inserting and Removing Disks

To insert a diskette into a 3.5-inch drive, hold the diskette with the label facing up and the metal shutter leading into the drive, as shown in the following illustration. Slide the diskette into the drive until it clicks into place.



To insert a diskette into a 5.25-inch drive, hold the diskette with the label facing up and the read/write slot leading into the drive. Turn down the latch to secure the diskette in the drive.

When you want to remove the diskette, make sure the drive light is off; then press the release button or turn the latch. Remove the diskette and store it properly.

Caution

Never remove a diskette or reset or turn off the computer while a diskette drive light is on. You could lose data. Also, remove all diskettes before you turn off the computer.

Stopping a Command or Program

You may sometimes need to stop a command or program while it is running. If you have entered a DOS or application program command that you want to stop, try one of the following:

- Press Pause
- Hold down Ctrl and press C
- Hold down Ctrl and press Break.

If these methods do not work, you may need to reset the computer as described below. Do not turn off the computer to exit a program or stop a command unless you have to, because the computer erases any data you did not save.

Resetting the Computer

Occasionally, you may want to clear the computer's current settings or its memory without turning it off. You can do this by resetting the computer.

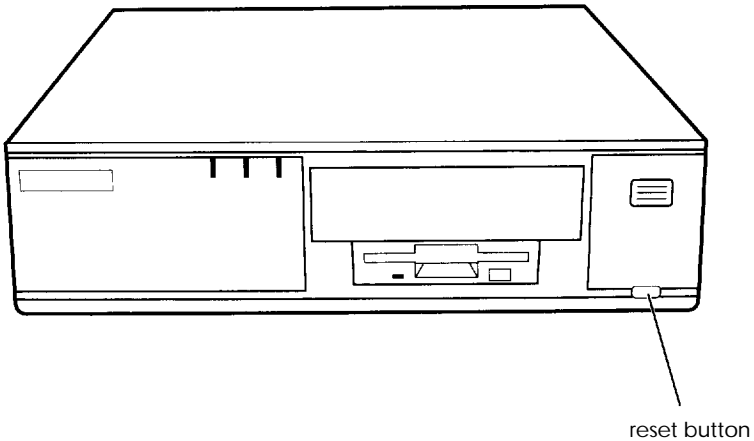
For example, if an error occurs and the computer does not respond to your keyboard entries, you can reset it to reload your operating system and try again. However, resetting erases any data in memory that you have not saved; so reset only if necessary.

Caution

Do not reset the computer to exit a program. Some programs classify and store new data when you exit them. If you reset the computer without properly exiting a program, you may lose data.

When you reset the computer, the operating system must be either on the hard disk or on a diskette in drive A; so if you do not have a hard disk, insert the operating system diskette in drive A. If you are using DOS, you can hold down Ctrl and Alt and press Del.

You can also press the **RESET** button located on the front right side of your computer. (See the illustration below.) The screen displays nothing for a moment and then the computer reloads the operating system.



If resetting the computer does not correct the problem, you probably need to turn it off and on again. Remove any diskette(s) from the diskette drive(s). Turn off the computer and wait 20 seconds. If you do not have a hard disk, insert the operating system diskette in drive A. Then turn on the computer.

Using a Password

You use the **Security and Anti-virus** option of the SETUP program to define your password security. You can define both a Supervisor password and a User password. You also specify whether a password is required when you boot the system and/or access a diskette drive.

If you enabled the **Password on boot** option when you ran the SETUP program, you must enter the Supervisor or User password every time you turn on or reset the computer. If you disable the **Password on boot** option, you enter the password when you start the SETUP program.

If you set the **Diskette** Access option to Supervisor, you can access a diskette drive only if the Supervisor password is entered during startup. If the User password is entered, you cannot access the diskette drive.

Follow these steps to enter your password when you see the password prompt:

1. Type your password. You see a rectangle for each character you type. Then press **Enter**.
2. After you type the password correctly and press **Enter**, the computer loads the operating system (or starts **SETUP**).

If you don't enter the correct password the first time you type it, you can try two more times. If you haven't entered the correct password on the third try, the computer locks up to prevent unauthorized access. You see the message:

System Disabled!

You must turn off the computer and start over. You **can reset** the computer using the **RESET** button but you cannot reset the computer by pressing **Ctrl + Alt + Del**.

Note

If you **want** to delete your password, you must run the **SETUP** program and follow the instructions for deleting a password in Chapter 2.

If you do not remember your password, see “Password Problems” in Chapter 7.

Changing the Processor Speed

Your computer's processor can operate at two speeds: fast speed (the speed of your microprocessor) or slow speed (8 MHz). The slow speed is available to provide compatibility with older application programs.

When your computer is operating at fast speed, the **TURBO** light on the front panel is on. When the computer is operating at slow speed, the light is off.

You should use fast speed for almost everything you do because your programs will work faster. However, certain application programs have specific timing requirements and can run only at the slower speed. See your software manual to determine if this is the case.

Some copy-protected programs require the computer to run at slow speed while accessing the program on a diskette. These programs also usually require you to leave a *key* disk—the diskette that contains the copy protection—in the diskette drive. If you use a copy-protected program, you can change the speed to slow to access the diskette and return it to fast speed when you are finished.

You can change the processor speed temporarily by entering one of the following commands from the numeric keypad on your keyboard:

- ❑ To select slow speed, hold down the **Ctrl** key and the **Alt** key simultaneously and then press the **-** key on the numeric keypad. This turns off the speed light.
- ❑ To select fast speed, hold down the **Ctrl** and **Alt** keys and press **+** on the numeric keypad. The speed light comes on.

Note

You can use the commands listed above while you are running a program. However, if the program uses one of these commands for another function, you cannot use it to change the processor speed.

The speed setting remains in effect until you do the following:

- Reset your computer
- Turn off your computer
- Change the speed with another keyboard command
- Change the jumper setting of J22 (as described in Chapter 4).

Installing and Removing Options

You can enhance the performance of your computer by adding optional equipment such as system, video, or cache memory modules, option cards, or a microprocessor upgrade.

This chapter first describes how to remove your computer's cover to install options and how to replace the cover when you are finished. It then describes the following:

- ❑ Locating the internal components
- ❑ Changing the jumper settings
- ❑ Installing and removing SIMMs (single inline memory modules)
- ❑ Installing and removing option cards
- ❑ Removing and re-installing the option card connector board
- ❑ Adding video memory
- ❑ Installing external cache
- ❑ Installing microprocessor upgrades.

Caution

Never install options or change jumper settings when the computer is turned on or the power cable is connected to the computer.

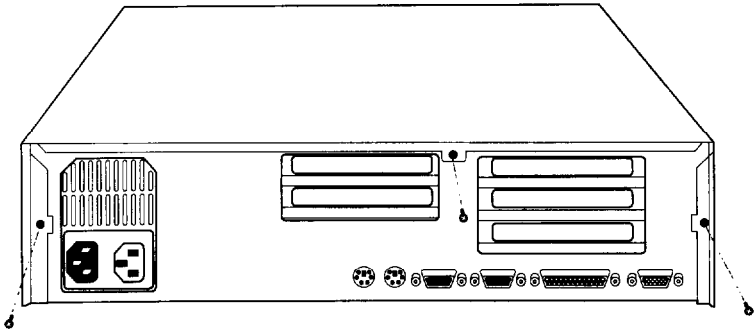
Once you have installed your option, see “Post-installation Procedures” on page 4-29.

Removing the Cover

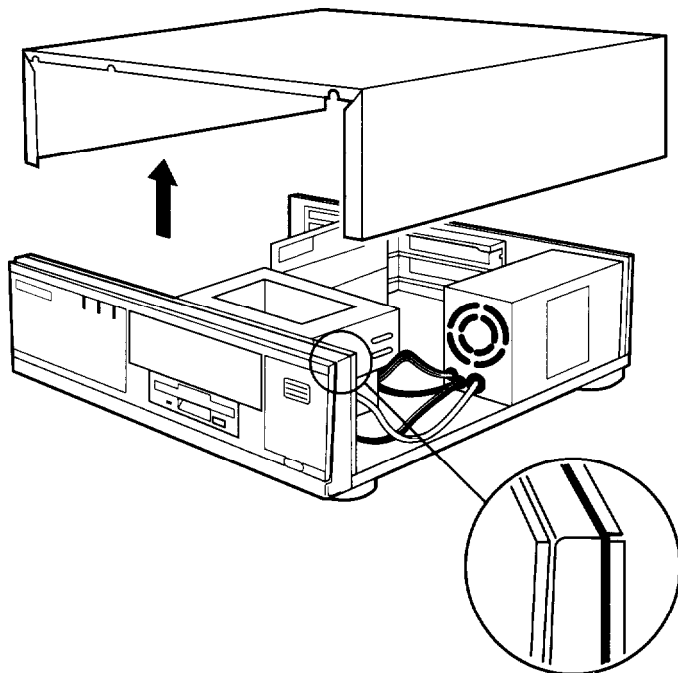
You need to remove the computer's cover to install any of the options described in this chapter or to install or remove a disk drive (as described in Chapter 5).

Follow these steps to remove the cover:

1. Turn off the computer and then any peripheral devices (including the monitor and printer).
2. Disconnect the computer's power cable from the electrical outlet and from the back panel. Also disconnect any cables that are connected to the computer, including the keyboard cable.
3. If the monitor is on top of the computer, lift it off and set it to one side.
4. Turn the computer around so the back panel is facing you.
5. Remove the three screws securing the back panel.



6. Grasp the sides of the cover and lift it straight up, as shown below:



7. Set the cover aside.
8. Ground yourself to the computer by touching the metal surface of the back panel.

Warning

Be sure to ground yourself by touching the back panel of the computer every time you remove the cover. If you are not properly grounded, you could generate an electric shock that could damage a component when you touch it.

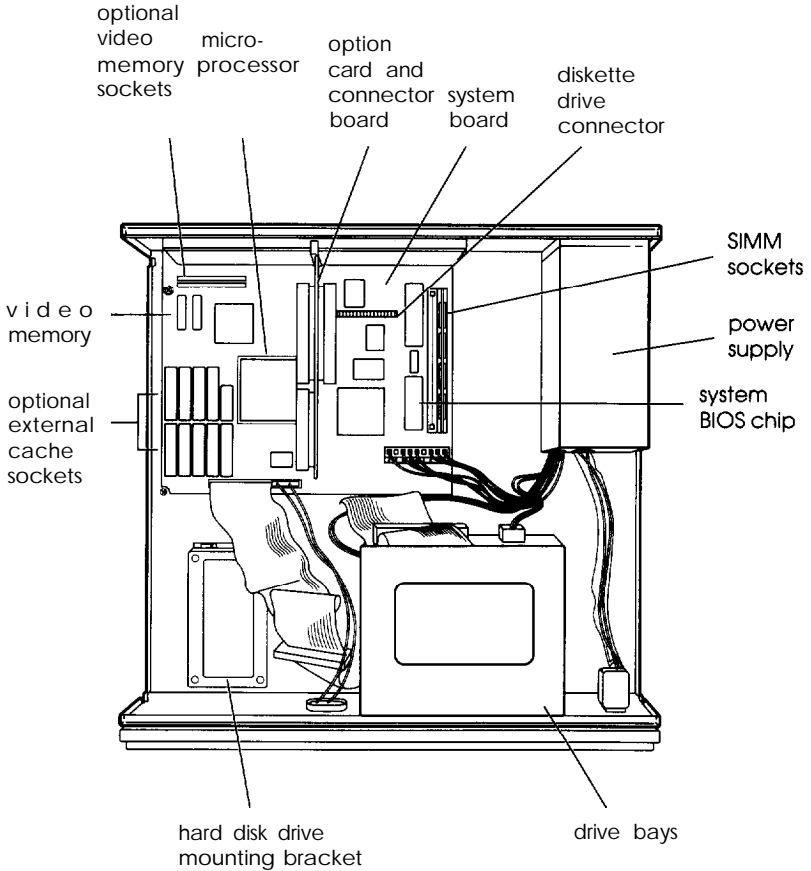
Replacing the Cover

When you are ready to replace the computer's cover, follow these steps:

1. Make sure all the internal components are installed properly.
2. Check all cable connections, especially those that might have been loosened during your work.
3. Make sure all cables are out of the way so they do not catch on the cover.
4. Insert the front of the cover between the front bezel and the chassis of the computer and guide it straight down. (See the illustration on page 4-3.)
5. Replace the three cover retaining screws.
6. Reconnect the computer to the monitor, printer, keyboard, and any other peripheral devices you have. Then reconnect the power cable to the back of the computer and to an electrical outlet.

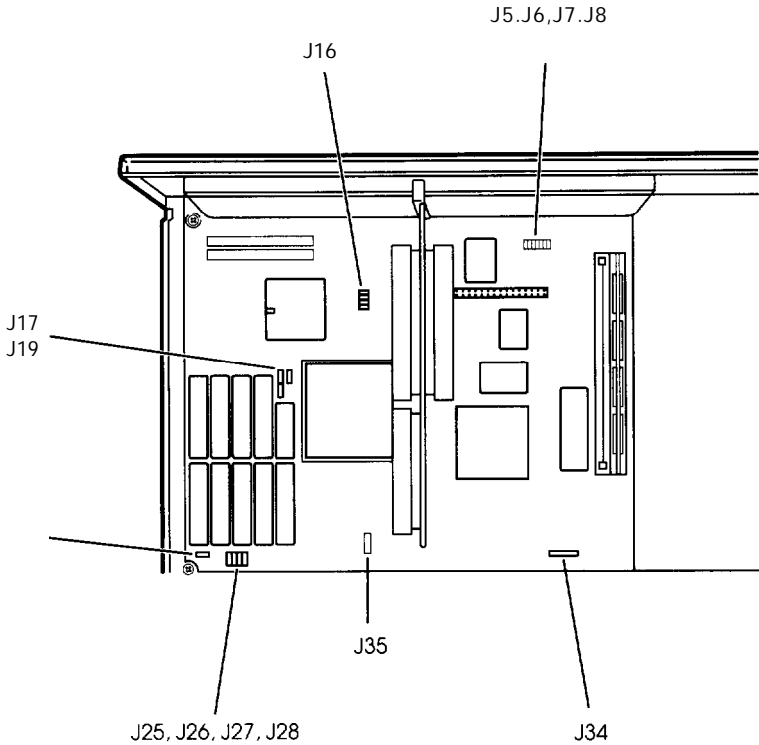
Locating the Internal Components

As you follow the instructions in this chapter, refer to the illustration below to locate the different components inside your computer.



Changing the Jumper Settings

The main system board in your computer has a number of jumpers that control certain functions. These jumpers are preset at the factory to default positions. See the illustration below to locate the jumpers on the system board.



Note
These are the only jumpers you may need to change. Other jumpers on the system board are for service purposes only.

Use the information in the following tables to change jumper settings, if necessary.

