

# EPSON

## User's Guide



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*The Energy Star emblem does not represent EPA endorsement of any product or service.*

# Important Safety Instructions

Read all of these instructions and save them for later reference. Follow all warnings and instructions marked on the computer.

- Unplug the computer before cleaning. Clean with a damp cloth only. Do not spill liquid on the computer.
- Do not place the computer on an unstable surface or near a radiator or heat register.
- Do not block or cover the openings in the computer's cabinet. Do not insert objects through the slots.
- Use only the type of power source indicated on the computer's label.
- Connect all equipment to properly grounded power outlets. Avoid using outlets on the same circuit as photocopiers or air control systems that regularly switch on and off.
- Do not let the computer's power cord become damaged or frayed.
- If you use an extension cord with the computer, make sure the total ampere rating of the devices plugged into the extension cord does not exceed the cord's ampere rating. Also, make sure the total of all devices plugged into the wall outlet does not exceed 15 amperes.
- Except as specifically explained in this User's *Guide*, do not attempt to service the computer yourself. Adjust only those controls that are covered by the operating instructions.
- Unplug the computer and refer servicing to qualified service personnel under the following conditions:

If the power cord or plug is damaged; if liquid has entered the computer; if the computer has been dropped or the cabinet damaged; if the computer does not operate normally or exhibits a distinct change in performance.

- If you plan to use the computer in Germany, observe the following:

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.

# Importantes instructions de sécurité

Lire attentivement les instructions suivantes et les conserver pour les consulter en cas de besoin. Observer soigneusement tous les avertissements et directives marqués sur l'ordinateur.

- Débrancher l'ordinateur avant de le nettoyer. N'utiliser qu'un chiffon humide. Veiller à ne pas renverser de liquides sur l'appareil.
- Ne pas placer l'ordinateur sur une surface instable ni près d'une source de chaleur.
- Ne pas bloquer ni couvrir les orifices d'aération de l'appareil. Ne pas introduire d'objets dans les ouvertures.
- Utiliser seulement le type de source d'alimentation électrique indiqué sur l'étiquette.
- Tout l'équipement doit être branché sur des prises de courant avec contact de terre. Ne jamais utiliser une prise sur le même circuit qu'un appareil à photocopies ou un système de contrôle de ventilation avec commutation marche-arrêt automatique.
- S'assurer que le cordon d'alimentation de l'ordinateur n'est pas abîmé ni effiloché.
- Dans le cas où on utilise un cordon de rallonge avec l'ordinateur, s'assurer que l'intensité en ampères requise pour tous les appareils branchés sur ce cordon ne soit pas supérieure à la capacité du cordon. S'assurer aussi que cette intensité ne dépasse jamais la somme de 15 ampères pour l'ensemble des appareils.
- Sauf dans les cas spécifiques expliqués dans ce manuel de l'utilisateur, ne pas essayer d'entretenir ou de réparer l'ordinateur soi-même. N'ajuster que les commandes décrites dans les directives.
- Débrancher l'ordinateur et contacter un technicien qualifié dans les circonstances suivantes:  
Si le cordon ou la prise sont abîmés; si un liquide a pénétré à l'intérieur de l'appareil; si on a laissé tomber l'appareil ou si le boîtier est endommagé; si l'ordinateur ne fonctionne pas normalement ou fonctionne d'une manière très différente de l'ordinaire.
- Pour utiliser l'ordinateur en Allemagne, il est nécessaire que le bâtiment soit muni d'un disjoncteur de 16 ampères pour protéger l'ordinateur contre les courts-circuits et le survolage.

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# Introduction

Your EPSON® computer provides powerful system performance and offers a wide range of enhancement options. System features include:

- Choice of microprocessor: Intel® or Cyrix® 486SX/ 25 or /33; DX/ 33, /40, or /50; DX2/ 50 or /66; SX2/50; DX4/ 75 or / 100, or Pentium™OverDrive™
- Energy Star compliant, low-power standby mode for the hard disk drive and video display
- 4MB or 8MB of internal memory, expandable to 64MB
- System and video BIOS shadow RAM
- 8KB of internal cache integrated into the microprocessor and support for up to 256KB of optional external cache memory on the main system board
- Integrated high-speed, local bus SVGA video interface
- 512KB (expandable to 1MB) or 1MB of on-board video memory
- Video resolutions up to 1280 x 1024 in 16 colors (with 1MB of VRAM)
- True Color™ support in the 640 x 480 resolution with 1MB of VRAM
- Two built-in serial ports and one built-in bi-directional parallel port
- One built-in PS/2™ compatible keyboard port and one built-in PS/ 2 compatible mouse port

- ❑ Five 16-bit, ISA-compatible option slots: three full-length, and two half-length
- ❑ Space for up to four mass storage devices (three externally accessible and one internal)
- ❑ On-board support for up to two IDE hard disk drives and two diskette drives (or one diskette drive and one tape drive)
- ❑ Math coprocessor integrated into the DX, DX2, and Pentium microprocessors
- ❑ Real-time clock and calendar on main system board with built-in rechargeable battery backup.

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 allows your system to speed up processing by moving the system and video BIOS into the RAM area of memory.

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## **Video**

The local bus SVGA video interface provides data transfer at the full speed of the processor, rather than at the standard 8.33 MHz ISA bus speed.

With 512KB of video RAM, the SVGA controller supports standard resolutions up to 640 x 480 in 16 colors and extended resolutions up to 640 x 480 in 256 colors or 1024 x 768 in 16 colors (interlaced and non-interlaced). With 1MB of VRAM, it supports extended resolutions up to 1280 x 1024 in 16 colors.

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## ***Energy Savings***

In standard configurations, this computer complies with the United States Environmental Protection Agency's Energy Star Program, which promotes the manufacture of energy-efficient printers, computers, and monitors. Your computer's "Green PC" feature places the hard disk drive in a low-power standby mode when the mouse and keyboard have been inactive for a specified period of time. It also stops sending video signals to your monitor.

### **Note**

If you have an Energy Star compliant monitor, it also goes into a low-power standby mode because it isn't receiving video signals from your computer. (Screens on non-compliant monitors go blank, but do not enter a low-power standby mode.)

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## ***VGA Drivers***

Your computer comes with VGA drivers and utilities for use with the integrated video interface. With these drivers, you can take advantage of the extended VGA features such as higher resolutions and 132-column text mode when you run popular applications. If your system was configured for you, these drivers and utilities may be installed on your hard disk. If you need to install them yourself, see the instructions in Chapter 1. To obtain drivers for additional applications, call the EPSON Connection<sup>SM</sup> or access the Epson America Forum on CompuServe®.

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## ***Optional Equipment***

You can easily upgrade your computer by installing additional memory and a wide variety of options, as described in Chapters 3 and 4.

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

***Video Memory*** You can increase the video memory in your system to 1MB, which allows you to use higher resolutions with more colors.

***CPU*** Your system supports a variety of microprocessors, including 5 Volt, 3.3 Volt, 3.45 Volt, and 3.6 Volt processors; see Chapter 3 for more information.

***Cache*** You can increase the external cache memory size to 64KB, 128KB, or 256KB by installing cache SRAM chips on the main system board, allowing you to access data faster and improve overall system performance.

***Drives*** Your system supports up to four mass storage devices, including hard disk drives, diskette drives, a tape drive, a CD-ROM drive, or an optical drive.



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## ***How to Use This Manual***

You do not have to read everything in this manual; check the following chapter summaries.

**Chapter 1** provides simple instructions for setting up your system and for turning it on and off. It also describes running the SETUP program to define your computer's configuration.

**Chapter 2** covers general operating procedures, resetting the computer, using the Green PC features, and changing the processor speed.

**Chapter 3** describes how to remove and replace the computer's cover, change jumper settings, and install optional equipment such as option cards and memory modules.

**Chapter 4** explains how to install and remove drives

**Chapter 5** contains troubleshooting tips.

**Appendix A** lists the specifications of your computer.

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

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## ***Where to Get Help***

If you purchased your computer in the United States or Canada, EPSON provides customer support and service through a network of Authorized EPSON Customer Care Centers. EPSON also provides support services through the EPSON Connection. In the United States, dial (800) 922-8911. In Canada, dial (800) **GO-EPSON**.

Call the EPSON Connection for the following:

- Technical assistance with the installation, configuration, and operation of EPSON products
- Assistance in locating your nearest Authorized EPSON Reseller or Customer Care Center
- Customer Relations
- EPSON technical information library fax service
- Product literature on current and new products.

You can purchase accessories, manuals, or parts for EPSON products from EPSON Accessories at (800) 873-7766 (U.S. sales only). In Canada, call (800) **GO-EPSON** for sales locations.

When you call for technical assistance, be ready to identify your system and its configuration, and provide any error messages to the support staff. See Chapter 5 for more information.

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

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

## ***CompuServe On-line Support***

If you have a modem, the fastest way to access helpful tips, specifications, drivers, application notes, tables for DIP switch or jumper settings, and bulletins for EPSON products is through the Epson America Forum on CompuServe.

If you are not currently a member of CompuServe, you are eligible for a free introductory membership as an owner of an EPSON product. This membership entitles you to:

- An introductory \$15 credit on CompuServe
- Your own user ID and password
- A complimentary subscription to *CompuServeMagazine*, CompuServe's monthly publication.

To take advantage of this offer, call (800) 848-8199 in the United States and Canada and ask for representative #529. In other countries, call the following U.S. telephone number: **(614) 529-1611** or your local CompuServe access number.

If you are already a CompuServe member, simply type **GO EPSON** at the menu prompt to reach the Epson America Forum.