Jumper settings

| Jumper number | Jumper setting | Function |
|---------------|--------------------|---|
| J5 | 1-2 * 2-3 | Assigns PARALLEL port as LPT1 Assigns PARALLEL port as LPT2 |
| J6 | 1-2 * 2-3 | Assigns COM 1 serial port as COM 1 Assigns COM 1 serial port as COM3 ** |
| J7 | 1-2 * 2-3 | Assigns COM2 serial port as COM2 Assigns COM2 serial port as COM4 ** |
| J8 | 1-2' 2-3 | Enables diskette drive controller Disables diskette drive controller |
| J16 | 1-2 *** 5-6 | Selects a CPU clock speed of 33 MHz (486SX/33, 486DX33, 486DX2/66) Selects a CPU clock speed of 25 MHz (486SX/25, 486DX2/50) |
| J22 | Off' On | Selects turbo speed Selects 8 MHz speed |
| J34 | 2-3 . 3-4 | Selects the system board battery Discharges CMOS memory (this resets the SETUP values to their factory defaults) |
| J35 | 1-2 . 2 - 3 | Enables the IDE hard disk drive controller Disables the IDE hard disk drive controller |

* Factory setting

** You can use MS-DOS to automatically reassign parallel and serial ports. Check your MS-DOS manual for more information.

*** Setting depends on CPU

*External cache jumper settings**

| Cache size | J25 | J26 | J27 | J28 |
|------------|-----|-----|-----|-----|
| 64KB | 1-2 | 1-2 | Off | 2-3 |
| 128KB | 2-3 | 1-2 | 1-2 | 1-2 |
| 256KB | 2-3 | 2-3 | 2-3 | 2-3 |

- If you have no external cache installed, the position of these jumpers does not matter.

Processor type jumper settings

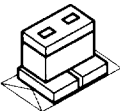
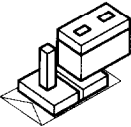
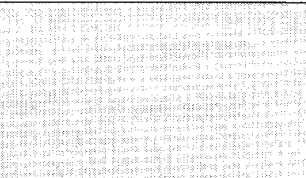
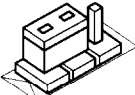
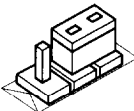
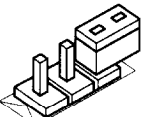
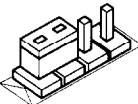
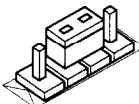
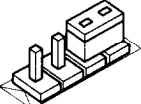
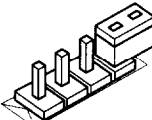
| Processor type | J17 | J19 |
|----------------|---------|-----|
| 486DX/DX2 | 1-2,3-4 | 1-2 |
| 486SX | 2-3 | Off |

Setting the Jumpers

If you need to change any jumper settings, follow these steps:

1. Refer to the illustration on page 4-6 to locate the jumpers.
2. If there are any option cards installed in your computer, you need to remove them to access the jumpers. See page 4-18.
3. A jumper's setting is determined by where the jumper is placed on the pins. Use the following table to identify the pin settings for 2-pin, 3-pin, and 4-pin jumpers. To identify pin 1, look at the system board under the jumper. You will see a triangle traced on the board at pin 1.

Setting jumpers

| Jumper type | Position | | | |
|--------------|--|--|--|--|
| 2-pin | On  | Off  |  | |
| 3-pin | 1-2  | 2-3  | Off  | |
| 4-pin | 1-2  | 2-3  | 3-4  | Off  |

To move a jumper from one position to the other, use needle-nose pliers or tweezers to pull it off its pins and gently move it to the desired position.

Caution

Be careful not to bend the jumper pins or damage any components on the main system board.

4. Replace any option cards you removed. See page 4-14 for instructions.

Installing Memory Modules (SIMMs)

Your computer comes with 4MB of memory on a SIMM. By installing additional SIMMs, you can increase the amount of memory in your computer up to 64MB.

There are two SIMM sockets on the main system board, and each can contain one memory module. You can install 1MB, 2MB, 4MB, 8MB, 16MB, and 32MB SIMMs. The following table shows the possible SIMM configurations. (When the front of the computer is facing you, BANK 0 is on the right. An x in the table below indicates no SIMM installed.)

SIMM configurations

| BANK 0 | BANK 1 | Total memory |
|---------------|---------------|---------------------|
| 4 MB | X | 4MB |
| 4 MB | 1MB | 5 MB |
| 4MB | 2MB | 6MB |
| 4MB | 4MB | 8MB |
| 4MB | 8MB | 12MB |
| 8MB | X | 8MB |
| 8MB | 1MB | 9 M B |
| 8MB | 2MB | 10MB |
| 8 MB | 4 MB | 12MB |
| 8 MB | 8MB | 16MB |
| 16MB | X | 16MB |
| 16MB | 1MB | 17MB |
| 16MB | 2MB | 18MB |
| 16MB | 4MB | 20MB |
| 16MB | 8MB | 24MB |
| 16MB | 16MB | 32MB |

S/MMM configurations (continued)

| BANK 0 | BANK 1 | Total memory |
|--------|--------|--------------|
| 16MB | 32MB | 48MB |
| 32MB | X | 32MB |
| 32MB | 1MB | 33MB |
| 32MB | 2MB | 34MB |
| 32MB | 4MB | 36MB |
| 32MB | 8MB | 40MB |
| 32MB | 16MB | 48MB |
| 32MB | 32MB | 64MB |

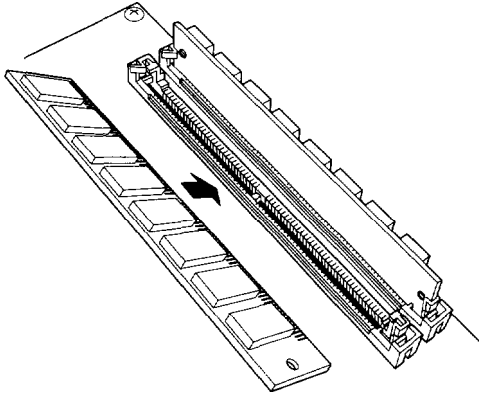
Use only tin-plated, 32-bit or 36-bit, 72-pin, fast-page mode SIMMs that operate at an access speed of 80ns (nanoseconds) or faster. Be sure all the SIMMs operate at the same speed. SIMMs that are 80ns must operate with 1 wait state; 70ns or faster SIMMs can operate with 0 wait state. (To add a wait state, **select** the DRAM wait state option from **the Advanced Chipset Control** option in SETUP.)

Inserting SIMMs

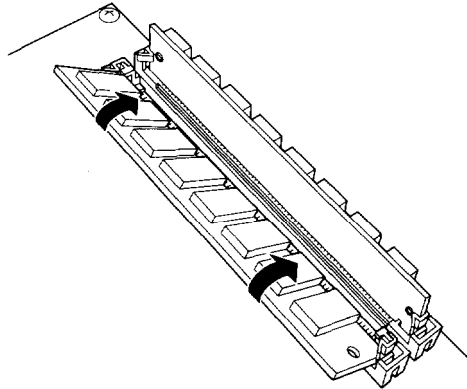
Make sure the computer is turned off and then follow these steps to install SIMMs:

1. Make sure the front of the computer is facing you.
2. Refer to the illustration on page 4-5 to locate the SIMM sockets on the right side of the system board.
3. Remove any option cards that may be blocking your access to the SIMM sockets. (See page 4-18 for instructions.)

4. Position the SIMM at an angle over the empty SIMM socket, as shown below.



5. Push the SIMM into the socket until it is seated firmly in the slot. Then tilt it upright, as shown below, guiding the hole at each end of the SIMM over the retaining post at each end of the SIMM socket. If it does not go in smoothly, do not force it; pull it all the way out and try again.

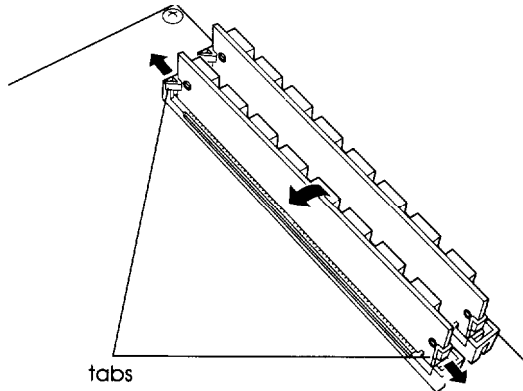


6. Replace any option cards you removed. (See page 4-14 for instructions.)

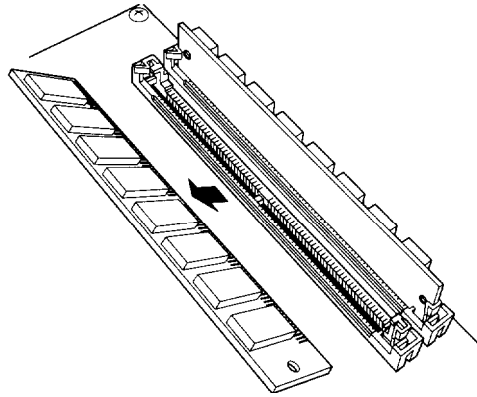
Removing SIMMs

If you need to remove SIMMs from your computer (to install different ones, for example), make sure the computer is turned off and then follow the steps below:

1. Remove any option cards that may be blocking your access to the SIMM sockets. (See page 4-18 for instructions.)
2. Use your fingers or a small screwdriver to carefully pull away the metal tabs that secure the SIMM at each end, as shown below.



3. As you pull away the tabs, the SIMM falls to the side. Remove it from the socket.



4. If necessary, follow the same procedure to remove the other SIMM.
5. If you are inserting different SIMMs, follow the instructions on page 4-11 to install your new SIMMs.
6. Replace any option cards you removed, as described below.

installing an Option Card

This section explains how to install option cards in your computer. Your computer has three 16-bit, full-length slots and two 8-bit, half-length slots to accommodate a total of five option cards.

Usually it does not matter which slot an option card occupies as long as the card fits in the slot. For example, you can place some 8-bit cards in a 16-bit slot. However, you cannot install a 16-bit card in an 8-bit slot.

Check the components on your option card and the system board before deciding which slot to use. Make sure that no components are touching or obstructing other cards or cables.

Caution

Make sure the power requirements for the option cards you install do not exceed the power supply limitations. See your option card manual(s) for the power requirements. Then check Appendix A for the option slot power limits.

Before you install an option card, see if you need to change any jumper settings on the system board. For example, if you install a SCSI hard disk drive, you may need to change jumper J35 to disable the IDE hard disk drive controller. See page 4-6 for more information on jumpers.

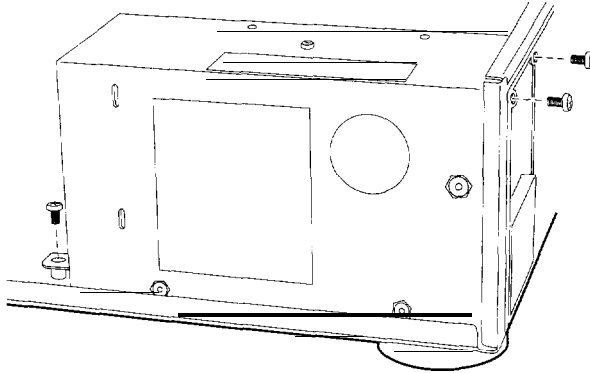
Note

You cannot install a video display card in this system.

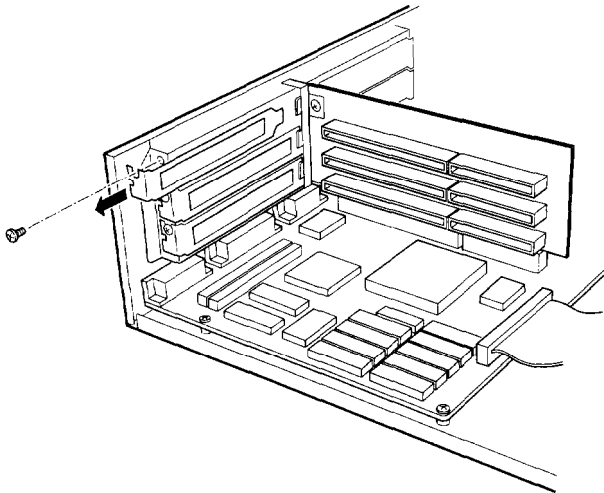
Refer to the illustrations below and follow these steps to install an option card:

1. If you are using a 16-bit option slot, go on to step 2. If you are using an 8-bit slot near the power supply, you need to move the power supply before you can remove the metal slot cover.

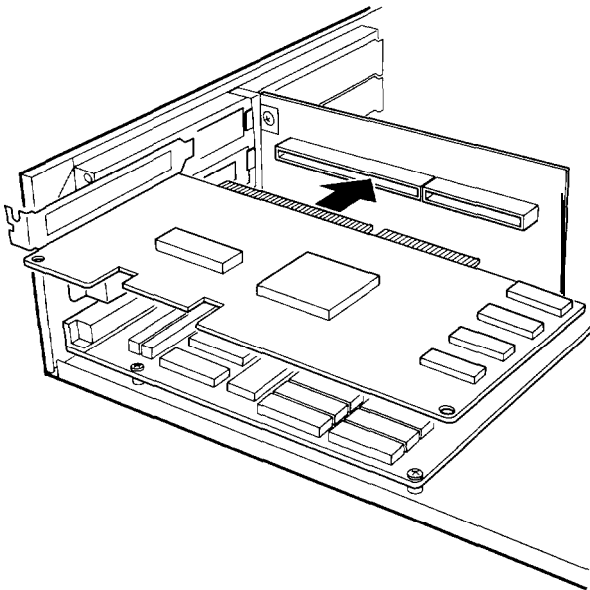
Remove the two retaining screws securing the power supply to the back of the computer and the third retaining screw holding the power supply to the base of the computer, as shown below. Be careful not to disconnect any of the cables. Slide the power supply out of the way.



2. Remove the retaining screw securing the option slot cover to the computer, as shown below. (Keep the screw to secure the option card to the computer.)



3. Slide out the slot cover and set it aside. (Store it in a safe place in case you remove the option card later.)
4. Unpack the option card and adjust any switches or jumpers on it, if necessary. (Check the option card instructions.) When you handle the card, be careful not to touch any of the components on the circuit board or the gold-edged connectors. If you need to set it down before you install it, place it gently on top of its original packing material with the component side facing up. Keep the packing materials in case you remove the card later.
5. Hold the card along the top corners and guide it into the connector, as shown below. (If you are installing a full-length card, insert the front edge of the card into the corresponding guide inside the computer's front panel.)



Once the connectors reach the slot, push the card in firmly (but carefully) to insert it fully. You should feel the card fit into place. If it does not go in smoothly, do not force it; pull the card all the way out and try again.