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## Chapter 1

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# Setting Up Your System

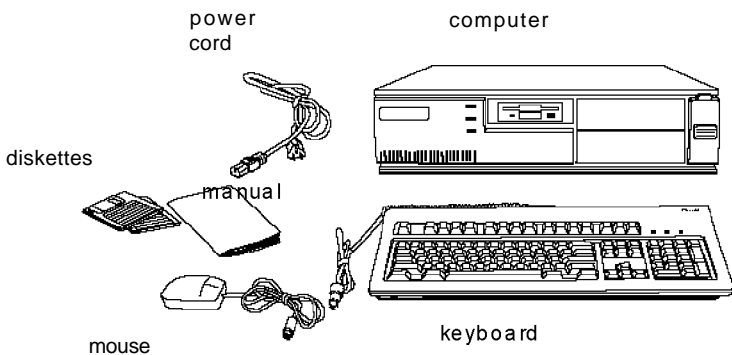
This chapter briefly describes how to set up your computer. It includes the following information:

- Unpacking your computer
- Setting the voltage selector switch
- Connecting system components
- Turning the computer on and off
- Running the SETUP program
- Post-SETUP procedures.

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## Unpacking Your Computer

When you unpack your system, make sure you have the items shown below.





If you purchased any optional equipment that goes inside the computer—such as option cards, memory modules, or drives—you should install these devices before you connect your computer. See Chapters 3 and 4 for instructions.

---

## ***Setting the Voltage Selector Switch***

Your system is powered by a 200 Watt power supply. The power supply voltage is controlled by a voltage selector switch on the computer's back panel. You can set this switch to 110 VAC or 220 VAC.

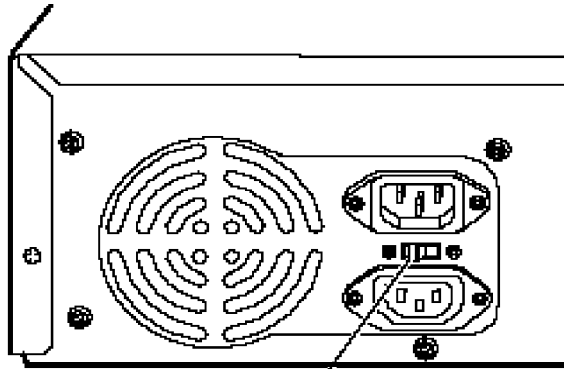
EPSON ships the computer with the voltage selector switch set to 110 VAC. This setting is appropriate for line source voltages between 100 and 120 VAC, and is generally the appropriate setting to select if you plan to use your computer in North America, South America, or Japan.

If you plan to operate the computer in the United Kingdom, Europe, or some South American countries, you will probably need to reset the voltage selector switch to 220 VAC. Doing so allows your computer to handle line source voltages between 200 and 240 VAC, which are standard in Europe.

**Caution**

Before you turn on the power to your system, make sure the voltage selector is set to the appropriate setting for the electrical power source in your location or you will seriously damage your system.

To change the voltage selector switch setting, slide the switch to the right to select 220 VAC or to the left to select 110 VAC.

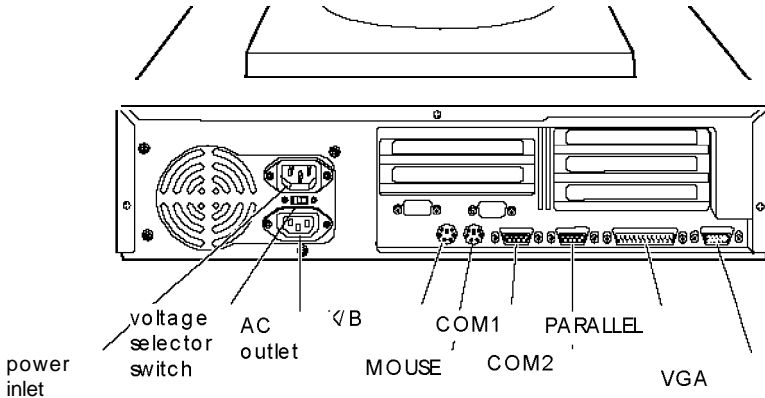


voltage selector switch

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## Connecting System Components

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



### 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.

Your computer also includes two removable panels above the mouse and keyboard ports providing access to a game port on the main system board and to one on an option card, if you installed one. You can enable the main system board game port via a jumper; see Chapter 3.

---

## ***Connecting the Power Cord***

Follow these steps to connect the power cord:

1. Plug the power cord into the power inlet on the back panel 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 an appropriate grounded electrical outlet.

After you connect the components of your system, you are ready to turn on the power.

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## ***Turning Your System On and Off***

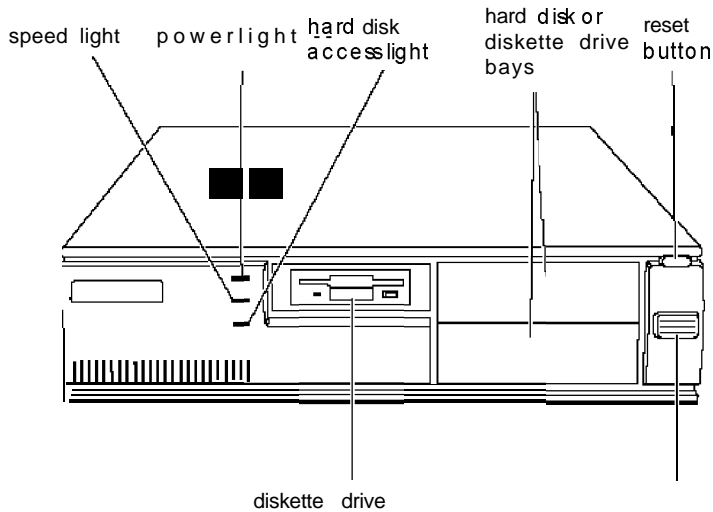
Before you turn on your system, be sure to read the Important Safety Instructions at the beginning of this manual.

### **Caution**

If there is a protective card in a diskette drive, remove it now or you may damage your drive.

First turn on the monitor, printer, and any other external devices connected to the computer.

Then turn on the computer by pressing the power button located on the right side of the front panel, as shown below.



The power indicator lights up. After a few seconds, the computer performs its power-on diagnostics. This is a series of everything is working correctly.

If necessary, use the controls on your monitor to adjust the on the screen.

Whenever you turn off your system, be sure to save your data the hard disk drive light and the diskette drive light(s) to make sure they are not on. Press the power button to turn off the peripheral devices.

Now follow the instructions below to configure your system

---

## ***Running the SETUP Program***

Be sure to run SETUP the first time you use your computer, so you can verify or update the configuration information. You also may need to run SETUP again later if you change your configuration.

SETUP lets you verify or change the following:

- System settings such as date, time, diskette drive type(s), and video display type
- Automatic or manual selection of hard disk drive(s)
- Automatic or manual selection of advanced hardware features for optimizing system performance
- System booting options
- Password security and anti-virus features
- Green PC options, such as the time intervals before the system and the hard disk drive go into low-power standby mode.

SETUP also allows you to see summary information about your system.

The SETUP program and the factory default settings are stored in the computer's ROM BIOS (read-only memory, basic input/ output system). The configuration information you enter 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

When you start your computer, it performs some power-on diagnostics. During these diagnostics, you may see the following message:

Press <F2> to enter **SETUP**

(In SETUP, you can disable this message, if desired.)

Press F2 to run SETUP. This message is only on the screen for a few seconds. If you missed it, restart the computer and try again.

If the system detects an error in your configuration, you hear two beeps and see an error message followed by this message:

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

**Press F2 to run SETUP.**

SETUP displays the Main Menu. From this menu, you can select the various options to identify your system's configuration and then save your new values to CMOS. If you change your mind, you can cancel 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
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

### *SETUP function keys (continued)*

<i>Key</i>	<b>Function</b>
F5 or -	Selects the previous value
F6 or + or Spacebar	Selects the next value
F9	Loads 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
Esc or Alt X	Returns to the previous screen

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

## ***The System Setup Option***

From the System Setup screen, you can set the options described below.

### ***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, you should not need to change them, unless you adjust the time for daylight savings or a different time zone. (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 display adapter you are using. If you connected your monitor to the computer's built-in VGA port, select EGA/VGA.



If you connected a monitor that doesn't support VGA to a video adapter card installed in your system, select either the CGA 80 X 25 or the Monochrome option. Also make sure you disabled the on board VGA controller by setting jumpers J14 and J15 to the Off position. (See Chapter 3 for instructions.)

### ***Checking system memory***

When you boot your system, the system BIOS detects 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 that the SIMM(s) are securely seated in their sockets. (See Chapter 3 to locate the SIMM sockets.)

### ***Setting the diskette drive type(s)***

On your system, diskette drive A is the 3.5-inch high-density drive installed in your computer. 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***

The options on the Fixed Disk Setup screen define the types of hard disk drives you installed in your system. From this screen, select Fixed Disk 0 Control or Fixed Disk 1 Control.

Your computer comes with a hard disk auto-sensing feature. 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, check Appendix A to see if your drive's parameters are included in the hard disk drive table. If not, 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. To define your own drive type, follow these steps:

1. Move the cursor to Type and select User.
2. Type the values in each field that are appropriate for your hard disk drive.
3. When you exit SETUP, make sure you save your changes.

### ***The Advanced System Setup Option***

When you select this option from the Main Menu, you see the Advanced System Setup screen, which contains the options described below.

Your system can automatically configure the Advanced System Setup options for you. To avoid configuration problems, you should let the system configure these options. However, if you connected a scanner or a parallel port network adapter to your parallel port, be sure to select Advanced Chipset Control so you can change the operation of the parallel port to PS2 mode (for bidirectional operation). See page 1-13 for more information.

## **Configuring cache memory**

The system can configure your Memory Cache options or you can manually set them. If you installed external cache, enabling cache memory improves system performance, especially in large data retrieval and processing environments.

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

## **Configuring memory shadow**

The system can configure the Memory Shadow options or you can manually set them. You can enable or disable shadowing of your system and video memory and control the specific blocks of ROM used for this purpose.

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, providing 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 blocks, the ROM located in these blocks is copied to the shadow area.

## **Configuring chipset registers**

The system can set your Advanced Chipset Control options or you can manually change the values in the chipset registers. Setting these values correctly increases your system performance; however, setting them 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.