6. Secure the end of the card to the computer with the retaining screw.

Removing an Option Card

You may need to remove an option card installed in your computer to access components on the main system board—to change a jumper setting, for example. You may also want to remove a card if you no longer need it. Refer to the option card illustration on page 4-17 and follow these steps:

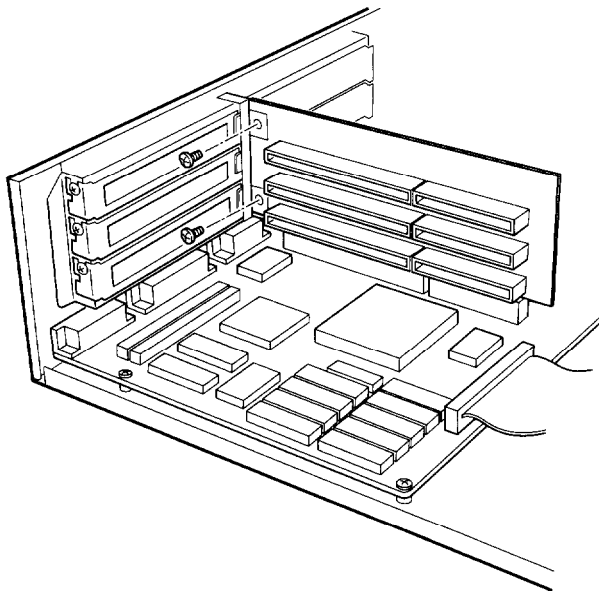
1. Remove the retaining screw securing the option card to the computer. Then pull the card straight out of the slot.
2. Set the card aside with the component side facing up.
3. If you are not replacing an option card, replace the option slot cover and retaining screw.

Removing the Option Card Connector Board

You may need to remove the option card connector board to replace the microprocessor installed on your system board. Follow these steps:

1. Remove any option cards from the connector board (see the section above).

2. Remove the two retaining screws securing the option card connector board to the back of the computer, as shown below.

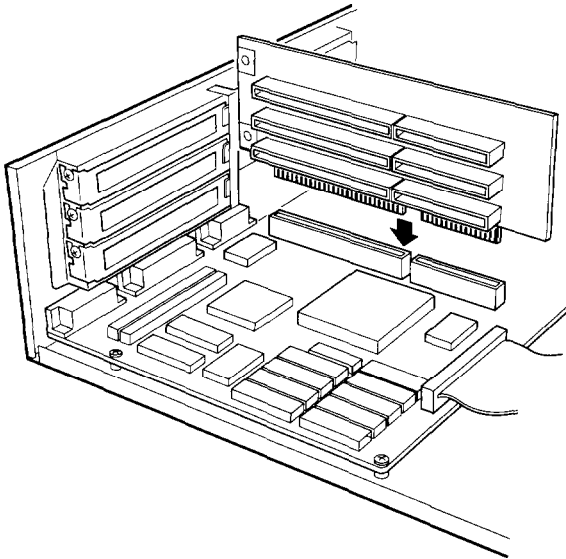


3. Pull the board straight up and out of its socket and set it aside.

Replacing the Option Card Connector Board

If you removed the option card connector board, follow these steps to replace it. Refer to the option card connector board illustration above.

1. Position the board above its slot and push it straight into the connector, as shown below.



2. Secure the board to the back of the computer with its two retaining screws.
3. Re-install any option cards you removed. See page 4-14.

Adding Video Memory

Your computer comes with 1MB of video memory. You can increase your video memory to 2MB by installing two video DRAM, 256KB x 16-bit, 40-pin, ZIP (Zig-zag Inline Package) chips. This is useful for running graphics-intensive applications or for supporting high resolutions with many colors.

The following table lists the video DRAM ZIP chips that you can install on the main system board.

Supported video ZIP chips

| Manufacturer | Part number |
|--------------|----------------------|
| Fujitsu | MB8 14260A-70/80 ns |
| MICRON | MT4C 162562-70/80 ns |
| Mitsubishi | M5M4426OAL-80 ns |
| NEC | U PD424260V-70/80 ns |
| Samsung | KM416C256JZ-70/80 ns |

Installing the Video Chips

You need two ZIPs to install the optional memory. For the memory to work properly, you must install one chip in each of the empty video memory sockets on the system board. Follow these steps:

1. Locate the memory chip sockets on the main system board, shown on page 4-5. The chip sockets are labelled U2 and U3.
2. If there is an option card in your way, remove it. See page 4-18 for instructions.

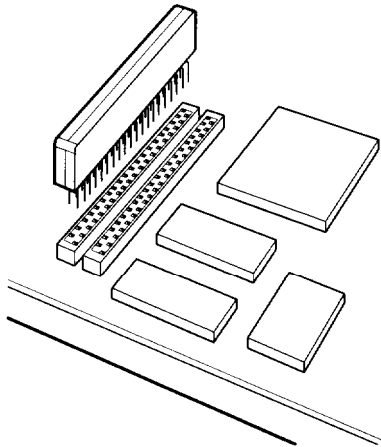
Caution

To avoid generating static electricity and damaging the memory chips, ground yourself by touching the metal surface on the inside of the computer's back panel. Then remain as stationary as possible while you install them.

3. Remove the memory chips from their package and inspect each one. The pins should point inward at slightly less than a 90° angle.

If any of the pins are bent or crooked, straighten them gently with your fingers or with small tweezers to align them with the other pins. Be careful when you do this; the pins are fragile and can break off easily.

4. Position one of the ZIP chips over the first empty socket (U2) as shown below, aligning the pins on the chip with the holes in the socket.



5. Gently press the chip halfway into the socket (to make sure it is correctly aligned). If the chip does not go in smoothly, remove it and try again.

6. When the chip is properly positioned, push down firmly on both ends of the chip to make sure it is well-seated.
7. Repeat steps 4 through 6 for the other chip.
8. Replace any option cards you removed. See page 4-14 for instructions.
9. Now run SETUP as described in Chapter 2 to enable your system to recognize the increased memory.

Installing External Cache

You can install 64KB, 128KB, or 256KB of external cache on your system.

- ❑ To install 64KB of external cache, use eight SRAM, 28-pin, 8 x 8, 20ns DIP chips, and one 8 x 8, 20ns tag chip
- ❑ To install 128KB of external cache, use four SRAM, 28-pin, 32 x 8, 20ns DIP chips, and one 8 x 8, 20ns tag chip
- ❑ To install 256KB of external cache, use eight SRAM, 28-pin, 32 x 8, 20ns DIP chips, and one 32 x 8, 20ns tag chip.

For the cache memory to work properly, you must install chips in the following configuration (each bank contains four cache memory sockets).

Cache memory configurations

| BANK 0 U20, 21, 22, 23 | BANK 1 U29, 30, 31, 32 | Tag SRAM U36 | Total cache |
|---------------------------|---------------------------|-----------------|-------------|
| 8K x 8 | 8K x 8 | 8K x 8 | 64KB |
| 32K x 8 | x | 8K x 8 | 128KB |
| 32K x 8 | 32K x 8 | 32K x 8 | 256KB |

Installing the Chips

Follow these steps:

1. Locate the external cache sockets on the main system board, shown on page 4-5.
2. If there is an option card in your way, remove it. See page 4-18 for instructions.

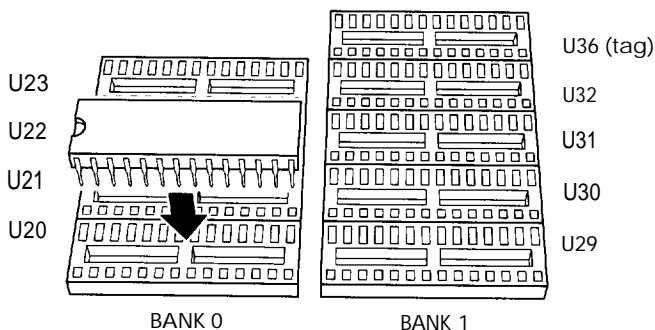
Caution

To avoid generating static electricity and damaging the cache chips, ground yourself by touching the metal surface on the inside of the computer's back panel. Then remain as stationary as possible while you install them.

3. Remove the cache chips from their package and inspect them. The pins should point inward at slightly less than a 90° angle.

If any of the pins are bent or crooked, straighten them gently with your fingers or with small tweezers to align them with the other pins. Be careful when you do this; the pins are fragile and can break off easily.

- Position one of the cache chips over the first socket as shown below, aligning the pins on the chip with the holes in the socket. Make sure the small notch on the end of the chip is aligned with the corresponding notch on the socket.



- Gently press the chip halfway into the socket (to make sure it is correctly aligned). If the chip goes in at an angle, remove it with a chip puller or a small flat-head screwdriver and try again.
- When the chip is properly positioned, push down firmly on both ends of the chip to make sure it is well-seated.
- Repeat steps 4 through 6 for each of the remaining chips.
- Change jumpers J25, J26, J27, and J28, as described on page 4-8, to correspond to the amount of cache you installed.
- Replace any option cards you removed. See page 4-14 for instructions.
- Run SETUP to enable the External **Cache** option and check that the System shadow and Video **shadow** options are enabled. You select these options from the Advanced System Setup menu. Make sure you save your settings as you leave SETUP (see Chapter 2).

When the computer restarts, it displays the amount of external cache you have installed on the system.

Upgrading the Microprocessor

You can upgrade your computer by replacing the microprocessor with a faster one. The following table lists the components you can use to upgrade the microprocessor in your system.

Microprocessor upgrade components

| Part | Manufacturer | Manufacturer's part number |
|---------------------|-----------------------|----------------------------|
| 486SX/33 processor | Intel | A80486SX-33 |
| 486DX/33 processor | Intel | A80486DX-33 |
| 486DX2/50 processor | Intel | A80486DX2-50 |
| 486DX2/66 processor | Intel | A80486DX2-66 |
| Heat sink | Tennmax Trading Corp. | HS-486DX33-9 |

To upgrade your microprocessor, you perform these general steps (see the page in parentheses for instructions):

1. Remove the option card connector board (see page 4-18).
2. Remove the existing processor chip (see page 4-27).
3. Install the new microprocessor (and heat sink, if necessary) (see page 4-27).
4. If necessary, change the settings of jumpers J16, J17, and J19 (see page 4-6).
5. Replace the option card connector board (see page 4-20).

Replacing the Processor Chip

You must remove the option card connector board to remove your existing microprocessor. Refer to page 4-18 to remove the option card connector board, then follow these steps to replace the processor chip:

1. Use the illustration on page 4-5 to locate the microprocessor on the system board. The microprocessor chip is inserted in a ZIF (Zero Insertion Force) socket.

Caution

Make sure you ground yourself by touching the metal surface on the inside of the computer's back panel before you touch the processor chip. Then remain as stationary as possible while you install it. Do not touch the pins on the processor chip. Handle the microprocessor only by the edges of its case.

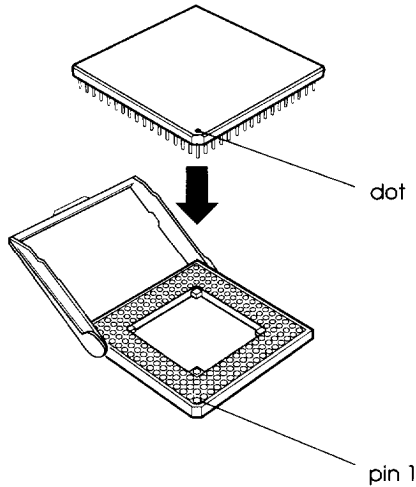
2. Open the ZIF socket by lifting up the ZIF handle. This releases the chip from the socket. (If the existing microprocessor has a heat sink that prevents the handle from passing over it, you must remove the heat sink first.)

Caution

The 486SX/25 microprocessor may be soldered onto an adapter board that is seated in the ZIF socket. Lifting the ZIF handle releases the adapter board from the socket.

3. Gently pull the processor chip straight up and set it aside.
4. Remove the replacement chip from its package and inspect the pins. If they are bent, do not install the processor chip. Contact your vendor for a new microprocessor.

5. Position the processor chip over the ZIF socket, aligning the notched edge of the chip (marked with a dot) with pin 1 on the socket, as shown below. A corresponding notch is drawn on the circuit board under the socket.



Note

If you install the processor chip in the wrong orientation, you may burn the chip and void your warranty.

6. Make sure the pins in the processor chip are directly over the holes in the socket. Then gently push the microprocessor straight into the socket, pressing evenly on all sides.
7. Close the ZIF by pressing the ZIF handle back to the closed position.

8. If you are upgrading from a 486SX processor to a DX or DX2 processor, you need to change the jumper settings of J17 and J19. If you are upgrading to a CPU with a different clock speed, you may need to change the setting of jumper J16. See the tables on pages 4-7 and 4-8 for the correct jumper settings.
9. If you are upgrading to a DX2 processor, you must install a heat sink. See the next section for instructions.
10. See page 4-20 for instructions on replacing the option card connector board. Then replace any option cards you removed.
11. Run SETUP as described in Chapter 2 to update your computer's configuration with the new microprocessor.

Installing a Heat Sink

If you are installing a DX2 processor, you must install a heat sink on the processor chip. Follow the instructions included with the heat sink.

Post-installation Procedures

After you install or remove options such as memory modules or a microprocessor, you must run SETUP to update the computer's configuration. See Chapter 2 for instructions. Additionally, you may need to add some commands to your configuration files. See your operating system manual and the manual that came with your optional equipment.

Installing and Removing Drives

This chapter describes how to install and remove optional drives in your computer. You can use these instructions to install a variety of devices, including hard disk drives, a diskette drive, a tape drive, or a CD-ROM drive. Although your drive may look different from the ones illustrated here, you should be able to install it the same way.

Your computer can hold up to four mass storage devices. You can install one or two hard disk drives in the internal hard disk drive bays. In the upper externally accessible bay, you can install a second diskette drive, a tape drive, or a CD-ROM drive.

To install or remove a drive, first remove the computer's cover as described in Chapter 4. Then follow the appropriate instructions in this chapter to install and remove drives:

- Installing a hard disk drive in the internal drive bay
- Removing a hard disk drive from the internal drive bay
- Installing a drive in the upper externally accessible drive bay
- Removing a drive from the upper drive bay
- Reconnecting drive and power cables to the diskette drive in the lower drive bay
- Post-installation procedures.

If you are installing or removing a non-Epson drive, some of the steps in this chapter may not apply; see the documentation that came with your drive for more information.

Installing a Hard Disk Drive in the Internal Drive Bay

Your computer may have a hard disk drive already installed in the internal drive bay. If not, you can install a 1-inch high by 3 ½-inch wide drive in this bay.

Here you will find steps for the following procedures:

- Removing the mounting frames from the hard disk drive (if necessary)
- Connecting the hard disk drive cables
- Installing the hard disk drive under the mounting bracket
- Installing the hard disk drive above the mounting bracket.

Note

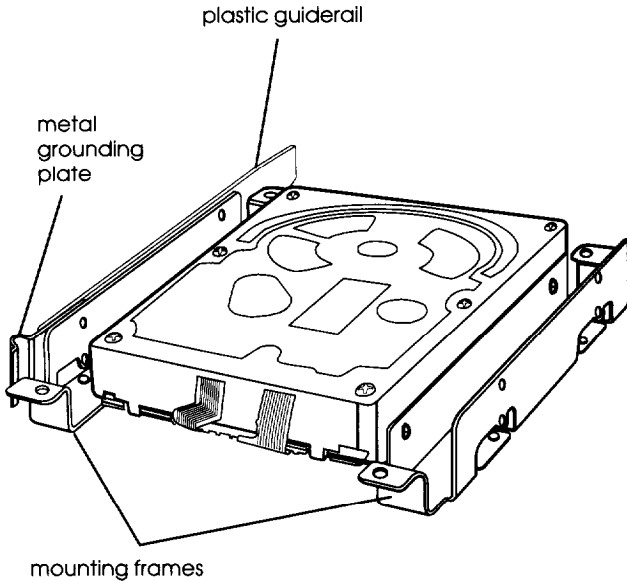
Be sure to check the jumper settings on the drive before you install a hard disk drive. Also, you may want to know the number of cylinders, heads, sectors, etc. See the documentation that came with your drive for this information.

Before you can install a hard disk drive, you need to remove any option cards that may be blocking your access to the hard disk drive area. Once you have installed the drive, replace any option cards you removed. See Chapter 4 for instructions.

Removing the Mounting Frames

If there are mounting frames attached to your hard disk drive, you need to remove them before you can install the drive. Follow these steps:

1. On your drive, there may be a plastic guiderail and metal grounding plate attached to one of the mounting frames. If so, remove the screws securing them to the mounting frame and remove the guiderail and grounding plate.



2. Then remove the two screws securing each mounting frame to the drive and remove the frames.

Connecting the Hard Disk Drive Cables

To connect the hard disk drive to the computer, you need to connect two cables: the hard disk drive ribbon cable and a power supply cable.

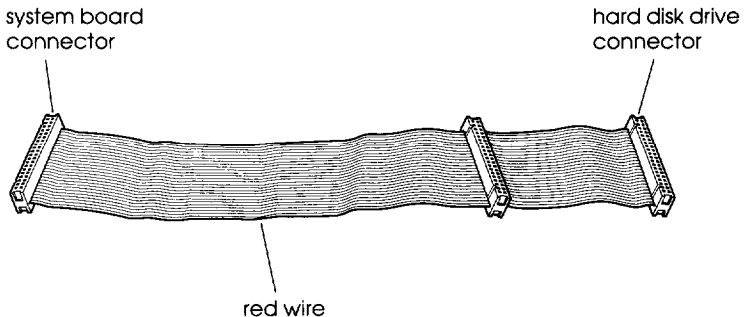
The hard disk drive ribbon cable is attached to your system board. If you need to remove it for any reason, see “Connecting the drive cable to the system board,” below, for instructions on reconnecting the cable to the system board. Otherwise, see page 5-6 for instructions on connecting the ribbon cable and power supply cable to the drive.

You should connect both the hard disk drive ribbon cable and the power supply cable to the drive before you secure it with the mounting bracket. You will not be able to attach them once the bracket is in place.

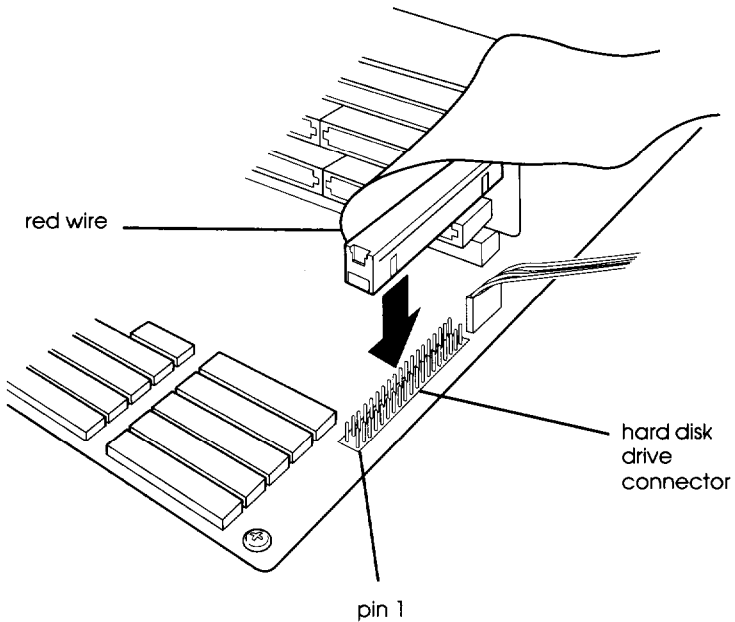
Connecting the drive cable to the system board

If you need to connect the hard disk drive ribbon cable to the system board, follow the steps below. (If the hard disk drive ribbon cable is already attached to the system board, see “Connecting the drive and power cables to the drive” on page 5-6.)

1. Locate the hard disk drive ribbon cable; it is a flat cable with a connector on each end and an additional connector on the ribbon cable.



2. Locate the hard disk drive connector on the system board.



3. Position the system board connector on the cable so that the red wire aligns with pin 1 of the connector on the system board. There is a "1" printed on the system board to identify pin 1.
4. Make sure the holes in the cable connector fit over the pins in the system board connector; then push in the cable connector.

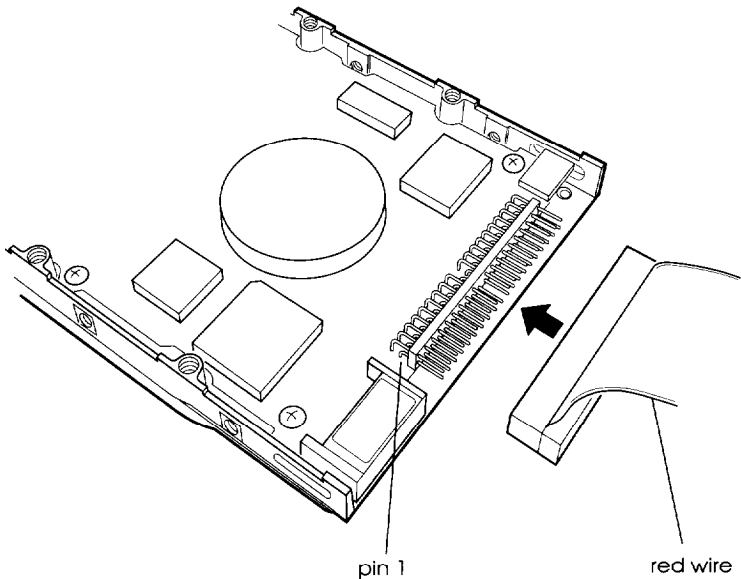
Caution

If you do not correctly align the holes with the pins, you could severely damage your system board when you push in the cable connector.

Connecting the drive and power cables to the drive

Follow the steps below to connect the hard disk drive ribbon cable and a power supply cable to the drive:

1. Locate the hard disk drive connector on the end of the hard disk drive ribbon cable.
2. Locate pin 1 on the drive connector. If you do not see it on the connector casing, turn the drive over so you can see the drive's circuit board, as shown below. There is a "1" or "2" printed on the board to identify the side of the connector containing pin 1.

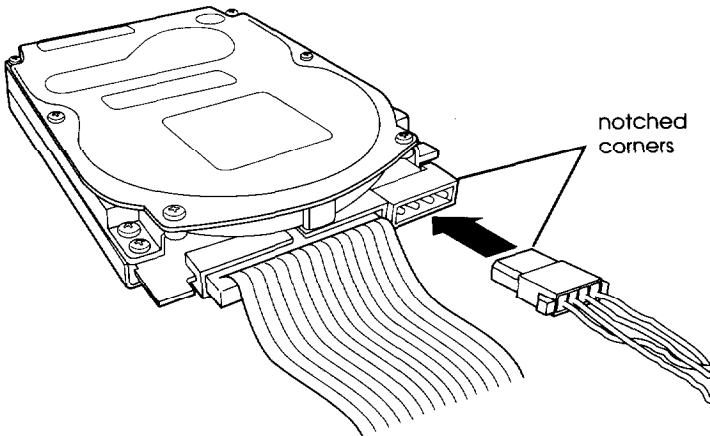


3. Position the connector on the cable so that the red wire aligns with pin 1 on the drive.
4. Make sure the holes in the cable connector fit over all the pins; then push in the connector.

Caution

If you do not correctly align the holes with the pins, you could severely damage your hard disk drive when you **push in the cable connector**.

5. Locate one of the power supply cables that lead from the power supply. (They have multi-colored wires and a plastic connector on the end.)
6. Position the power supply cable connector so that its notched corners line up with the notched corners of the power supply connector on the hard disk drive.



7. Make sure the holes fit over all the pins and then push in the connector.

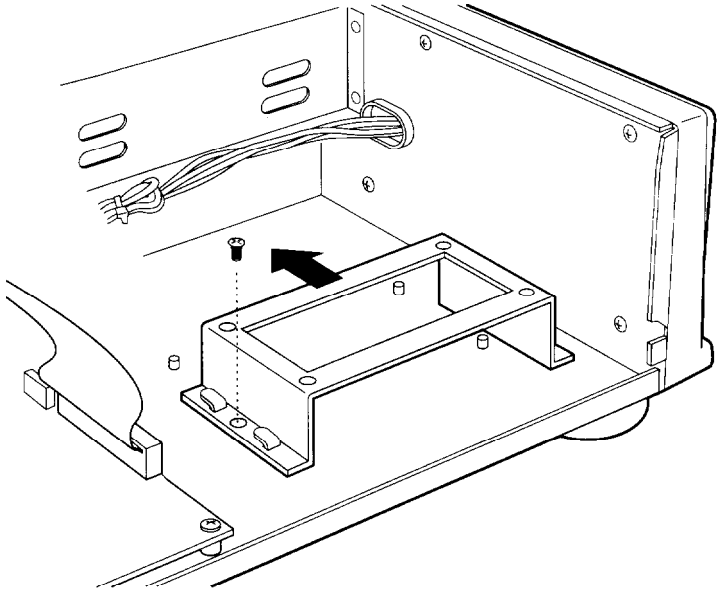
Caution

If you do not align the cable connector correctly, you could severely damage your hard disk drive when you push it in.

Installing the Hard Disk Below the Mounting Bracket

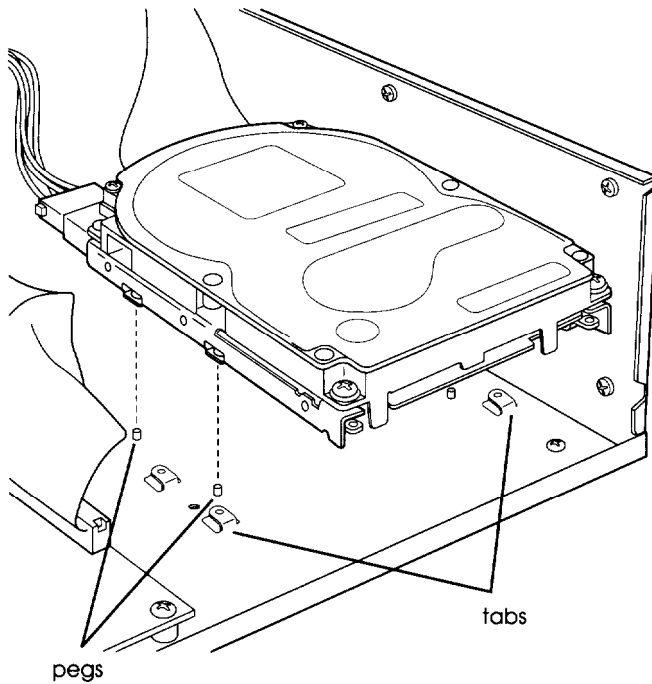
If you have a 1-inch tall hard disk drive, you can install it below the hard disk drive mounting bracket. Refer to the illustrations below and follow these steps:

1. Remove the screw securing the mounting bracket to the base of the computer, as shown below.



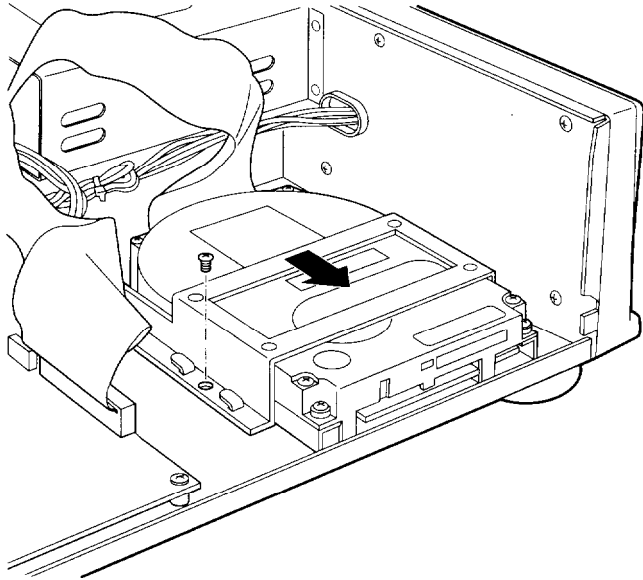
2. Slide the mounting bracket toward the diskette drive bays, as shown above, until the slots clear the tabs.
3. Lift the mounting bracket out of the computer and set it aside.

4. Align the hard disk drive so that the cables lead toward the diskette drive bays and the four screw holes on the base of the drive are above the four pegs, as shown below.



5. Gently lower the drive over the pegs. When the pegs are inserted in the screw holes on the base of the hard disk drive, the drive will not move from side to side.
6. Lower the mounting bracket over the hard disk drive, making sure that the slots in the mounting bracket fit over the tabs on the base of the computer.

7. Slide the bracket toward the side of the computer, as shown below, until the tabs hold the bracket in place.



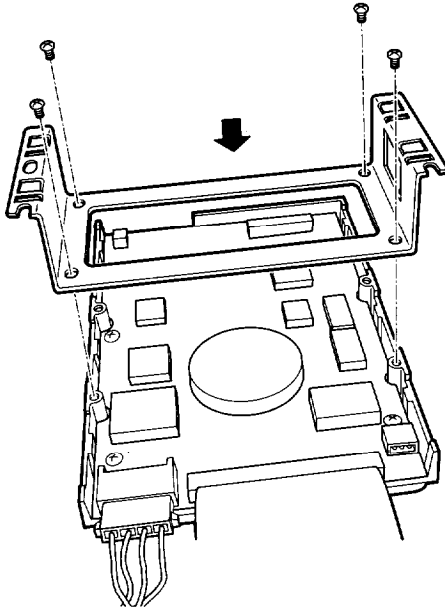
8. Secure the mounting bracket with a screw on each side, as shown above.