However, if you connected a scanner or a parallel port network adapter to your parallel port, you should set Auto Configuration to Disabled so you can change the Printer Port Control option to PS2 mode (for bidirectional operation). The default setting for the parallel port is AT mode (for unidirectional operation).

## **Setting the Boot Options**

When you select Boot Options from the Main Menu, you see the Boot Options screen, which contains the options described below.

### **Selecting the drive boot sequence**

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 first tries to load the operating system from drive A. If drive A doesn't contain an operating system, the computer loads it 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.

## ***Setting the floppy seek option***

If you set the **Disk drive boot sequence option to C: only**, you can disable the **Floppy seek option so the system does not try to access the diskette drive at startup**. Disabling the **Floppy seek option decreases the time needed to boot the system**.

## ***Disabling the SETUP prompt***

The **Display SETUP prompt during POST option allows you to disable the message Press <F2> to enter SETUP that you see during power-on diagnostics**. You may want to disable this prompt to prevent unauthorized users from seeing the SETUP prompt. Even when the message is disabled, however, you can still start SETUP by pressing F2 within the allowed amount of time.

## ***Disabling power-on diagnostic error messages***

The **Pause on POST errors option allows you to disable the error message and the message Press <F1> to resume, <F2> to Setup that you see when the system identifies a configuration error**. If you disable this option, the system ignores configuration errors it finds during power-on diagnostics and starts as it normally would. It's a good idea to keep this option enabled.

## ***Disabling the system summary screen***

By disabling the **System summary screen at boot option**, you can disable the system summary screen that you see when you start the system. If you disable this option, your system starts up faster. You can see the same screen by selecting the System Summary option from the Main Menu. (See page 1-19.)

## ***The System Security and Anti-Virus Options***

When you select the Security and Anti-Virus option from the Main Menu, you see the System Security and Anti-Virus screen, which contains the options described below.

### ***Entering or changing a password***

You can define both User and Supervisor password levels for this system. If the system will be used by more than one person, you may want to set a Supervisor password for yourself and a User password for others you don't want to have complete access to the system. For instance, you may want to restrict access to the diskette drives or the computer's virus protection features.

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 this option but you have defined passwords, you must enter the password each time you start the SETUP program. If both a Supervisor and User password are enabled, SETUP displays options for setting the User password only for users who logged on with a user password.

To specify a User password, you must first specify a Supervisor password. Follow these steps to enter or change a Supervisor password:

1. Select the Set Supervisor Password option and press **Enter**.
2. You see a Set Supervisor Password window. Type the password you want to use, then press **Enter**. You can define a password of up to eight characters.
3. Type the same password a second time and press **Enter**. You see a message that your changes have been saved.

4. Press the spacebar. The Supervisor Password IS option is now set to Enabled.

To set a User password, select the Set User Password option and follow the steps above.

### ***Deleting passwords***

To delete your passwords, follow these steps:

1. Set the Password on boot option to Disabled.
2. Delete the User password by pressing **Enter** for both the password field and the confirmation field. Don't type any characters in these fields.
3. Then delete the Supervisor password the same way.

#### **Note**

You must delete the User password before SETUP will allow you to access the Supervisor password.

If you have forgotten your password(s), see “Password Problems” in Chapter 5.

### ***Using the virus protection features***

Several options on the Security and Anti-Virus screen allow you to define system protection features.

The Diskette Access option allows you to restrict access to your diskette drives based on the password levels you have defined. This prevents unauthorized users from accessing the drives and possibly introducing a virus to your system. You can restrict diskette access only if passwords are enabled and you have enabled the Password on boot option.

If you select Supervisor for this option, you can access the diskette drives only if you enter the Supervisor password when you start your system. Someone who starts the system with a

she tries to access the diskette drive. If you select User for the Diskette Access option, you can access the diskette

### **Note**

To use passwords for diskette drive access, you must enable the Password on boot option. If you select a password level for Diskette Access but leave the Password on boot option disabled, you see an error message whenever you try to access your diskette drive.

You can also protect your system by selecting Write protect for the Fixed disk boot sector option. When this option is enabled, the system displays an error message when a program tries to write to the boot sector of your hard disk drive. To use a legitimate program (such as the MS-DOS@ FORMAT command) you must disable the write protect option.

Two additional options on this screen allow you to define time intervals for the system to display a prompt asking whether you have performed your scheduled virus check or your scheduled backup for your hard disk drive. You can disable these prompts or have them display Daily, Weekly, or Monthly. If you respond that you have not performed these functions, however, the system still starts normally.



## Using the Green PC Features

The Green PC options allow you to define how the energy-saving features of this Energy Star compliant system will work for you. The options on the Green PC Features screen allow you to disable the energy-saving feature or set time-out periods to put the system and hard disk drive in a low-energy standby mode.

The Inactivity Timer 1 option sets the time-out period for video signals to your monitor. When the mouse or keyboard has been inactive for the time period you select here, your computer stops sending video signals to your monitor. If your monitor is also Energy Star compliant, it goes into a low-power standby mode because it isn't receiving video signals from your computer. Screens on monitors that aren't Energy Star compliant will go blank when your system is in standby mode.

If you select a time period for the Lockout Timer as well as the Inactivity Timer 1 option, the system won't accept your keyboard input for the specified period of time after your system has returned to an active mode. This allows time for your monitor to return to full power also.

The Fixed Disk Timeout option determines the time-out period for your hard disk drive. The hard disk drive goes into a low-power standby mode when the mouse and keyboard have been inactive for the period of time you've indicated.

### Note

Some hard disk drives do not support a low-power standby mode. Also, the delay caused by the hard disk drive returning to active mode may cause errors in some applications. If you have problems, you may want to disable the Fixed Disk Timeout option.

## ***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. You can choose not to have the system display this screen so system startup is faster. See page 1-14 for information on disabling this option

## ***Exiting SETUP***

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

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

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

## **Post-SETUP Procedures**

After you run SETUP for the first time, you may need to install the operating system if your computer is not preconfigured. 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. (If your computer was configured for you, these drivers are already installed.) The README files on Drivers Diskettes 1 and 2 provide instructions for installing and using the drivers.

To read the file on your screen, insert Drivers Diskette 1 in drive A, type the following, and press **Enter**:

```
A : \README
```

To print the file to your printer, type the following and press **Enter**:

```
A : \README.P
```

Use the same commands to read or print the README file on Drivers Diskette 2.

### **Note**

If you plan to install video drivers for Microsoft® Windows™ applications, you must install Windows before you install the drivers.

## Chapter 2

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# Using Your Computer

This chapter briefly describes the following operations:

- Working comfortably
- Stopping a command or program
- Resetting the computer
- Using energy wisely
- Using the Green PC features
- Changing the processor speed

---

## Working Comfortably

This section provides some tips for creating a comfortable work environment.

- Use good posture. Keep your elbows, hips, and knees bent at approximately 90 degree angles and keep your wrists as close to horizontal as possible.
- Vary your posture often and take frequent breaks. Stand up, stretch, and move around.
- Use a good chair. Make sure your chair supports your lower back. A chair with padded armrests lets you rest your arms as you work.

- If you use a copy stand, keep it at the same eye level as your screen. This reduces eye and neck strain. Also, rest your eyes occasionally by closing them or focusing on a fixed spot in the distance.
- Be gentle with your keyboard. Too much force creates tension in your hands. Also, make sure your work surface has enough room for you to move the mouse or other pointing device freely.
- Use good lighting that isn't too bright. Try to keep bright light sources out of your field of vision when you are looking at the screen.
- Place your monitor directly in front of you and sit about an arm's length away from it. The top of the screen should be slightly below your eye level so you look down at the screen. Position the monitor so that no light is reflected from the screen.

---

## ***Stopping a Command or Program***

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

- Press **Pause**
- Press **Ctrl C**
- Press **Ctrl 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 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 normally. If you reset the computer without properly exiting a program, you may lose data.

Also do not remove a diskette or reset or turn off the computer while a diskette drive light is on. You could lose data. Be sure to remove all diskettes before you turn off the computer.

To reset the computer, press **Ctrl Alt Del**. The screen displays nothing for a moment and then the computer reloads your operating system.

You can also press the **RESET** button located in the upper right corner on the front of your computer.

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 system diskette in drive A. Then turn on the computer.

---

## ***Using Energy Wisely***

By purchasing this low-power, Energy Star compliant computer, you join a growing number of users concerned about conserving energy. Here are a few additional tips you can use to be even more energy-wise:

- If your printer and monitor aren't Energy Star compliant, turn them off when you're not using them.
- Use your software's print preview option (if available) before you print something. You'll be able to catch formatting errors before you commit them to paper.
- If you have an electronic mail system available to you, send E-mail rather than memos. Not only is this faster, but you'll save paper and storage space too.
- Use recycled paper whenever you can

---

## ***Using Your Green PC Features***

Your computer places the system, the hard disk drive, or both into a low-power standby mode when the keyboard or mouse has been inactive for the time periods you select in SETUP. See Chapter 1 for information on setting these values.

When your system is in standby mode, the Num Lock light on your keyboard flashes and your screen is blank. Press any key or move the mouse to resume activity.

If the hard disk drive is in standby mode, it doesn't return to active mode until you access it. You'll hear it start again. It will take a second or two to reach its operating speed and read or write to the disk. The hard disk drive access light turns on when the system begins accessing the disk.

### **Note**

Some hard disk drives do not support a low-power standby mode. Also, the delay caused by the hard disk drive returning to active mode may cause errors in some applications. If you have problems, you may want to disable the standby mode for the hard disk drive.

---

## ***Changing the Processor Speed***

Your computer's processor can operate at two speeds: fast or slow (8 MHz). The slow speed is available to provide compatibility with older application programs, such as those that require you to leave a key disk—the diskette that contains the copy protection—in the diskette drive.

When your computer is operating at fast speed, the SPEED 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 application software manual to determine if this is the case.

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, press **Ctrl Alt --**. (Press the --key on the numeric keypad.)
- To select fast speed, press **Ctrl Alt +**.

The speed setting remains in effect until you reset your computer or turn it off.