Installing the Hard Disk On the Mounting Bracket

You can install a hard disk drive on top of the mounting bracket rather than under it. Refer to the illustration of the mounting bracket on page 5-8 and the one below while following these steps:

1. Remove the screw securing the mounting bracket to the base of the computer and slide the mounting bracket toward the diskette drive bays until the slots clear the tabs. (See the illustration on page 5-8.)
2. Lift the mounting bracket out of the computer.

3. Turn the hard disk drive over and locate the four mounting holes on the drive.
4. Position the bracket on the hard disk drive, aligning the holes in the bracket with the holes on the drive.



5. Secure the bracket to the drive with four screws.

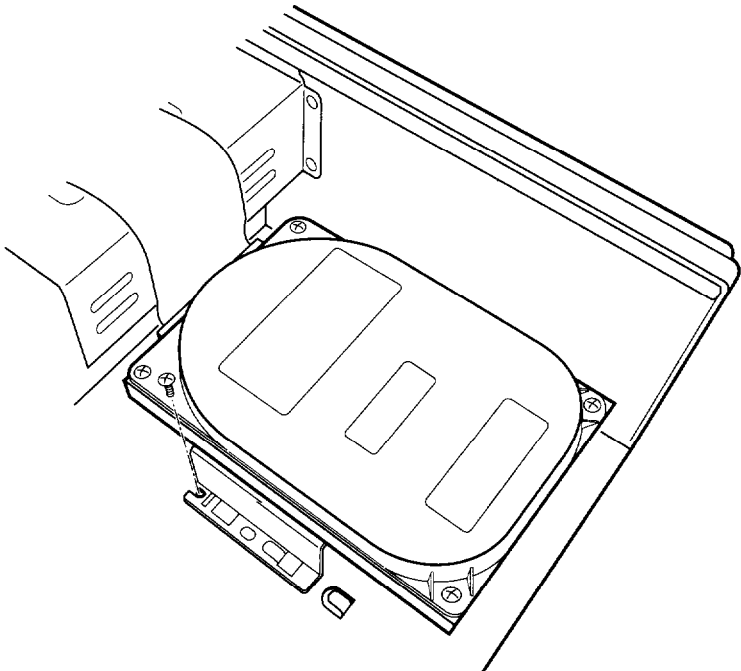
Note

If you plan to install two hard disk drives, you must use flat-head screws to secure this drive to the mounting bracket. You can purchase flat-head screws at any hardware store; request this size: #6-32UNC x 8 FH, M,+ . Also, make sure you set the jumpers on both hard disk drives to indicate which is the master and which is the slave drive. See the documentation that came with your drive for instructions.

6. Turn the drive and the mounting bracket over, then slide the slots in the mounting bracket under the tabs at the base of the computer until the tabs hold the bracket in place.
7. Secure the mounting bracket with the retaining screw.

Note

If the drive does not fit within the internal bay, you can move the mounting frame toward the diskette drive bays and align only one set of the slots on the mounting bracket with the tabs on the computer. In this case, you insert the retaining screw in the front slot on the mounting bracket as shown below.



Removing a Hard Disk Drive From the Internal Drive Bay

To remove a hard disk drive, reverse the installation steps outlined above. Then disconnect the hard disk drive ribbon cable and the power supply cable from the back of the drive. When you disconnect the cables, grasp the connectors and pull them straight out so you do not bend the pins; do not pull on the cables. Use the screws to again secure the hard disk drive mounting bracket to the base of the computer.

Installing a Drive in the Upper External Drive Bay

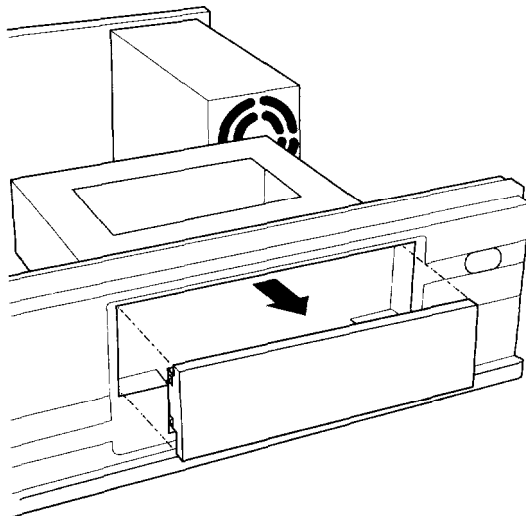
Your system comes with a 3.5-inch diskette drive installed in the lower externally accessible drive bay. You can also install a diskette drive, a CD-ROM, or a tape drive in the upper externally accessible drive bay.

If you are installing a tape drive with a standard 5.25-inch diskette drive connector, you can connect it using the diskette drive cable that came with your system.

Before you install a drive in the upper drive bay, remove the cover. Once you have the drive installed, replace the cover, following the instructions in Chapter 4.

Follow these steps to install a drive in the upper drive bay:

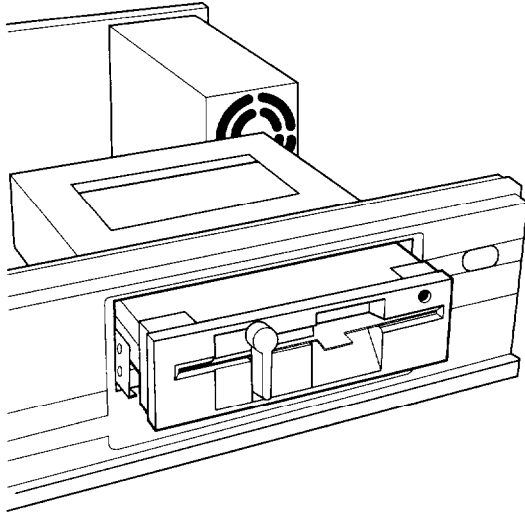
1. Remove the faceplate from the bay by pushing it forward, as shown below.



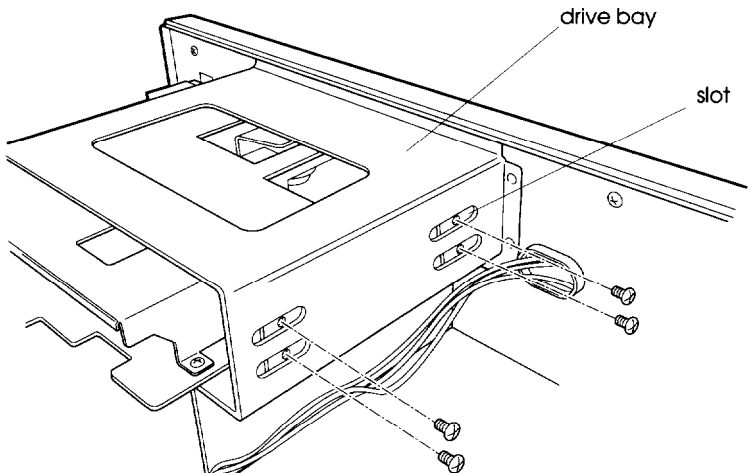
Keep the faceplate in a safe place in case you remove a drive later (or you are installing a drive that you don't need to access).

2. Remove any brackets or mounting frames from the drive. See page 5-3 for instructions.

- Slide the drive into the bay until it is flush with the front of the computer.



- Align the slots at the side of the drive bay with the mounting holes in the drive. Then secure both sides of the drive to the drive bay using the retaining screws.

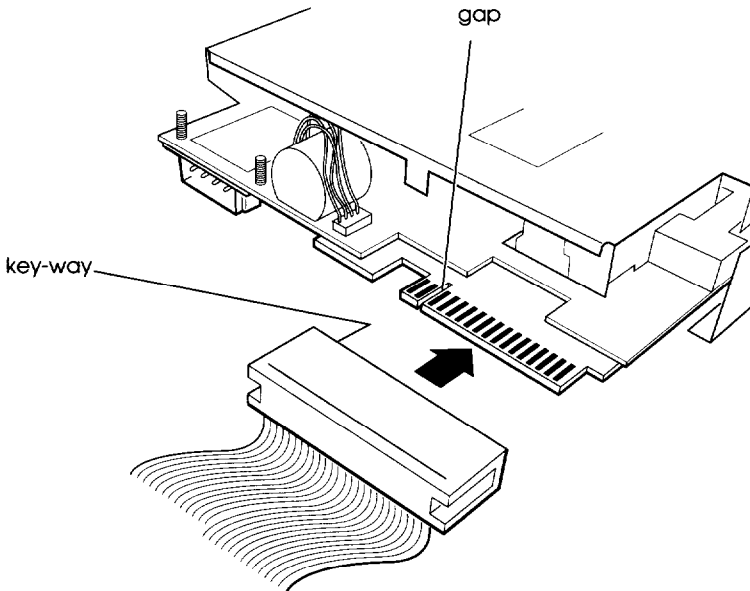


Connecting the Drive and Power Cables

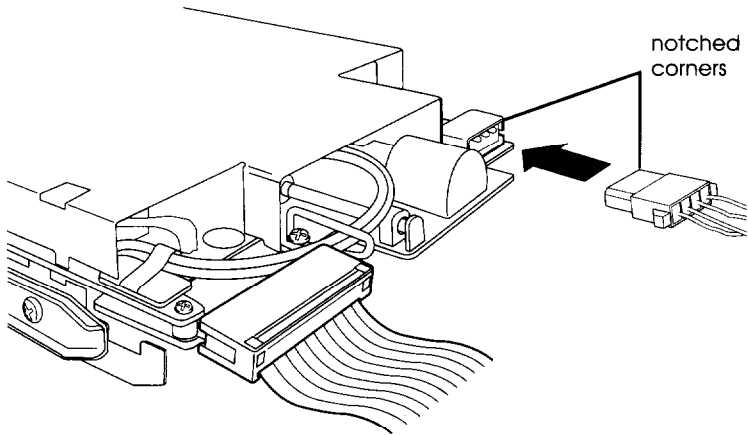
To connect the drive to the computer, you need to connect both the drive ribbon cable and a power supply cable. Follow the steps below.

1. If you are installing a diskette drive, locate the diskette drive ribbon cable. (The connector in the middle of the cable is already connected to the system board.)
2. If you are installing a second diskette drive or a tape drive with a card-edge connector, one end of the cable is connected to the bottom diskette drive. Use the other connector on the ribbon cable to connect the drive to the system board.

Make sure you align the key-way (the plastic divider) with the gap in the drive connector, as shown below.



3. Locate one of the power supply cables that lead from the power supply. (They have multi-colored wires and a plastic connector on the end.)
4. Align the notched corners of the power supply cable connector with the notched corners of the drive's power supply connector (such as the one shown below). Make sure the holes fit over all the pins and then push in the connector.



Caution

If you do not align the cable connectors correctly, you could severely damage your drive when you push them in.

If you installed a diskette drive in the upper bay, it is drive B; the lower drive is A. You can change the drive assignments through your operating system or you can purchase a different diskette drive ribbon cable.

Removing a Drive from the Upper Drive Bay

To remove a drive from the upper drive bay, follow these steps:

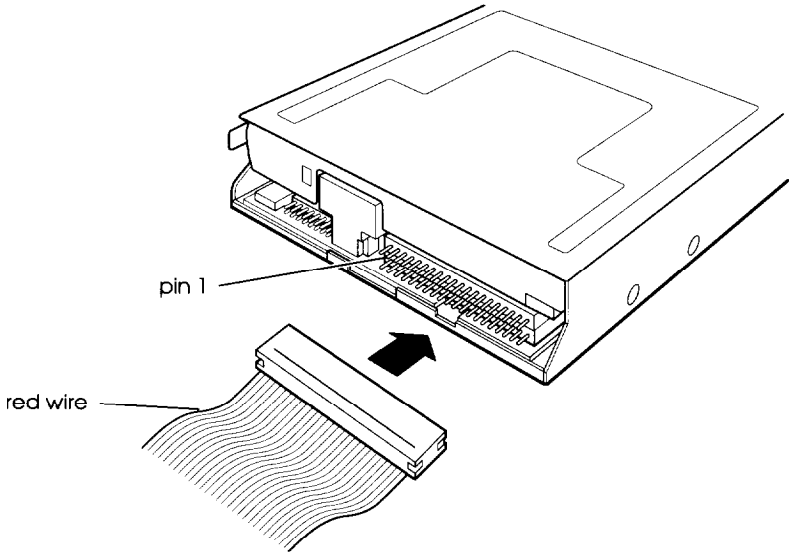
1. Remove both the ribbon cable connector and the power cable connector from the drive.
2. Remove the screws securing the drive.
3. Reach behind the drive and gently push it to the front of the bay; then pull it out of the slot.
4. Once you have removed the drive, replace the faceplate by inserting one side of the plate, then gently guiding the other side into place. You will hear it snap into place.

Reconnecting the Drive and Power Cables to the Diskette Drive in the Lower Drive Bay

If for any reason you had to disconnect the drive and power cables from the diskette drive mounted in the lower drive bay, refer to the illustration below while you follow these steps to reconnect the cables:

1. Locate the connector on the diskette drive ribbon cable.

2. Identify pin 1 on the drive and align the connector so that the red wire is at pin 1, as shown below. Push in the connector.



3. Locate the multi-colored power supply cable with the small connector. This cable is attached to the system board rather than the power supply.
4. Position the power supply cable connector so that the holes fit over all the pins. The red wire on the cable will align with pin 1 identified at the power connector on the circuit board of the drive. Push in the connector.

Caution

If you do not align the cable connector correctly, you could severely damage your hard disk drive when you push it in.

Post-installation Procedures

After you install or remove your drive(s) and replace the cover on your computer, you need to run the SETUP program to define the correct configuration for your newly installed drive. See Chapter 2 for instructions.

Chapter 6

Installing VGA and IDE Drivers

The Drivers diskette included with your system contains special VGA (video graphics array) drivers for your computer's built-in VGA adapter and IDE (integrated drive electronics) drivers for use with the local bus IDE hard disk drive interface. This chapter describes how to install these drivers.

If your system was configured for you, these drivers are already installed. However, you may want to read this chapter for the information it provides regarding the drivers. Also, to optimize your display capabilities, you may need to change the resolution setting in Windows 3.1.

VGA Drivers

Since software programs can run on different types of display adapters with different types of monitors, the VGA drivers identify your display adapter and monitor for the software. These drivers are files your software uses to communicate with your display adapter and monitor.

Your computer's built-in VGA adapter is 100% compatible with IBM VGA. This adapter allows you to use the computer with Epson VGA monitors, other brands of VGA monitors, and VGA compatible, multifrequency monitors that use analog input. The drivers described in this chapter work with any of these monitors.

Standard VGA monitors display resolutions up to 640 x 480, and you do not need to install the drivers or utilities for your monitor to operate properly with your application programs at this resolution. Also, your system supports the VESA standard 1.20. If you have programs that use VESA, install the VESA drivers that came with these programs.

However, you need to install these drivers if you want to use resolutions over 640 x 480 or take advantage of the following special features:

- Interlaced and non-interlaced resolutions up to 1280 x 1024 in graphics modes with up to 16.8 million colors in 640 x 480 resolutions
- 132-column text mode in 16 colors
- High-speed video memory interface
- 16-bit data path to video memory and hardware registers
- Video adapter control of graphics cursor movement.

Your computer comes with 1MB of video memory installed on the system board. You can upgrade the video memory to 2MB by installing additional video memory chips. (See Chapter 4 for installation instructions.) The resolutions your system can support for each application depend on the size of your video memory.

The Drivers diskette that came with your computer contains drivers for Microsoft Windows, version 3.1. Other drivers are available from the Epson Electronic Bulletin Board; call (310) 782-4531 to request additional drivers.

The Drivers diskette also contains a utility program called SetRES, which allows you to change your screen resolutions from within the Windows environment.

Installing the Windows Drivers

If you have not yet installed Windows 3.1, follow the instructions in your Windows documentation to install it. Select VGA as the default display device. Then follow these steps to install the new drivers:

1. Within Windows, select **R**un from the file menu in the Program Manager.
2. Insert the Drivers diskette in drive A.
3. Type the following command and select **OK** or press **Enter**:

```
A : \I N S T A L L
```

4. When the INSTALL program asks you to identify your Windows directory, press **Enter** to accept the default or delete the default and type the path for your Windows directory.
5. Select **OK** or press **Enter**. The program copies the Windows drivers and the SetRES utility to the program directory and creates a SetRES utility icon in your Windows program manager.
6. When you see the message telling you that the drivers and utility were successfully added, select **OK** or press **Enter**.

Configuring the Drivers

Once you have used the INSTALL program to copy the drivers to your Windows program directory, follow these steps to configure the drivers:

1. Open the Windows Setup icon.
2. Select Options.

3. Select **Change System** Settings.
4. Select **Display**.
5. From the Display menu, select **Other** (Requires **disk provided by a hardware manufacturer**).
6. When the program prompts you to insert your display driver diskette and displays the path **A : **, insert the Drivers diskette and press Enter.

You see a list of drivers and their associated resolutions.

7. Select the driver you want and press Enter.
8. When you see **Accept the configuration as shown above**, press Enter.
9. Follow the rest of the instructions on the screen and in your Windows documentation to complete the installation.

To change your VGA resolution, you can run the Setup program from within Windows or you can run the SetRES utility described in the next section.

SetRES

The SetRES utility allows you to change the screen resolution, the number of screen colors, and the font size for Windows 3.1 applications.

Before you can use the SetRES utility, you must install the Windows VGA drivers as described on page 6-3. As the INSTALL program copies the drivers, it also installs the SetRES utility in your Windows program directory and creates a SetRES utility icon in your Windows program manager.

To start the SetRES utility, open the SetRES icon.

Select the resolution, font size, and number of colors you want to use and select **OK** or press **Enter**.

Once you have changed options using the SetRES utility, you need to restart Windows for the new settings to take effect.

IDE Drivers

The IDE drivers allow your system to take advantage of the high-speed performance of the local bus IDE hard disk drive interface. Installing these drivers will increase the speed with which the system accesses the hard disk drive.

Installing the IDE Drivers

The Drivers diskette contains an installation program, called IDESETUP, which you can use for installing the IDE drivers on your hard disk.

Follow these steps to install the IDE drivers:

1. Insert the Drivers diskette in drive A.
2. Log onto drive A.
3. Type the following and press **Enter**:

IDESETUP

4. Follow the instructions on the screen to install the IDE drivers on your hard disk.

After installing the drivers, the system reboots.

Note

Not all hard disk drives can take advantage of this feature. To take advantage of the local bus IDE interface, your hard disk drive must support a 32-bit data path that utilizes double-word I/O. To find out whether your hard drive utilizes double-word I/O, see the hardware specifications for the drive or contact the vendor of the drive and request a product specification.

Chapter 7

Troubleshooting

If you have any problems as you set up and use your computer, refer to this chapter. You can correct most problems by adjusting a cable connection, repeating a software procedure, or resetting the computer.

The troubleshooting suggestions in this chapter are organized in general categories, such as “The computer will not start.” Within each category, a more specific problem is described with possible solutions.

If the suggestions here do not solve the problem, contact your Epson service representative.

Identifying Your System

When you request technical assistance, be ready to provide the serial number of your computer, its system BIOS version number, its configuration (including the type of disk drives, monitor, and option cards), and the names and version numbers of any software programs you are using.

Use these guidelines to locate information about your system:

- Serial number:** Look on the back panel of the computer to find the serial number.
- System BIOS version:** Restart your system. You'll see the system BIOS version number displayed on the screen when your system performs power-on diagnostics.
- System configuration:** Start SETUP and select the System Summary option to see your system's configuration.
- MS-DOS version:** At the MS-DOS prompt, type `VER` and press Enter to see the MS-DOS version number.
- Software versions:** In Windows applications, select "About" from the Help menu. As your software application starts, it usually displays a version number on the banner screen. Also, you can check your application documentation for a version number.
- CONFIG.SYS:** At the MS-DOS prompt, type `TYPE CONFIG.SYS` and press Enter to see a listing of your CONFIG.SYS file. This file contains your system configuration information.

AUTOEXEC.BAT:

At the MS-DOS prompt, type
`TYPE AUTOEXEC.BAT` and press
Enter to see a listing of your
AUTOEXEC.BAT file. This file
contains your system startup
information.

The Computer Will Not Start

The power light is on, but the computer does not start.

Replace your main operating system diskette and turn on the computer again.

Caution

If you turn off the computer, always wait at least 20 seconds before turning it back on. This prevents damage to the computer's electrical circuitry.

The computer does not start and the power light is not lit.

Make sure the power cord is securely connected to both the AC inlet on the back panel and an electrical outlet.

The power cord is securely connected, but the computer still does not start.

Check the electrical outlet for power. Turn off your computer and unplug the power cord. Plug a lamp into the outlet and turn it on.

You installed or removed system components, and now your computer does not start.

Check to make sure you have reconnected all the internal and external cables correctly.

You may have installed option cards that exceed the system's power requirements. Check the power requirements in Appendix A.

You may have installed a SIMM incorrectly. If the system doesn't find memory, nothing happens. Check that your SIMM(s) are securely installed in their sockets.

If you replace the microprocessor, make sure the new processor chip is installed correctly. Also make sure pin 1 on the chip is connected with pin 1 on the system board. See Chapter 4.

The Computer Does Not Respond

The computer locks up.

Wait a few moments; if your computer does not respond after a reasonable length of time, press Ctrl Alt Del. If that doesn't work, press the RESET button.

You may have installed memory using SIMMs that work at the wrong speed. Install the correct SIMMs (see Chapter 4).

Your system may have over-heated. If you are using a DX2 processor, make sure you have an adequate heat sink installed on the chip.

you reset the computer, but it still does not respond.

Try turning the computer off, wait 20 seconds, and turn it on again.

Your computer sudden/y stops operating.

You may have overloaded the power supply limitations. See your option card manual(s) for the power requirements for your option card(s). Then check Appendix A to see if you have exceeded the option slot power limits.

Keyboard Problems

The screen displays a keyboard error message when you turn on or reset the computer.

Make sure the keyboard is securely connected to the correct port.

Nothing happens when you type on the keyboard.

See “The Computer Does Not Respond,” above.

The cursor keys on the numeric keypad do not work properly.

If the Num Lock light in the upper right corner of the keyboard is lit, press NumLock to turn off the function.

Monitor Problems

There is no display on the screen.

Check that the monitor’s power switch is on and that its power light is on.

The power light is on, but you still do not see anything on the screen.

Check the brightness and contrast controls.

If you still do not see anything on the screen, make sure the monitor is securely connected to the computer.

If you are running an application program, see if you need to set up the program for the type of monitor and display adapter you have. Also make sure you are using the appropriate monitor and display adapter for your software.

Note

You must use a VGA monitor with this computer.

The power switch is on but the power light is not on.

Turn off the monitor's power, wait five seconds, and turn it back on.

If the light still does not come on, check the electrical outlet for power. Turn off your monitor and unplug it from the outlet. Then plug a lamp into the wall outlet and turn it on. If the light turns on, your monitor may be faulty.

Diskette Problems

You see a diskette error message.

Reinsert the diskette, making sure you insert it all the way. If the drive has a latch, turn it down to secure the diskette.

Also, check to see that you have inserted the right type of diskette in the drive. For example, make sure you are not inserting a high-density diskette in a double-density drive.

Reinserting the diskette does not solve the problem.

Insert the diskette in another diskette drive of the same type. If you can read the diskette in a different drive, your drive may be faulty.

The diskette is the right type, but you still see an error.

Check that the diskette is not write-protected, preventing the drive from writing to the diskette.

Make sure the diskette is formatted. See your operating system documentation for instructions on formatting diskettes.

You may have a defective diskette. Try copying the files from the bad diskette to a new diskette.

Something is wrong with the data in the files.

If you are using MS-DOS, run CHKDSK to repair the files. You may also be able to use special utilities or diagnostics to solve this problem.

Diskette Drive Problems

A newly-installed diskette drive is not working properly.

Make sure you have installed the drive correctly and check all the cable connections.

You see a diskette drive error when you start your computer.

Run the SETUP program and configure your system for the correct type of diskette drive.

The diskette drive is making loud or unusual noises.

Contact your service representative.

Hard Disk Drive Problems

A newly-installed hard disk drive is not working properly or its performance is not what you expect.

Make sure you have installed the drive correctly and check all cable connections. Also, check the jumper settings on your drive.

Check that you have installed the IDE drivers on your hard disk (see Chapter 6). To take advantage of the local bus IDE interface, your hard disk drive must support a 32-bit data path that utilizes double-word I/O.

You see a hard disk drive error when you start your system.

Run SETUP and check that your system is auto-sensing the correct drive type. If auto-sensing is enabled and SETUP displays information that does not match your drive, you may need to define your own drive type. See Chapter 2 for setup information.

Make sure the jumpers on the system board are set correctly. Jumper J31 enables or disables the IDE hard disk drive controller. See Chapter 4 for jumper information.

You are unable to store data on the hard disk drive.

If your drive was not configured, make sure you have partitioned and formatted it correctly for your operating system. See your operating system manual for instructions.

Also, make sure your hard disk drive has been physically formatted by the manufacturer. (All Epson-supplied drives are physically formatted at the factory.) If it has not been physically formatted, use the format utility that came with the drive to format it before you partition it or install the operating system.

Note that a physical format is different from software-based formatting commands, such as the MS-DOS FORMAT command.

You have been using your hard disk drive successfully for some time but notice a reduction in performance.

The data on the disk may have become fragmented. Back up all your data and use a disk compaction utility to reorganize the files on your disk.

Check that your IDE drivers are installed correctly (see Chapter 6). Make sure your CONFIG.SYS has not been altered and that it loads the IDE drivers.

If you cannot access data on your hard disk or you are seeing read/write errors, the disk may have a physical problem. Contact your service representative.

Password Problems

You have forgotten your password.

You must discharge your CMOS memory. To do this, you need to change the setting of jumper J34 to position 3-4. See Chapter 4 for details on changing the jumper.

When you turn the computer back on after changing J34, the SETUP values are reset to their factory defaults. Both the Supervisor and the User passwords are disabled.

Be sure to turn off the computer and set J34 back to 2-3 before you start work.

Software Problems

The application program does not start.

Check that you are following the correct procedure for starting the program and that it is installed correctly. If you do not have a hard disk, make sure the correct diskette is in the diskette drive. If you need help, contact your software manufacturer.

The application program is having trouble reading a key disk.

You may be running an application that requires a slower processor speed. You need to change the turbo switch jumper, J22. See Chapter 4 for information on changing the jumper.

Your application has locked the computer, making it unresponsive to keyboard commands.

Reset the computer and try again. If resetting the computer does not help, turn it off, wait 20 seconds, then turn it on again.

Some software, like OS/2,[®] UNIX,[®] or NetWare 3.11, needs a minimum of 4MB to 8MB of RAM to work correctly. Check your software documentation for the minimum memory requirements. If necessary, add additional memory using the instructions in Chapter 4.

Printer Problems

The printer does not work at all.

Check that the printer has power and is properly connected to the computer. Also make sure your printer has paper in it.

The printer prints garbled information.

Check the printer manual for the printer's correct DIP switch or control panel settings.

Also, make sure you have the proper drivers installed for your printer and make sure you've selected the correct printer within your software application.

Option Card Problems

A new/y installed option card is not working correctly.

Make sure the option card is installed correctly and is well-seated in its slot. Run the SETUP program to update your computer's configuration after you install the card. Also, perform setup procedures for any software you are using with the option card.

See the documentation that came with the option card to set any necessary DIP switches or jumpers on the card.

The computer may also have some jumpers that must be set for the option card to work properly. See Chapter 4 for system jumper information.

Your system may need to operate at the slower processor speed to access the device. Try reducing the processor speed (see Chapter 3).

Make sure you install option cards that meet the system's power requirements. See Appendix A for power requirements.

Note

You cannot install an optional video display card in this computer.

An external device connected to the option card is not working correctly.

Make sure you are using the proper cable to connect the device to the card.

Memory Module Problems

The memory count displayed by the power-on diagnostics program is incorrect.

You may have installed the SIMMs incorrectly. They may be the wrong type or speed, or they may not be inserted all the way. See Chapter 4 for information on installing SIMMs.

If you have installed a gold-plated SIMM in one of the sockets, the socket may have corroded slightly. Remove the SIMM and clean the gold-plated connection; then reinstall the SIMM.

Mouse Problems

Your mouse isn't working properly or you see an auxiliary device error message.

Make sure the mouse cable is securely connected to the MOUSE port. Also make sure you installed the mouse driver correctly (if necessary). See the documentation that came with your mouse for instructions. (You don't need to install a mouse driver for Windows 3.1.)

Controller Problems

*You see a controller error for the **hard disk drive controller** or the **I/O port controllers** when you **start your** system.*

The indicated controller on your system board may be faulty. If you have an option card with a controller that will work with your device, you can install it and change the jumper settings on the system board to disable the built-in controller. You can then continue to use your system until it is convenient for you to have it serviced.

External Cache Problems

*The **cache** displayed by the **power-on diagnostics** program is **incorrect**.*

You may have installed the external cache chips incorrectly. They may be the wrong type, or they may not be inserted all the way.

Also, you may not have changed the SETUP program or the jumpers to recognize the new cache. Make sure you have set the **External cache** option to **Enabled** and set both the **System shadow** and the **video shadow** options to **Enabled**.

See Chapter 4 for instructions on changing the jumper settings or information on installing external cache; see Chapter 2 for instructions on using the SETUP program.