**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.

## Chapter 3

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# ***Installing and Removing Options***

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

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 memory modules
- Installing and removing option cards
- Adding video memory
- Adding cache memory
- Upgrading the microprocessor.

### **Caution**

Never install options or change jumper settings with the computer turned on or the power cord connected to the computer.

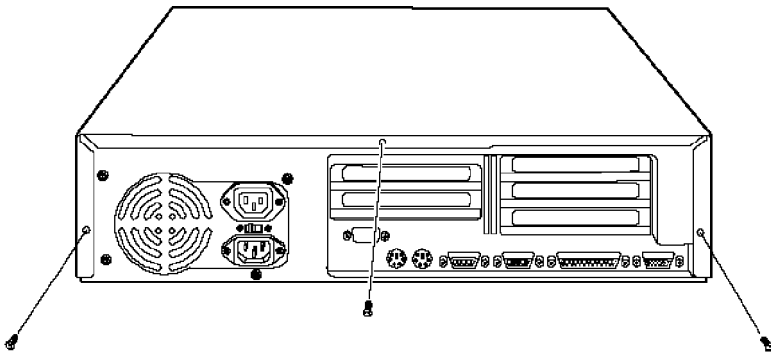
Once you have installed your option, see "Post-installation Procedures" on page 3-26.

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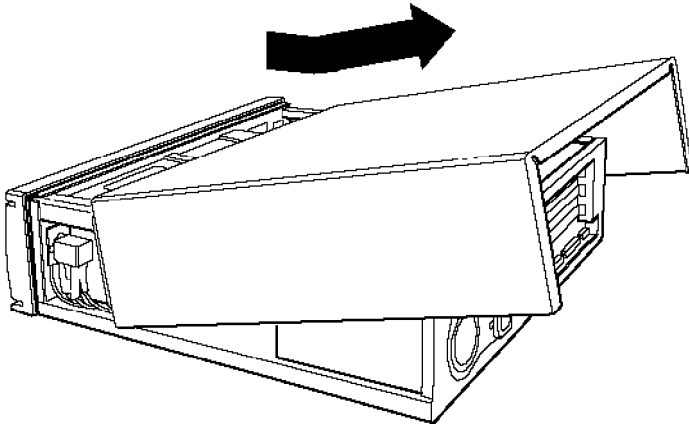
## ***Removing the Cover***

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 (described in Chapter 4). Follow these steps to remove the cover:

1. Turn off the computer and then any external devices
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 cover to the back panel, as shown below.



6. Grasping the sides of the cover, lift it up at an angle and pull it off, 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.

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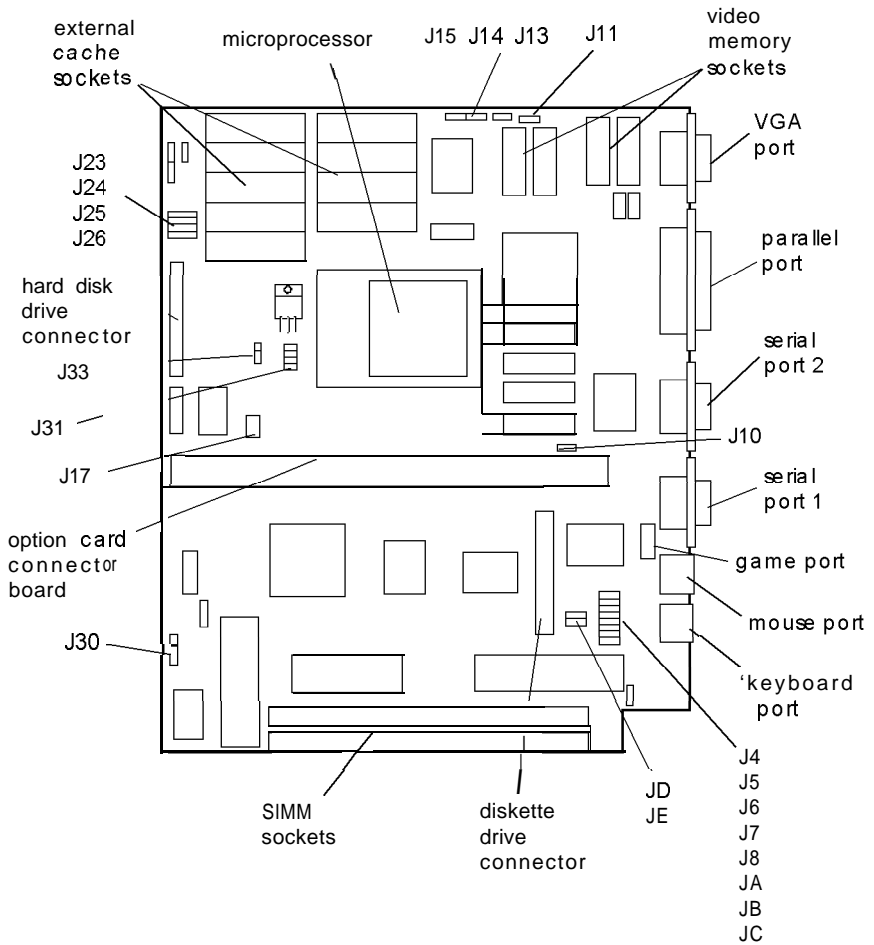
## ***Replacing the Cover***

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 lip at the front of the cover between the front bezel and the computer case and guide it straight down. (See the illustration on page 3-3.)
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 following illustration to locate the major components on your system board.



---

## Changing the Jumper Settings

The jumpers on the main system board control certain functions and are preset at the factory to default positions; however, you can use the information in the following tables to change their settings, if necessary.

### *Miscellaneous jumper settings*

Jumper number	Jumper setting	Function
JA	1-2 * 2-3	Enables LPT (parallel port) Disables LPT (parallel port)
JB **	1-2 * 2-3	Enables HDC (IDE hard disk drive controller) Disables HDC (IDE hard disk drive controller)
JC	1-2* 2-3	Enables COMA (serial port 1) Disables COMA (serial port 1)
JD	1-2 * 2-3	Enables COMB (serial port 2) Disables COMB (serial port 2)
JE **	1-2* 2-3	Enables HDC (IDE hard disk drive controller) Disables HDC (IDE hard disk drive controller)
J4	1-2 2-3 *	Enables game port (J1) Disables game port (J1)
J5	1-2* 2-3	Assigns the parallel port as LPT1 (378h-37Fh) Assigns the parallel port as LPT2 (278h-27Fh)
J6	1-2* 2-3	Assigns serial port 1 as COM1 (3F8h-3FFh) Assigns serial port 1 as COM3 (3E8h-3EFh)
J7	1-2 * 2-3	Assigns serial port 2 as COM2 (2F8h-2FFh) Assigns serial port 2 as COM4 (2E8h-2EFh)
J8	1-2 * 2-3	Enables the diskette drive controller Disables the diskette drive controller
J10	On * Off	Enable VGA interrupt Disable VGA interrupt
J17 ***	1-2  3-4 1-2,3-4 5-6	Microprocessor installed runs at 33 MHz or 66 MHz or a multiple of these (486SX/33, 486DX/33, 486DX2/66, DX4/100, or Pentium) Microprocessor installed is a 486DX/50 Microprocessor installed is a DX/40 Microprocessor installed runs at 25 MHz or 50 MHz or a multiple of these (486SX/25, 486DX2/50, DX4/75, or SX2/50)

### *Miscellaneous jumper settings (continued)*

Jumper number	Jumper setting	Function
J30	1-4 2-3 * 3-4	Selects external battery Selects the system board battery Discharges CMOS memory (this resets the SETUP values to their factory defaults)

\* Factory setting

\*\* Jumpers JB and JE must be set to the same position to enable or disable the hard disk drive controller

\*\*\* Default setting depends on the type of factory-installed microprocessor

### *Microprocessor type jumper settings*

Microprocessor type installed	J11 *	J13 *
486DX, 486DX2, or DX4	1-2	1-2, 3-4
486SX	Off	2-3
487SX or Pentium OverDrive	2-3	1-2, 3-4
SX2/50	1-2 or Off	2-3

\* Default setting depends on the type of factory-installed microprocessor

### *Microprocessor voltage jumper settings (1)*

Microprocessor voltage	J31	J33 (3)
5 Volt	1-2 and 3-4 (2)	—
3.3 or 3.45 Volt	5-6 and 7-8	1-2
3.6 Volt	5-6 and 7-8	2-3

(1) To determine the voltage of your microprocessor, see page 3-23.

(2) Default setting

(3) The setting of J33 does not matter if you are using a 5 Volt microprocessor

### *Built-in VGA controller jumper settings*

Function	J14	J15
Enable built-in VGA controller	On *	On *
Disable built-in VGA controller	Off	Off

\* Default setting



### Note

To use an external display adapter in an expansion slot, you must disable the built-in VGA adapter.

### *External cache size jumper settings*

External cache size *	J23	J24	J25	J26
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, the setting of these jumpers does not matter

The jumpers listed in the preceding tables are the only ones you may need to change; others are for service purposes only.

## **Setting the Jumpers**

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

1. Refer to the illustration on page 3-5 to locate the jumpers.
2. If the jumper you need to change is blocked by any option cards installed in your computer, you need to remove the card(s) to access the jumpers. See page 3-17.
3. 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 surrounding components on the main system board.

4. Replace any option cards you removed; see page 3-14.

---

## ***Installing Memory Modules***

Your computer comes with 4MB or 8MB of memory on memory modules-also called SIMMs (single in line memory modules). 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 SIMM. You can use 1MB, 2MB, 4MB, 8MB, 16MB, and 32MB SIMMs.

The following table shows the possible SIMM configurations; do not install memory in any other configuration. The labels on the system board identify the sockets (Bank 0 and Bank 1) where you should install SIMMs.