Appendix A

Specifications

CPU and Memory

32-bit CPU Intel 486SX/25, 486SX/33, 486DX/33, 486DX2/50, or 486DX2/66 microprocessor

System speed Fast and slow speeds available; fast is the speed of the microprocessor, slow is 8 MHz; speed selection through keyboard commands or jumper setting

Memory 4MB RAM standard on a SIMM; expandable to 64MB using 1MB, 2MB, 4MB, 8MB, 16MB, and 32MB SIMMs; SIMMs must be tin-plated, 72-pin, 32-bit or 36-bit, fast-page mode type with access speed of 80ns (with 1 wait state) or 70ns or faster (with 0 wait state)

ROM 128KB system BIOS, video BIOS, and SETUP code located in EPROM on main system board

Video RAM 1MB DRAM on main system board; expandable to 2MB using two ZIP chips

Shadow RAM Supports shadowing of system and video BIOS ROM into RAM

Cache 8KB of internal cache; supports 64KB, 128KB, or 256KB of external cache using 28-pin, 8 x 8, 20ns DIP chips or 28-pin, 32 x 8, 20ns DIP chips

***Math
coprocessor***

On DX and DX2 systems, math coprocessor built into the microprocessor

***Clock/
calendar***

Real-time clock, calendar, and CMOS RAM socketed on main system board with built-in battery backup

Controllers

Video

Super VGA high-speed local bus with True Color support; provides resolutions up to 1280 x 1024 in 256 colors

Diskette

Controller on main system board supports up to two diskette drives or one diskette drive and one tape drive

Hard disk

High-speed, 32-bit local bus IDE interface on main system board supports up to two IDE hard disk drives with built-in controller; BIOS provides hard disk auto-sensing function

Interlaces

Monitor

VGA interface for fixed or multi-frequency monitor built into system board; 15-pin, D-shell connector

Parallel

One standard B-bit parallel interface built into main system board; 25-pin, D-shell connector

Serial

Two RS-232C, programmable, asynchronous interfaces built into main system board; 9-pin, D-shell connectors

| | |
|------------------------|--|
| <i>Keyboard</i> | PS/2 compatible keyboard interface built into main system board; 6-pin, mini DIN connector |
| <i>Mouse</i> | PS/2 compatible mouse interface built into main system board; 6-pin mini DIN connector |
| <i>Option slots</i> | Three 16-bit, full-length and two 8-bit, half-length I/O expansion slots, ISA compatible, 8.33 MHz bus speed |
| <i>Speaker</i> | Internal |
| <i>Mass storage</i> | Internal mounts: Two 3½-inch wide, half-height drives Externally accessible mounts: One 3½-inch wide, third-height drive and one 5¼-inch wide, half-height drive |
| <i>Diskette drives</i> | Your system supports the following diskette drives: 3.5-inch diskette drive, 1.44MB (high-density) storage capacity 5.25-inch diskette drive, 1.2MB (high-density) storage capacity 3.5-inch diskette drive, 720KB (double-density) storage capacity 5.25-inch diskette drive, 360KB (double-density) storage capacity |

| | |
|--------------------------------|--|
| <i>Hard disk drives</i> | 3½-inch form factor hard disk drive(s), up to half-height size; maximum of two drives Epson IDE hard disk drives are available in BOMB, 120MB, 170MB, 240MB, 250MB, and 340MB |
| <i>Other devices</i> | Half-height tape drive, CD-ROM, or other storage device; 5¼-inch or 3½-inch with mounting frames |

Physical Characteristics

| | |
|----------------------|--|
| <i>Width</i> | 15.6 inches (396 mm) |
| <i>Depth</i> | 14.5 inches (368 mm) |
| <i>Height</i> | 4.1 inches (104 mm) |
| <i>Weight</i> | 15 lb (6.8 kg), without drives or keyboard |

Power Supply

| | |
|-------------------------------|---|
| <i>Type</i> | 65 Watt, UL listed, fan-cooled |
| <i>Input ranges</i> | 90 to 260 VAC |
| <i>Maximum outputs</i> | +5 VDC at 7.5 Amps, -5 VDC at 0.3 Amps, +12 VDC at 2.0 Amps, -12 VDC at 0.3 Amps |
| <i>frequency</i> | 47 to 63 Hz |

Option Slot Power limits (Total)

| | | | | |
|-----------------|----------|-----------|-----------|-----------|
| Maximum current | +5 volts | - 5 Volts | +12 volts | -12 Volts |
| For all slots | 4.6 Amps | 0.1 Amps | 1.8 Amps | 0.1 Amps |

Environmental Requirements

| Condition | Operating range | Non-operating range | Storage range |
|---------------------------|---------------------------------------|---|---|
| Temperature | 41° to 90°F (5° to 32° C) | -4° to 140° F (-20° to 60° C) | -4° to 140°F (-20° to 60° C) |
| Humidity (non-condensing) | 20% to 90% | 10% to 90% | 10% to 90% |
| Altitude | -330 to 9,900 ft (-100 to 3,000 m) | -330 to 39,600 ft (-100 to 12,000 m) | -330 to 39,600 ft (-100 to 12,000 m) |

Tested Operating Environments

Although your system will run most software applications, the following operating environments have been tested for compatibility with your system. As new environments become available, these also will be tested.

MS-DOS 3.1 to 5.0 and 6.0
DR DOS® 6.0
Novell® NetWare* 2.2, 3.11, and 4.0
Novell NetWare Lite 1.1
OS/22.1
SCO UNIX
Windows 3.1
Windows for WorkGroups

- Certified as Workstation tested as File server

Your system has also received Novell's "Yes, NetWare tested and approved" certification as a workstation.

Options Available from Epson

The following list represents the options available for this product from Epson. Other options are available from other vendors. Call your nearest marketing location for more information on specific options.

Options

| Option | Product | Product code |
|----------------------------|------------------------------------|--------------|
| Peripheral devices | | |
| Monitors | 14" VGA monochrome monitor | A880611 |
| | 14" VGA color monitor, 0.39 mm | A804321 |
| | 14" Extended color VGA monitor | A804211 |
| | 17" Professional Series monitor | A804241 |
| | 20" Professional Series monitor | A804341 |
| Keyboards | 101 USA | A800181 |
| | 102 International language | Several |
| Mouse | 6-pin PS/2-type mouse | A880282 |
| Mass storage devices | | |
| Additional diskette drives | 5.25" 1.2MB FDD | A811371 |
| | 3.5" 1.44MB FDD | A811381 |
| Hard disk drives | 80MB HDD w/embedded AT controller | A812001 |
| | 120MB HDD w/embedded AT controller | A811951 |
| | 170MB HDD w/embedded At controller | A880861 |
| | 240MB HDD w/embedded At controller | A811991 |
| | 340MB HDD w/embedded At controller | A880911 |
| Tape backup drive | Epson 250 MB tape backup unit | A811613 |
| Memory expansion kits | | |
| System memory | 4MB SIMM memory expansion kit | A880801 |
| | 8MB SIMM memory expansion kit | A880811 |
| | 160MB SIMM memory expansion kit | A880821 |
| Processor upgrade kits | | |
| 486SX/33 | 486SX/33 processor | A880722 |
| 486DX/33 | 486DX/33 processor | A880732 |
| 486DX2/50 | 486DX2/50 processor, heat sink | A880742 |
| 486DX2/66 | 486DX2/66 processor, heat sink | A880752 |

Options (continued)

| Option | Product | Product code |
|-----------------|---------------------------------------|--------------|
| Printers | | |
| 9-pin | Epson LX-810, narrow carriage | CO16231 |
| | ActionPrinter 2250, narrow carriage | C100011 |
| | FX-870, narrow carriage | C094001 |
| | FX-1170, wide carriage | C095001 |
| | DFX-5000, wide carriage | C112001 |
| | DFX-8000, wide carriage | C030001 |
| 24-pin | ActionPrinter 3250, narrow carriage | C092011 |
| | LQ-570, narrow carriage | C062001 |
| | LQ-860, narrow carriage | C035031 |
| | LQ-870, narrow carriage | C060021 |
| | LQ-1070, wide carriage | C063001 |
| | LQ-1170, wide carriage | C061021 |
| | LQ-2550, wide carriage | L752 |
| Lasers | EPL-8000 | C09001 |
| | ActionLaser 1000 | C108001 |
| | ActionLaser 1000 (2MB) | C108001-2 |
| | ActionLaser 1500 | C108101 |
| Ink jet | Stylus 800 Ink Jet Printer | CI06001 |
| Software | | |
| | Microsoft Windows 3.1, 3.5" diskettes | 300013500 |
| | Epson MS-DOS 6.0, 3.5" diskettes | A880382 |
| | Epson MS-DOS 5.0, 5.25" diskettes | A807162 |
| | Epson MS-DOS 5.0, 3.5" diskettes | A807172 |
| | Epson OS/2, version 2.0 | A807062 |

Hard Disk Drive Types

Hard disk drive types

| Type | Size* (MB) | Cylinders | Heads | Sectors/Track | Landing Zone | Write Precomp |
|------|------------|-----------|-------|---------------|--------------|---------------|
| 1 | 10 | 306 | 4 | 17 | 305 | 128 |
| 2 | 21 | 615 | 4 | 17 | 615 | 300 |
| 3 | 32 | 615 | 6 | 17 | 615 | 300 |
| 4 | 65 | 940 | 8 | 17 | 940 | 512 |
| 5 | 49 | 940 | 6 | 17 | 940 | 512 |
| 6 | 21 | 615 | 4 | 17 | 615 | None |
| 7 | 32 | 462 | 8 | 17 | 511 | 256 |
| 8 | 31 | 733 | 5 | 17 | 733 | None |
| 9 | 117 | 900 | 15 | 17 | 901 | None |
| 10 | 21 | 820 | 3 | 17 | 820 | None |
| 11 | 37 | 855 | 5 | 17 | 855 | None |
| 12 | 52 | 855 | 7 | 17 | 855 | None |
| 13 | 21 | 306 | 8 | 17 | 319 | 128 |
| 14 | 44 | 733 | 7 | 17 | 733 | None |
| 16 | 21 | 612 | 4 | 17 | 633 | 0 |
| 17 | 42 | 977 | 5 | 17 | 977 | 300 |
| 18 | 59 | 977 | 7 | 17 | 977 | None |
| 19 | 62 | 1024 | 7 | 17 | 1023 | 512 |
| 20 | 31 | 733 | 5 | 17 | 732 | 300 |
| 21 | 44 | 733 | 7 | 17 | 732 | 300 |
| 22 | 31 | 733 | 5 | 17 | 733 | 300 |
| 23 | 10 | 306 | 4 | 17 | 336 | 0 |
| 24 | 21 | 612 | 4 | 17 | 633 | 305 |
| 25 | 10 | 612 | 2 | 17 | 612 | 300 |

Hard disk drive types (continued)

| Type | Size* (MB) | cylinders | Heads | Sectors/ Track | Landing Zone | Write Precomp |
|------|---------------|-----------|-------|-------------------|-----------------|---------------|
| 26 | 21 | 614 | 4 | 17 | 614 | None |
| 27 | 42 | 820 | 6 | 17 | 820 | None |
| 28 | 42 | 977 | 5 | 17 | 977 | None |
| 29 | 336 | 1218 | 15 | 36 | 1218 | None |
| 30 | 159 | 1224 | 15 | 17 | 1224 | None |
| 31 | 71 | 823 | 10 | 17 | 823 | 512 |
| 32 | 42 | 809 | 6 | 17 | 809 | 128 |
| 33 | 50 | 830 | 7 | 17 | 830 | None |
| 34 | 72 | 830 | 10 | 17 | 830 | None |
| 35 | 44 | 1024 | 5 | 17 | 1024 | None |
| 36 | 71 | 1024 | 8 | 17 | 1024 | None |
| 37 | 42 | 615 | 8 | 17 | 615 | 128 |
| 38 | 109 | 1024 | 8 | 26 | 1024 | None |
| 39 | 72 | 925 | 9 | 17 | 925 | None |
| 40 | 80 | 1024 | 9 | 17 | 1023 | None |
| 41 | 119 | 918 | 15 | 17 | 917 | None |
| 42 | 133 | 1024 | 15 | 17 | 1023 | None |
| 43 | 143 | 823 | 10 | 34 | 822 | None |
| 44 | 84 | 969 | 5 | 34 | 968 | None |
| 45 | 118 | 969 | 7 | 34 | 968 | None |

* Actual formatted size may be slightly different than size on drive label; you cannot change this value.

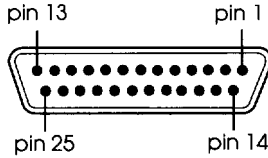
Epson-supplied hard disk drive types

| Epson drive options | Cyl | Hd | Pre | LZ | Sec | Size* (MB) |
|----------------------------|------------|-----------|------------|-----------|------------|-----------------------|
| 80MB (Conner CP30084E) | 903 | 4 | 0 | 902 | 4 6 | 8 1 |
| 120MB (Conner CP30104H) | 762 | 8 | 0 | 761 | 3 9 | 115 |
| 170MB (Conner CP30174E) | 903 | 8 | 0 | 902 | 4 6 | 162 |
| 170MB (Quantum ELS170AT) | 1011 | 15 | - 1 | 1010 | 2 2 | 170 |
| 240MB (Quantum LPS240AT) | 723 | 13 | - 1 | 722 | 5 1 | 234 |
| 250MB (Conner CP30254) | 895 | 10 | 0 | 894 | 5 5 | 254 |
| 340MB (Conner CP30344) | 655 | 16 | 0 | 654 | 6 3 | 343 |

Actual formatted size may be slightly different than size on drive label

Connector Pin Assignments

Parallel Port Connector (CN3)

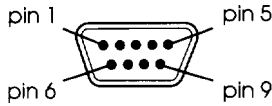


Parallel port connector pin assignments

| Pin | Signal | Pin | Signal | Pin | Signal |
|-----|--------|-----|---------------|-----|---------------|
| 1 | Storbe | 10 | ACK* | 19 | Signal ground |
| 2 | Data 0 | 11 | Busy | 20 | Signal ground |
| 3 | Data 1 | 12 | PE | 21 | Signal ground |
| 4 | Data 2 | 13 | Select | 22 | Signal ground |
| 5 | Data 3 | 14 | Auto* | 23 | Signal ground |
| 6 | Data 4 | 15 | Error* | 24 | Signal ground |
| 7 | Data 5 | 16 | Init* | 25 | Signal ground |
| 8 | Data 6 | 17 | Selectin* | | |
| 9 | Data 7 | 18 | Signal ground | | |

*Active low logic

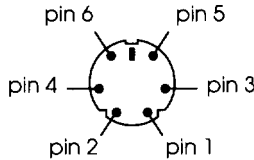
Serial Port Connectors (CN4 and CN5)



Serial port connector pin assignments

| Pin | Signal | Pin | Signal |
|-----|---------------------|-----|-----------------|
| 1 | Data carrier detect | 6 | Data set ready |
| 2 | Receive data | 7 | Request to send |
| 3 | Transmit data | 8 | Clear to send |
| 4 | Data terminal ready | 9 | Ring indicator |
| 5 | Ground | | |

Keyboard and Mouse Connectors (CN7 and CN6)

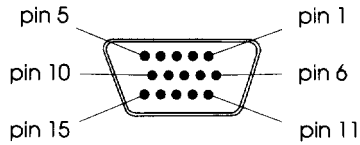


Although the keyboard and mouse connectors are physically identical, they cannot be used interchangeably.