### *SIMM configurations*

<b>Bank 0</b>	<b>Bank 1</b>	<b>Total memory</b>
1MB	—	1MB
1MB	1MB	2MB
2MB	—	2MB
2MB	1MB	3MB
1MB	2MB	3MB
4MB	—	4MB
4MB	1MB	5MB
4MB	2MB	6MB
4MB	4MB	8MB
8MB	-	8MB
8MB	1MB	9MB

*SIMM configurations (continued)*

<b>Bank 0</b>	<b>Bank 1</b>	<b>Total memory</b>
8MB	2MB	10MB
8MB	4MB	12MB
8MB	8MB	16MB
16MB	—	16MB
16MB	1MB	17MB
16MB	2MB	18MB
16MB	4MB	20MB
16MB	8MB	24MB
16MB	16MB	32MB
32MB	—	32MB
32MB	1MB	33MB
32MB	2MB	34MB
32MB	4MB	36MB
32MB	8MB	40MB
32MB	16MB	48MB
16MB	32MB	48MB
32MB	32MB	64MB

Before you install SIMMs, check the following guidelines to ensure that they will work properly:

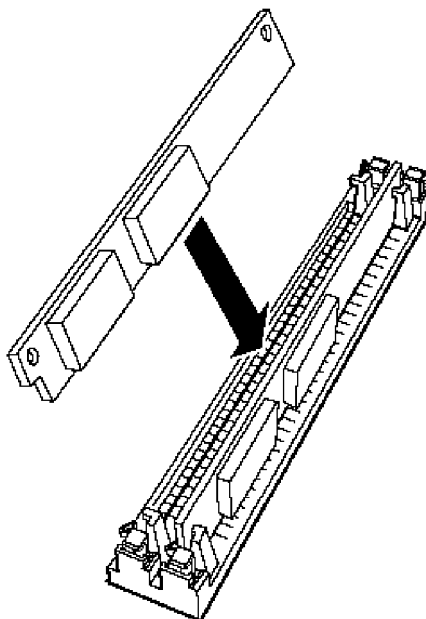
- Use only tin-plated, 72-pin, 32-bit or 36-bit, fast-page mode SIMMs that operate at an access speed of 80ns (nanoseconds) or faster. Be sure all the SIMMs operate at the same speed.
- Use the correct SIMM configuration to add the amount of memory you want. See the table above.

- Your SIMM sockets may not look exactly like the ones in the illustrations. If you're not sure how to install SIMMs, contact the EPSON Connection and ask for assistance.

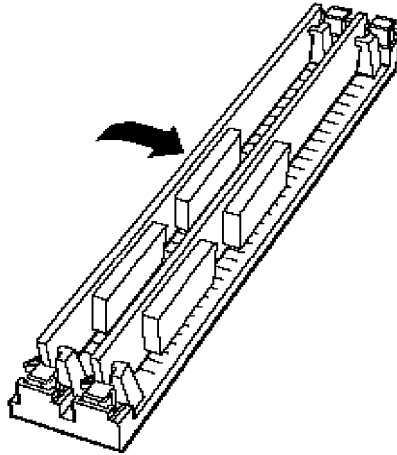
## ***Inserting SIMMs***

Follow these steps to install SIMMs:

1. Refer to the illustration on page 3-5 to locate the SIMM sockets.
2. Remove any option cards that may be blocking your access to the SIMM sockets. (See page 3-17 for instructions.)
3. Position the first SIMM at an angle over the first empty socket in the bank you are filling, as shown below. The components on the SIMM should face the computer's power supply.



4. 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.



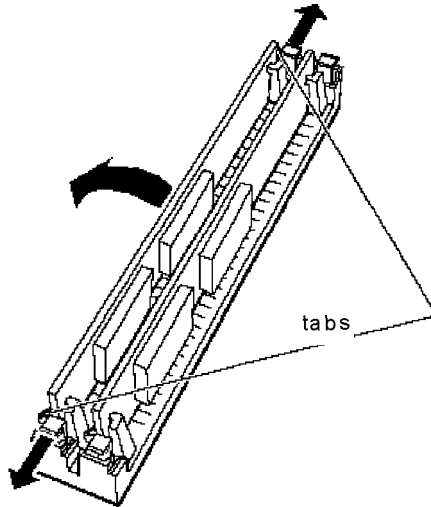
5. Repeat steps 3 and 4 for the other SIMM, if necessary.
6. Replace any option cards you removed. (See page 3-14 for instructions.)

## ***Removing SIMMs***

If you need to remove SIMMs from your computer (to install different ones, for example), follow the steps below:

1. Remove any option cards that may be blocking your access to the SIMM sockets. (See page 3-17 for instructions.)

2. Use your fingers or a small screwdriver to carefully pull away the tabs that secure the SIMM at each end, as shown below. As you pull away the tabs, the SIMM falls to the side. Remove it from the socket.



3. If necessary, follow the same procedure to remove the other SIMM.
4. Replace any option cards you removed, as described in the next section.

---

## ***Installing an Option Card***

This section explains how to install option cards in your computer. Your computer has five 16-bit, ISA slots: three full-length and two half-length.

### **Caution**

Before you install any option cards in your system, make sure that no card draws current in excess of the limits listed in Appendix A.

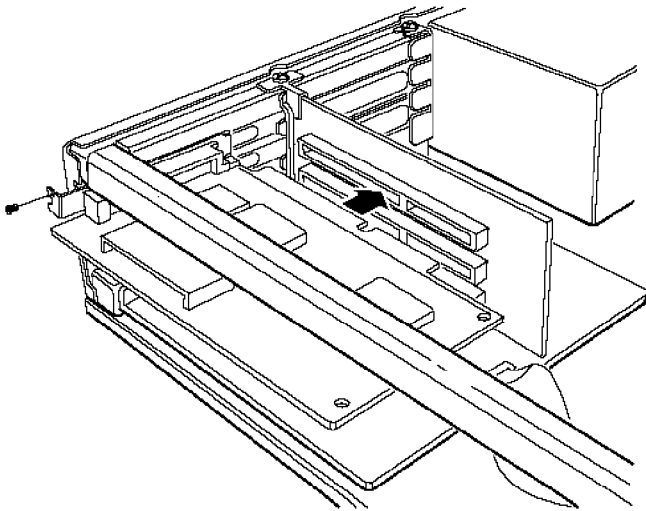
As you install option cards, keep these guidelines in mind:

- Check the components on your card and the system board before deciding which slot to use. Make sure that no components are touching or obstructing other cards or cables.
- When you unpack the option card, do not touch any of the components on the circuit board or the gold-edged connectors. 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.
- Before you install the card, adjust any switches or jumpers on it, if necessary. (See the instructions that came with the card.) Also, see if you need to change any jumper settings on the system board. (For example, if you install a video card, you need to disable the built-in VGA adapter.) See page 3-6 for more information on jumpers.

## ***Installing a Card in a Full-length Slot***

Follow these steps to install an option card in one of the full-length slots:

1. 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.)
2. Slide out the slot cover and set it aside. (Store it in a safe place in case you remove the option card later.)
3. Hold the card along the top corners and guide it into the slot, 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 it fit into place. If the card does not go in smoothly, do not force it; pull it all the way out and try again.

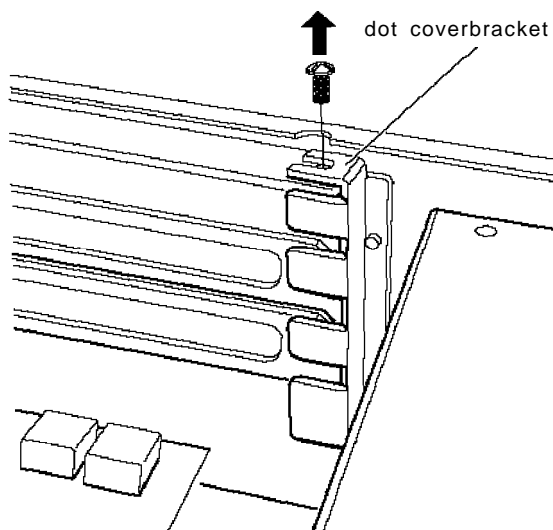


4. Secure the end of the card to the computer with the retaining screw.

## ***Installing a Card in a Half-length Slot***

Follow these instructions to install a card in one of the half-length slots:

1. Remove the retaining screw securing the slot cover bracket. Remove the bracket by lifting it straight up and out of the small metal holder at the bottom.



2. Remove the slot cover.

3. Hold the card along the top corners with the components facing down and guide it into the slot.

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.

4. Replace the slot cover bracket by inserting it into the small metal holder below the option slots.
5. Secure the slot cover bracket 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 illustrations on pages 3-15 and 3-16 as you follow these steps:

1. If you are removing a card from one of the full-length slots, first remove the retaining screw securing the option card to the computer. Then pull the card straight out of the slot.
2. If you are removing a card from one of the half-length slots, first remove the slot cover bracket. Then pull the card straight out of the slot.
3. Set the card aside with the component side facing up.
4. If you are not installing another option card in the empty slot, replace the option slot cover and retaining screw.

---

## ***Adding Video Memory***

Your computer comes with 512KB or 1MB of video memory. If you have 512KB, you can increase your video memory to 1MB by installing four video DRAM DIP (Dual Inline Package) chips. The chips must be 20-pin, 256KB chips that operate at a 70ns access speed. For the memory to work properly, you must install one chip in each empty video RAM socket on the system board.

Additional video memory is useful for running graphics-intensive applications or for supporting video resolutions up to 1280 x 1024 in 16 colors. See Appendix A for information on supported colors and resolutions for each amount of video memory.

The table below lists the video DRAM DIP chips that are approved for use in your computer.

### *Video DRAM DIP chip types*

<b>Manufacturer</b>	<b>Part number</b>
Goldstar	GM71C256A-70/80
Fiji	MB81C256A-70/80
NMBS	AAA1M204P-70/50
Toshiba	TC514256AP-7/8
Samsung	KM44C256BP-7/8

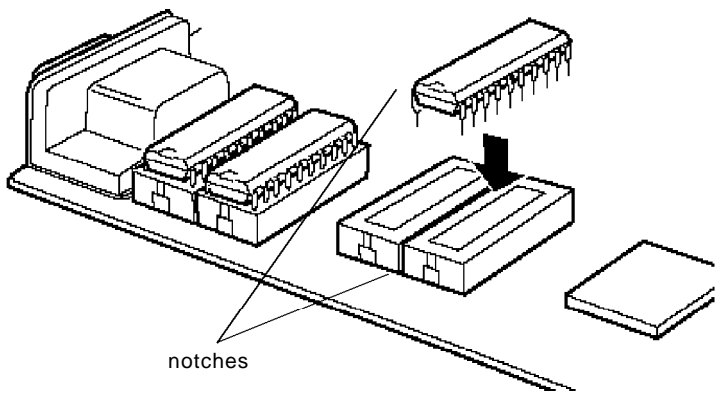
Note that your video memory sockets may not look exactly like the ones shown here. If you're not sure how to install video memory chips, contact the EPSON Connection and ask for assistance.

1. Locate the video memory sockets on the main system board, shown on page 3-5.
2. If there is an option card in your way, remove it. See page 3-17 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 not in this position, use your fingers or small tweezers to gently align them with the other pins. Be careful; the pins are fragile and can break off easily.
4. Position one of the memory chips over the 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 aligns with the corresponding notch 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 to make sure it is well-seated.
7. Repeat steps 4 through 6 for each of the remaining chips.
8. Replace any option cards you removed. See page 3-14 for instructions.

---

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

The table below lists the cache SRAM DIP chips that are approved for use in your computer.

*Cache SRAM DIP chip types*

Manufacturer	Part number	Manufacturer	Part number
UMC (8K x 8)	UMC 164K-20	Samsung (32K x 8)	KM68257BP-15/:
Cypress (8K x 8)	CY78185-15	Paradigm (32K x 8)	PDM41256S-20
Toshiba (32K x 8)	TC5532K-20	Micron (32K x 8)	MT502568-20
UMC (32K x 8)	UM61256AK-15/20	NKK (32K x 8)	N341256P-20
Winbond (32K x 8)	W24257AK-15	Aster (tag)	AA88128AK-20

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*

<b>Bank 0 U23 - U26</b>	<b>Bank 1 U30 - U33</b>	<b>Tag SRAM U34</b>	<b>Total cache</b>
8K x 8	8K x 8	8K x 8	64KB
32K x 8	-	8K x 8	128KB
32K x 8	32K x 8	32K x 8	256KB

Note that your cache memory sockets may not look exactly like the ones illustrated here. If you're not sure how to install cache memory chips, contact the EPSON Connection and ask for assistance.

## ***Installing the External Cache Chips***

Follow these steps to install the external cache chips:

1. Locate the external cache memory sockets on the main system board, shown on page 3-5.
2. If there is an option card in your way, remove it. See page 3-17 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.

4. 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.

U26

U25

U24

U23

5. Gently press the chip halfway into the socket (to make sure  
with ms025 chip T47f 0ore2 d .3pR8 21t

- 6.

- 7.

- 8.



9. Replace any option cards you removed. See page 3-14.
10. 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 Memory Cache and Memory Shadow options on the Advanced System Setup menu. (See Chapter 1.)

---

## ***Upgrading the Microprocessor***

You can upgrade your computer by replacing the microprocessor with a faster one. The following table lists the microprocessors, their voltages, and other components you can install in your system.

### *Microprocessor upgrade components*

<i>Part</i>	<i>Manufacturer</i>	<i>Voltage</i>
486SX/33 processor	Intel	5 Volt
486DX/33 processor	Intel** or Cyrix*	5 Volt
486DX/40 processor	Cyrix *	5 Volt
486DX/50 processor	Intel **or Cyrix *	5 Volt
486DX2/50 processor	Intel **or Cyrix *	5 Volt
486DX2/66 processor	Intel** or Cyrix*	Intel, 5 Volt; Cyrix, 5 Volt or 3.6 Volt
SX2/50 processor	Intel **	5 Volt
DX4/75 processor	Intel** or Cyrix**	Intel, 3.45 Volt; Cyrix, 5 Volt
DX4/100 processor	Intel** or Cyrix**	Intel, 3.3 Volt; Cyrix, 5 Volt
Pentium OverDrive processor	Intel **	5 Volt
Heat sink*	Tennmax Trading Corp.®	-
Heat sink/fan assembly**	Tennmax Trading Corp.	-

\* A heat sink is required for all Cyrix DX and DX2 processors (except the DX/33) and the Intel SX2/50 processor

\*\* A heat sink and fan assembly are required for all Intel DX, DX2, and Pentium OverDrive processors and for the Intel and Cyrix DX4 processors; except the Intel DX/33, which does not need a fan assembly



Note that your microprocessor socket may not look exactly like the one illustrated here. If you're not sure how to install your new processor, contact the EPSON Connection and ask for assistance.

## ***Replacing the Processor Chip***

Follow these steps to replace the processor chip :

1. Use the illustration on page 3-5 to locate the microprocessor on the system board. The microprocessor chip may be inserted in a ZIF (Zero Insertion Force) socket.

### **Caution**

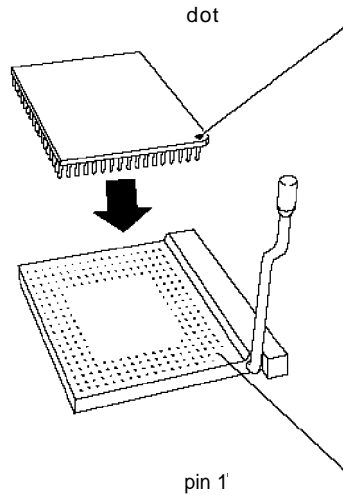
Make sure you ground yourself by touching the metal surface on the inside of the computer's back panel before you touch the processor chip. Then remain as stationary as possible while you install it. Do not touch the pins on the processor chip; handle it only by the edges of its case.

2. If there are any option cards in your way, remove them. See page 3-17 for instructions.
3. Open the ZIF socket by lifting up the ZIF handle. The handle rests under a plastic tab. Press the handle down and away from the tab; then rotate the handle upward. This releases the chip from the socket. The illustration on the next page shows this handle in the released position.
4. Gently pull the processor chip straight up and set it aside.

### **Note**

The 486SX/25 microprocessor may be soldered onto an adapter board that is seated in the socket. Remove the adapter board as described above.

5. 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.
6. Position the processor chip over the socket, aligning the notched edge of the chip (marked with a dot) with pin 1 on the socket, as shown below.



### **Caution**

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

7. 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.

If you are installing a 486 chip rather than a Pentium OverDrive processor, you'll see an extra row of holes around the outside of the socket. The 486 chip does not occupy the outside row of holes.

8. Secure the processor chip by pressing the ZIF handle back to the closed position.
9. Check the settings of jumpers J11 and J13 to be sure they are correct for the type of microprocessor you installed. You may also need to change the setting of jumper J17 to match the microprocessor type and operating speed.

If you installed a microprocessor with a different voltage (check the table on page 3-23) you need to change the settings of jumpers J31 and J33. See pages 3-6 and 3-7 for information on all these jumper settings.

10. If you are upgrading to a DX/ 40, DX/ 50, DX2, DX4, SX2, or Pentium OverDrive processor, you must install a heat sink and/or a fan, depending on the brand of processor you installed. See the table on page 3-23 for more information. Follow the instructions included with the heat sink if you need to install one. If the heat sink comes with a fan, install it using the instructions that came with the heat sink and fan kit.
11. If you removed any option cards, replace them now; see page 3-15 to replace a full-length card or page 3-16 to replace a half-length card.
12. Run SETUP as described in Chapter 1 to update your computer's configuration with the new microprocessor

---

## ***Post-installation Procedures***

After you install or remove options, you must run SETUP to update the computer's configuration. See Chapter 1 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.

## Chapter 4

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# ***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, diskette, tape, CD-ROM, and optical drives. 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 hard disk drive using the internal mounting bracket below the diskette drive. In the externally accessible bays, you can install a second diskette drive or another type of drive.

To install or remove a drive, first remove the computer's cover as described in Chapter 3. Then remove any option cards that may be in your way. Once you have installed the drive, replace any option cards you removed. See Chapter 3 for instructions.

Follow the appropriate instructions in this chapter to install and remove drives:

- Removing the drive mounting bracket
- Installing a hard disk drive in the mounting bracket
- Removing a hard disk drive from the mounting bracket
- Installing a drive in one of the externally accessible drive bays
- Removing a drive from one of the externally accessible drive bays
- Post-installation procedures.

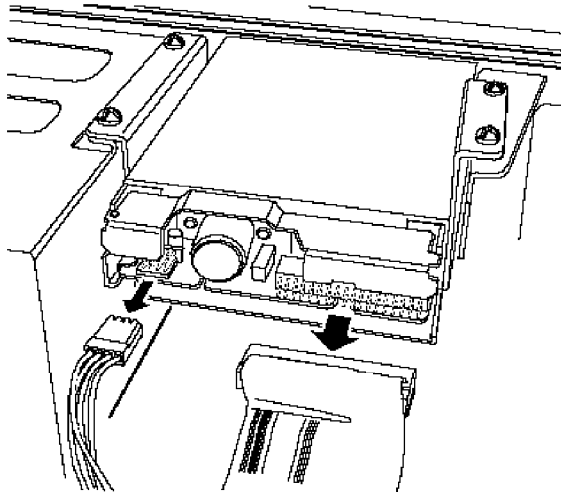
Some of the steps in this chapter may not apply for the drive you are installing. See the documentation that came with your drive for more information.