Keyboard and mouse connector pin assignments

| Pin | Signal | Pin | Signal |
|-----|----------|-----|----------|
| 1 | Data | 4 | +5 VDC |
| 2 | Reserved | 5 | Clock |
| 3 | Ground | 6 | Reserved |

VGA Port Connector (CN2)



VGA port connector pin assignments

| Pin | Signal | Pin | Signal | Pin | Signal |
|-----|--------|-----|--------------|-----|-----------------|
| 1 | Red | 6 | red ground | 11 | N C |
| 2 | Green | 7 | Green ground | 12 | Monitor detect |
| 3 | Blue | 8 | Blue ground | 13 | Horizontal sync |
| 4 | N C | 9 | N C | 14 | Vertical sync |
| 5 | Ground | 10 | GND | 15 | N C |

DMA Assignments

DMA assignments

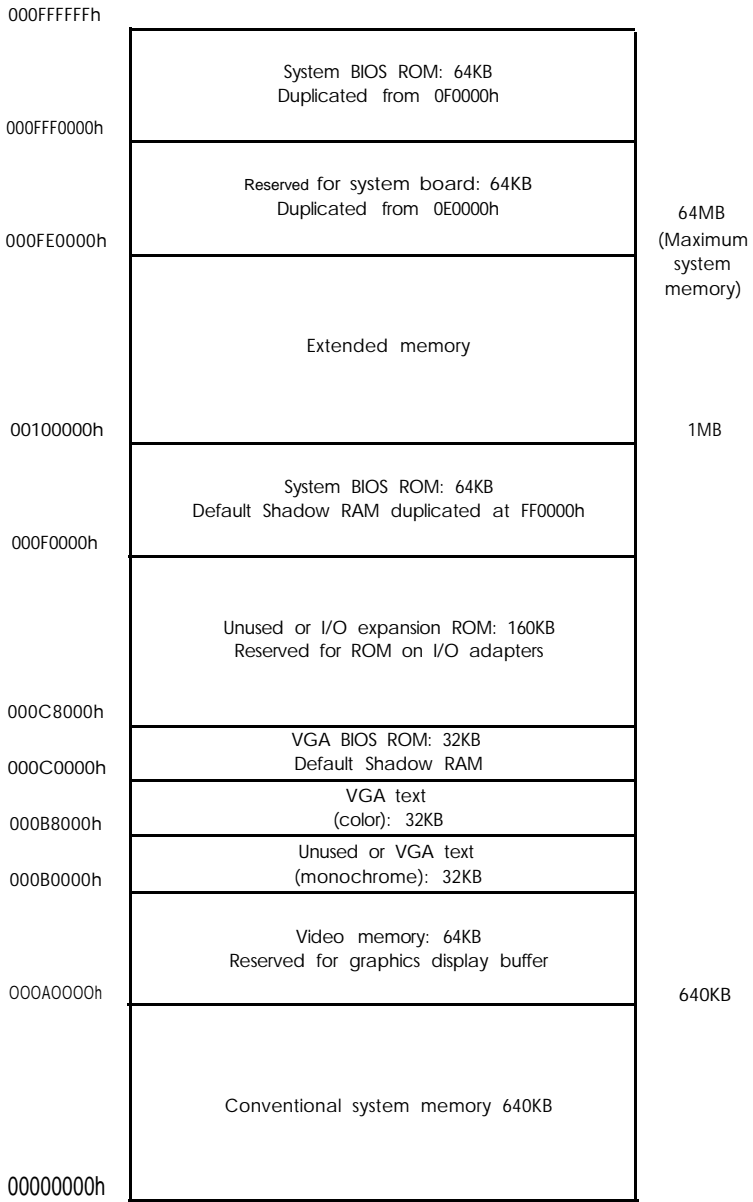
| level | Assigned device |
|-------|------------------------------|
| DMA0 | Reserved (8-bit) |
| DMA1 | Reserved (8-bit) |
| DMA2 | FDD controller (8-bit) |
| DMA3 | Reserved (8-bit) |
| DMA4 | Cascade for DMA controller 1 |
| DMA5 | Reserved (16-bit) |
| DMA6 | Reserved (16-bit) |
| DMA7 | Reserved (16-bit) |

Hardware In tempts

Hardware interrupts

| IRQ no. | Function |
|---------|-------------------------------|
| IRQ0 | Timer output |
| IRQ1 | Keyboard |
| IRQ2 | Cascade from IRQ controller 2 |
| IRQ3 | Serial port 2 |
| IRQ4 | Serial port 1 |
| IRQ5 | Parallel port 2 |
| IRQ6 | FDD controller |
| IRQ7 | Parallel port 1 |
| IRQ8 | Real-time clock |
| IRQ9 | Reserved |
| IRQ10 | Reserved |
| IRQ11 | Reserved |
| IRQ12 | PS/2 mouse |
| IRQ13 | Math coprocessor |
| IRQ14 | HDD controller |
| IRQ15 | Reserved |

System Memory Map



System I/O Address Map

System I/O address map

| Hex address | Assigned device |
|-------------------|---|
| 000-01F | DMA controller 1, 8237 |
| 020-03F | Interrupt controller 1, 8259, master |
| 022-024 | Chip set configuration register |
| 040-05F | timer, 8254 |
| 060-06F | Keyboard controller, 8042 |
| 070-07F (CMOS) | Real-time clock NMI (non-maskable interrupt) mask |
| 080-09F | DMA page register, 74LS612 |
| 0A0-0BF | Interrupt controller 2, 8259A |
| 0B4, 0BB | AD12 control register |
| 0BC | AD12 control register |
| 0C0-0DF | DMA controller 2, 8237 |
| 0F0 | Clear math coprocessor busy |
| 0F1 | Reset math coprocessor |
| 0F8-0FF | Math coprocessor |
| 1F0-1F8 | Hard disk |
| 200-207 | Game I/O |
| 278-27F | Parallel printer port 2 |
| 2B0-2DF | Alternate enhanced graphics adapter |
| 2E1 | GPIB (adapter 0) |
| 2E2, 2E3 | Data acquisition (adapter 0) |
| 2F8-2FF | Serial port 2 |
| 300-31F | Prototype card |
| 360-363 | PC network (low address) |
| 368-36B | PC network (high address) |

System I/O address map (continued)

| Hex address | Assigned device |
|-------------|--|
| 378-37F | Parallel printer port 1 |
| 380-38F | SDLC, bisynchronous 2 |
| 390-393 | Cluster |
| 3A0-3AF | SDLC, bisynchronous 1 |
| 3B0-3BF | Monochrome display and printer adapter |
| 3C0-3CF | Enhanced graphics adapter |
| 3D0-3DF | Color graphics monitor adapter |
| 3F0-3F7 | FDD controller |
| 3F8 - 3FF | Serial port 1 |
| 6E2, 6E3 | Data acquisition (adapter 1) |
| 790-793 | Cluster (adapter 1) |
| AE2, AE3 | Data acquisition (adapter 2) |
| B90, B93 | Cluster (adapter 2) |
| EE2, EE3 | Data acquisition (adapter 3) |
| 1390 -1393 | Cluster (adapter 3) |
| 22E1 | GPIB (adapter 1) |
| 2390 - 2393 | Cluster (adapter 4) |
| 43E1 | GPIB (adapter 2) |
| 62E1 | GPIB (adapter 3) |
| 82E1 | GPIB (adapter 4) |
| A2E1 | GPIB (adapter 5) |
| C2E1 | GPIB (adapter 6) |
| E2E1 | GPIB (adapter 7) |

Glossary

Access speed

The time it takes for a device, such as memory or a disk drive, to return data. For example, your computer's SIMMs return data requested by the microprocessor at an access speed of 70ns.

Address

The location where information is stored in a computer's memory.

AUTOEXEC.BAT file

The batch file your computer runs automatically whenever you load MS-DOS. It configures the installed system devices and sets various user preferences. See also Batch file.

Base memory

See Conventional memory.

Batch file

A file that executes commands automatically. Batch files are text files with the filename extension .BAT. When you type the filename, the operating system sequentially executes the commands in that file.

BIOS

Basic Input/Output System. Routines in ROM (Read Only Memory) that handle the transfer of information among various hardware components, and between the hardware and your operating system.

Boot

The process a computer performs to check its components and then load the operating system into memory.

Bus

A wire or group of wires that sends information between components in the computer. The speed of a bus increases by the number and width of the channels the bus uses to move data.

Cache

A high-speed memory buffer that stores frequently used data where your microprocessor can access it faster. Your computer includes 8KB of internal cache expandable to 256KB with external cache chips. See also *External cache* and *Internal cache*.

CMOS

Complementary Metal-Oxide Semiconductor. A low-power silicon chip used for RAM and switching applications that is backed up by a battery.

Conventional memory

The memory in the computer below 1MB that is available to MS-DOS and application programs-usually 640KB. Also called base memory or main memory.

Coprocessor

See *Math coprocessor*.

Copy-protected program

A program containing a software “lock” that prevents it from being copied. See also Key disk.

CPU

Central Processing Unit. The primary device that interprets instructions, performs tasks, keeps track of stored data, and controls input and output operations. See also *Microprocessor*.

Device driver

A file containing instructions that allow your computer to recognize and communicate with a device. The device may be a printer, monitor, or other type of device.

Display adapter card

A circuit board that controls the way a monitor displays text and graphics, normally installed in an option slot. Also called video card. This computer does not support optional display adapter cards. (A VGA display adapter is built into your computer's main system board.)

Expanded memory

Memory that specially written MS-DOS programs can use when an expanded memory manager program maps that memory into an accessible area.

Extended memory

Memory above 1MB that is accessed by 386 or 486 microprocessors when they are operating in protected or virtual mode. This memory is available to OS/2 programs, but is available to MS-DOS only if an extended memory manager program is installed. See also *Expanded memory*.

External cache

Optional cache chips you can install on the system board to increase cache memory.

IDE

Integrated Drive Electronics. A type of hard disk drive interface in which the controller is on the drive instead of on a controller card. Your computer includes an interface on the main system board for up to two IDE hard disk drives.

Internal cache

Cache memory built into your microprocessor. Your computer includes 8KB of internal cache.

Jumper

A small moveable plug that connects two pins on a device's circuit board. Jumpers alter the operation of a particular function.

Key disk

A diskette containing a copy-protected program that must remain in a diskette drive while you use the program. See also *Copy-protected program*.

Kilobyte (KB)

A unit used to measure storage space in a computer's memory or on a disk. One kilobyte equals 1024 bytes.

Local bus

An internal bus that controls the connections from the microprocessor to the VGA and IDE interfaces on this computer. Local bus provides increased performance and speed. See also *Bus*.

Main system board

The circuit board inside your computer containing the circuitry and components your computer needs to operate.

Math coprocessor

A device that enables the computer to process mathematical calculations faster by using floating point numbers instead of whole numbers.

Megabyte (MB)

A unit used to measure storage space in a computer's memory or on a disk. One megabyte equals 1024KB (kilobytes).

Megahertz (MHz)

A unit used to measure oscillation frequency, such as that of a computer's internal clock. A megahertz is one million cycles per second.

Memory module

A small circuit board, commonly called a SIMM (single inline memory module), that contains surface-mounted memory chips. You can add memory modules to the main system board to expand your computer's memory.

Microprocessor

A small CPU on one semiconductor chip. See also CPU.

Numeric keypad

The number and cursor control keys grouped together on the right side of the keyboard. The operation of the dual-use keys on the numeric keypad is controlled by the NumLock key.

Parallel

An interface that transmits data simultaneously over separate wires in a cable. See also *Serial*.

Pathname

The directory name(s) you specify to locate a file. For example, the pathname for the file SALES, stored in the subdirectory BUSINESS, is \BUSINESS\SALES.

Power-on diagnostics

Tests stored in a computer's ROM that the computer runs to check its internal circuitry, peripheral device configuration, and operating status each time you turn it on or reset it.

Processor speed

See *Operating speed*.

RAM

Random Access Memory. The area of the computer's memory used to run programs and store data while you work. All data in RAM is erased when you turn off or reset the computer.

Read/write head

The physical device inside a disk or tape drive that reads data from and writes data to the magnetic surface of the disk or tape.

Real-time clock

A clock inside the computer that keeps track of the time and date, even when the computer is turned off, by using power from a backup battery.

Refresh rate

The frequency with which a monitor can redraw a screen image. The faster the refresh rate, the less the screen will flicker.

Reset

To restart a computer without turning it off. You can reset your computer by pressing Ctrl Alt Del. Resetting erases all data stored in RAM and reloads your operating system.

ROM

Read Only Memory. Memory that can only be read and cannot be modified. ROM retains its contents even when you turn off the computer by using power from a backup battery.

Root directory

The main directory in a hierarchical disk directory structure. All other directories are subdirectories of the root directory.

RS-232C

A standard type of serial communication. You can connect an RS-232C device to either of the computer's RS-232C serial ports.

Serial

The type of communication that transmits data from a serial interface to a serial device over a single wire. See also *Parallel*.

Shadow RAM

The feature in your computer that copies the contents of the system, video, and external BIOS ROMs into the RAM area of memory to speed up processing.

SIMM

See *Memo y module*.

Subdirectory

In a hierarchical disk directory structure, a group of files in a directory within another directory or the root directory.

True Color

A VGA feature that supports 24-bit-per-pixel color, which enables your VGA interface to display 16.8 million colors. The screen image looks more like a photograph than a traditional computer image.

Vesa

Video Electronic Standards Association. The standards set for a common hardware and software interface to super VGA video adapters; provides simplified software application access to VGA products.

VGA

Video Graphics Array. A high-resolution display adapter that provides a variety of video modes. Your computer's built-in VGA controller supports resolutions up to 1280 x 1024 on a compatible monitor, depending on the amount of video RAM.

Video card

See *Display adapter card*.

Write-protect

To protect the data on a diskette from being changed by setting the write-protect switch on a 3.5-inch diskette or by placing a write-protect tab over the notch on a 5.25-inch diskette. You cannot change data on a write-protected diskette.

Zif socket

Zero Insertion Force. The type of socket on your system board that holds the microprocessor. With this type of socket, it is easy to remove and install processor chips.

ZIP chip

Zig-zag Inline Package. The type of optional video memory chip you can install on the system board. On this type of chip, the pins alternate in a zig-zag pattern rather than symmetrically.

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