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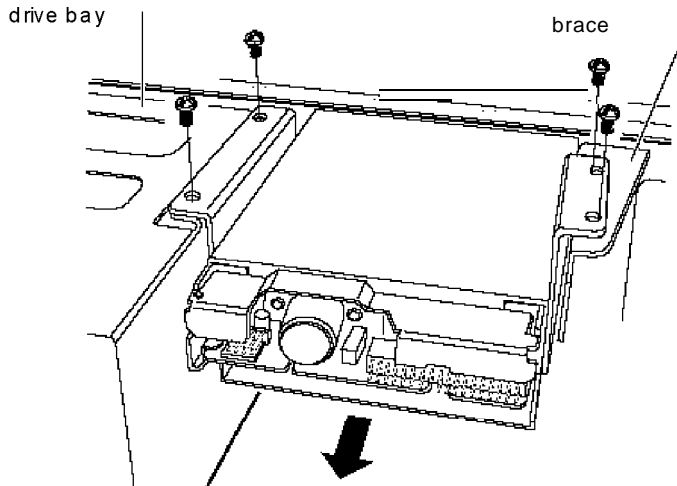
## ***Removing the Drive Mounting Bracket***

Your computer has a 3.5-inch diskette drive installed in a mounting bracket. (You may also have a hard disk drive installed in the bracket.) In order to install or remove any drives in the computer, you must first remove the drive mounting bracket. Follow these steps:

1. Remove the two cables from the diskette drive, as shown below. Grasp the connectors and pull them straight out so you do not bend the pins; do not pull on the cables. (If necessary, remove the cables from the hard disk drive also.)



2. Remove the screws securing the bracket to the drive bay and brace.



3. Slide the bracket away from the front of the computer and lift it out.

---

## ***Installing a Hard Disk Drive in the Mounting Bracket***

You can install a hard disk drive below the diskette drive in the mounting bracket after you have removed the bracket and drive from the computer. In order to fit in this space, your hard disk drive must be 1 inch high by 3½ inches wide. If you have a larger hard disk drive, you can install it in one of the drive bays (see page 4-15).

This section includes steps for the following procedures:

- Removing the mounting frames from the hard disk drive (if necessary)
- Installing the hard disk drive in the mounting bracket
- Replacing the mounting bracket in the computer
- Connecting the drive cables.

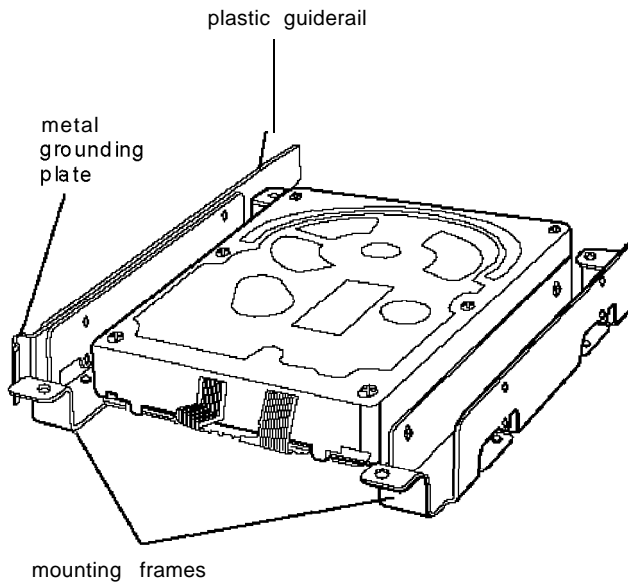
Be sure to check the jumper settings on the hard disk drive before you install it. If you have two hard disk drives, one must be configured as the master (which contains the operating system) and the other as the slave. A table of jumper settings for high-capacity EPSON drives is included in Appendix A.

Also, you may need to know the number of cylinders, heads, sectors, etc., if the hard disk drive auto-sensing feature in SETUP is unable to correctly identify your drive. The hard disk drive table used in the SETUP program is included in Appendix A. If your drive is not listed or you need more information, see the documentation that came with your drive or contact the manufacturer.

## Removing the Mounting Frames

If there are mounting frames attached to your hard disk drive, remove them before you 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.

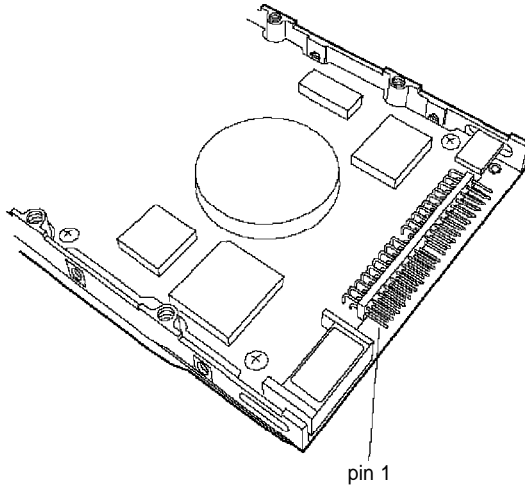


2. Then remove the two screws securing each mounting frame to the drive and remove the frames.



**Note**

Before you install the hard disk drive, turn it over so you can see the circuit board, as shown below. Locate the side of the drive connector containing pin 1, indicated by a “1” or “2” printed on the board. You will need to know the location of pin 1 when you connect the hard drive cable.

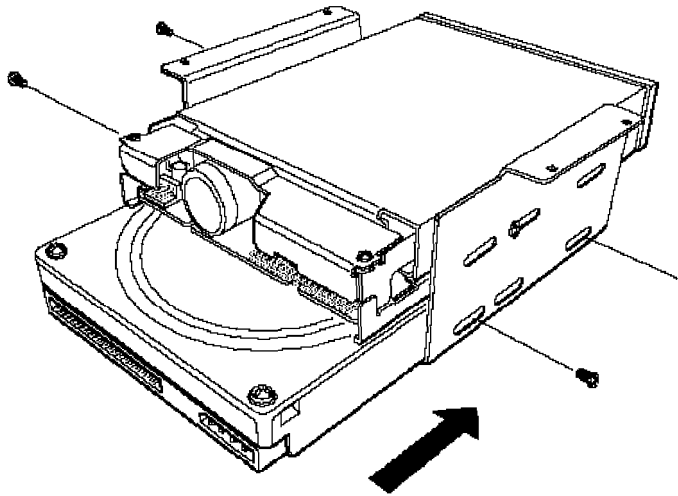


## ***Installing the Hard Disk Drive***

Follow these steps to install the hard disk drive in the mounting bracket:

1. With the drive components facing down, slide the drive into the bracket until the front of the drive is nearly flush with the edge of the bracket.

2. Align the holes in the drive with the oval-shaped holes in the bracket.

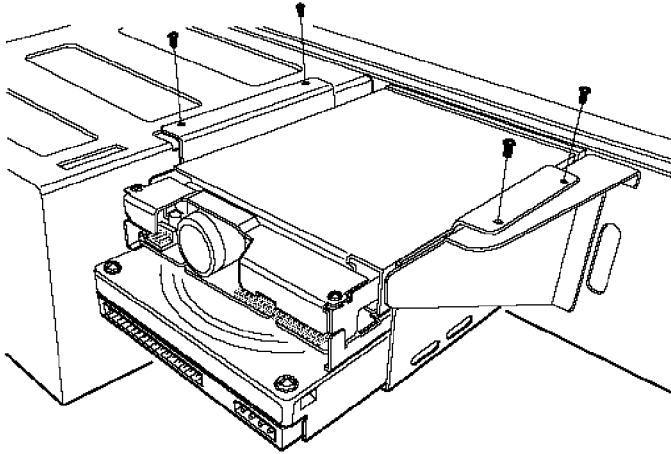


3. Secure the drive with two or four screws, depending on the location of the holes.

## ***Replacing the Bracket in the Computer***

Follow these steps to replace the bracket in your computer:

1. Lower the bracket with the drives into the mounting area and slide it forward, guiding the front of the diskette drive through the drive slot in the front panel of the computer.



2. Make sure the holes in the bracket are aligned with the holes in the drive bay and brace. Then secure the bracket with the screws you removed previously.

## Connecting the Drive Cables

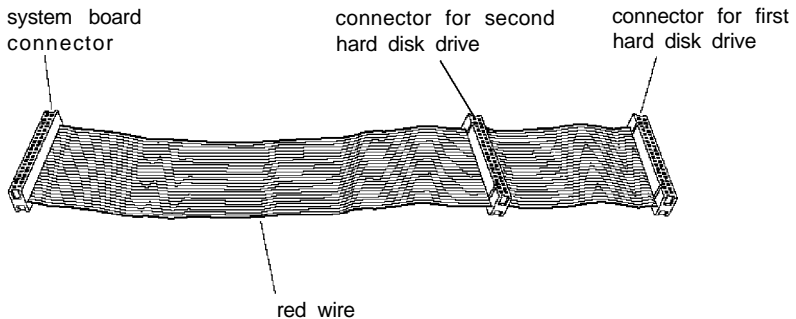
After you replace the bracket, you need to connect the cables for both the hard disk drive and the diskette drive. This section includes steps for the following procedures:

- Connecting the drive ribbon cable to the system board
- Connecting the cables to the hard disk drive
- Reconnecting the cables to the diskette drive.

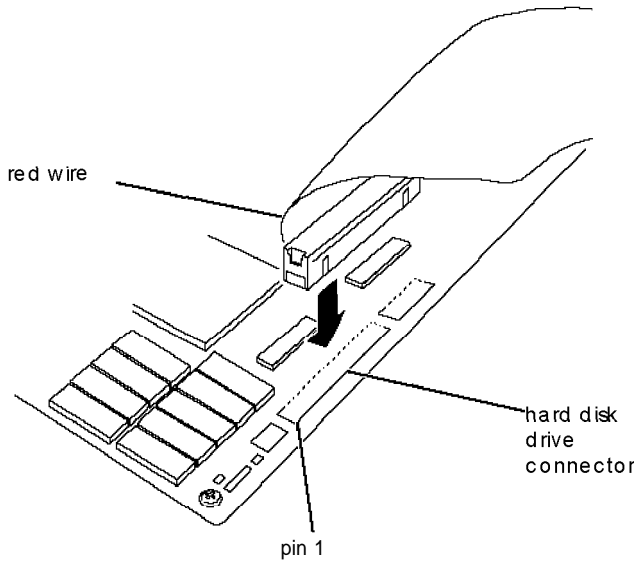
### Connecting the drive cable to the system board

Follow the steps below to connect the hard drive ribbon cable to the system board, if it is not already connected.

1. Locate the hard disk drive ribbon cable; it is a flat cable with three connectors that came in the box with your computer. All the connectors on this cable look the same.



2. Locate the hard disk drive connector on the system board using the illustration below.
3. Position the system board connector end of 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 connector fit over the pins; then push in the cable connector.

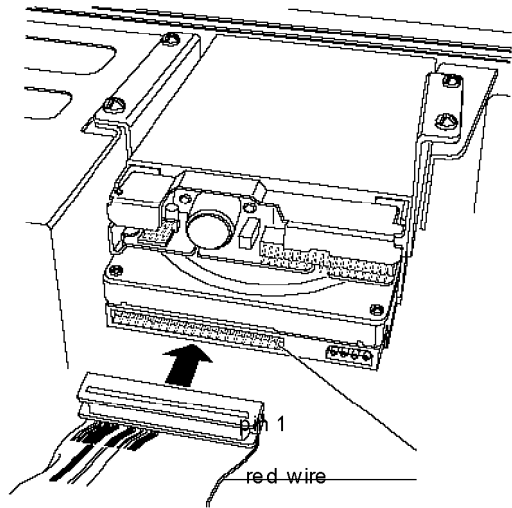
**Caution**

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 ribbon 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 and you did not locate it before you replaced the drive bracket, you may have to remove the drive and turn it over to check the circuit board. See page 4-14 for instructions on removing the drive and page 4-6 for instructions on locating pin 1 on the drive connector.
3. Position the connector on the cable so that the red wire aligns with pin 1 on the drive.

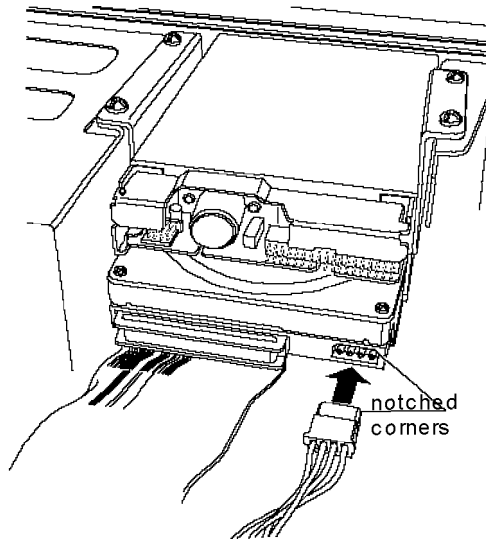


4. Make sure the holes in the cable connector fit over all the pins; then push in the connector.

**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.

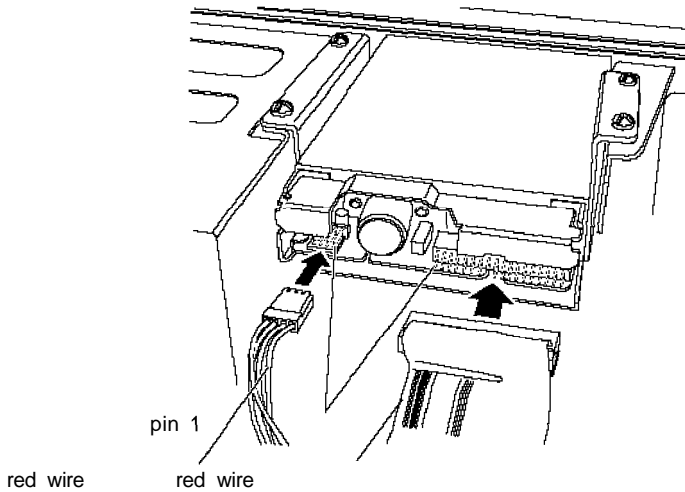
5. Locate one of the power supply cables that lead from the power supply. (They have multi-colored wires and a plastic connector on the end.)
6. Position the power supply cable connector so that its notched corners line up with the notched corners of the power supply connector on the hard disk drive.



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

## Reconnecting the Cables to the Diskette Drive

Refer to the illustration below while you follow these steps:



1. Locate the connector on the diskette drive ribbon cable.
2. Identify pin 1 on the drive and position the connector so that the red wire is next to pin 1. Push in the connector.

### **Caution**

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

3. Locate the power supply cable with the small connector.
4. Position the power supply connector so that the holes fit over all the pins and the red wire on the cable aligns with pin 1 on the drive's power connector. Push in the connector.

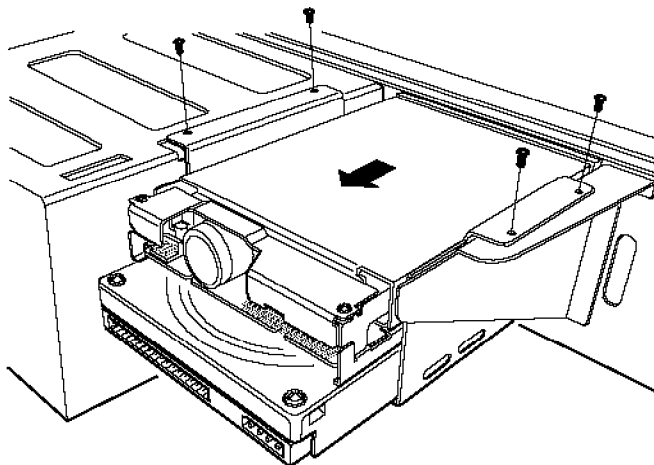


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## **Removing a Hard Disk Drive From the Mounting Bracket**

Follow these steps if you need to remove the hard disk drive from the bracket:

1. Disconnect the cables from any drives installed in the mounting bracket. Grasp the connectors and pull them straight out so you do not bend the pins; do not pull on the cables.
2. Remove the screws securing the bracket to the drive bay and brace.
3. Slide the bracket away from the front of the computer and lift it out.



4. Remove the screws securing the hard disk drive to the bracket and slide the drive out of the bracket.
5. Replace the bracket using the instructions on page 4-8.

---

## ***Installing a Drive in an External Drive Bay***

Your system comes with two externally accessible drive bays. You can use these bays to install any of the following: diskette drive, hard disk drive, CD-ROM drive, tape drive, or optical drive.

If you are installing a diskette drive or 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. If you are installing a hard disk drive or drive with a different type of connector, you may need to purchase a different cable.

If you are installing a second hard disk drive, you need to check the settings of the drive's jumpers to be sure they are correct for your configuration. A table of jumper settings for high-capacity EPSON drives is included in Appendix A. If your drive is not listed or you need more information, see the documentation that came with your drive or contact the manufacturer.

Before you can install a drive in one of the external bays, you must first remove the mounting bracket containing the diskette drive (and possibly a hard disk drive). See page 4-2 for instructions.

This section includes steps for the following procedures:

- Attaching mounting frames to the drive (if necessary)
- Installing the drive in the bay
- Connecting the drive cables

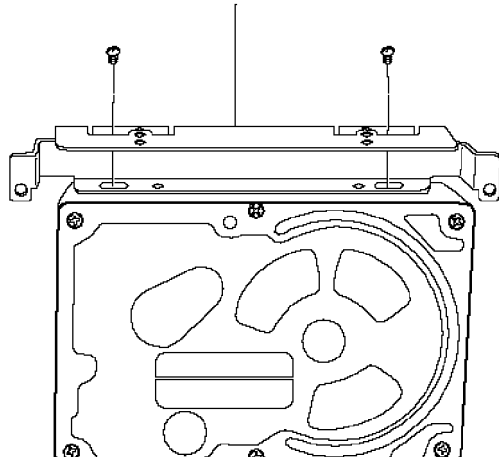
## ***Attaching Mounting Frames to the Drive***

If you are installing a 3½-inch wide drive, you need to attach mounting frames to the drive. If you are installing a drive that already has mounting frames on it, see if it also has a plastic guiderail and metal grounding plate attached to it. If so, follow step 1 on page 4-5 to remove the guiderail and grounding plate. Then go to “Installing the Drive” on page 4-17.

Follow these steps to attach mounting frames to a drive:

1. Locate the two mounting frames and four screws that came with the drive.
2. As shown below, place a mounting frame on one side of the drive and align it so that the oval holes in the frame are positioned over the holes in the drive. Then secure the mounting frame to the drive with the two screws.

mounting frame

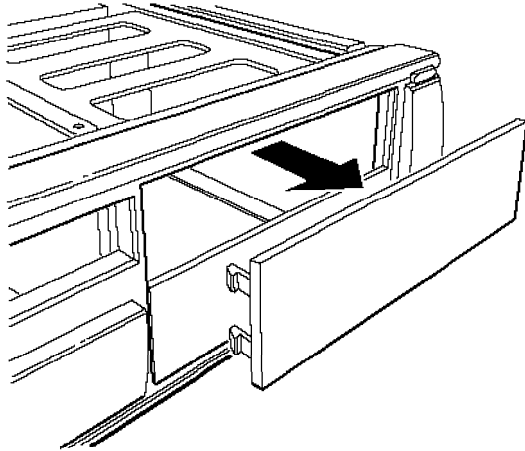


3. Repeat step 2 to attach a mounting frame to the other side of the drive.

## ***Installing the Drive***

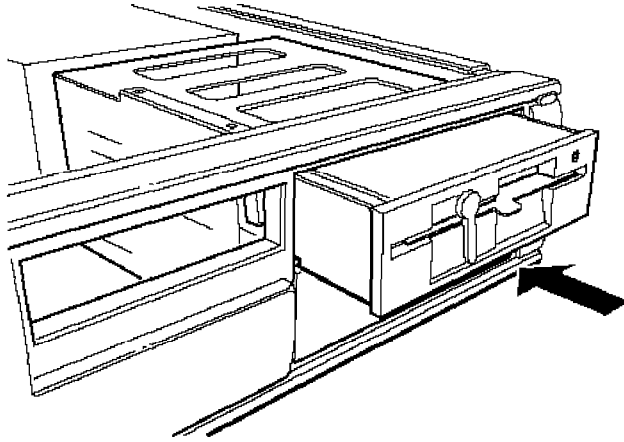
Follow these steps to install a drive in the upper or lower external drive bay:

1. Remove the faceplate from the drive bay by pushing it out from the inside of the computer.

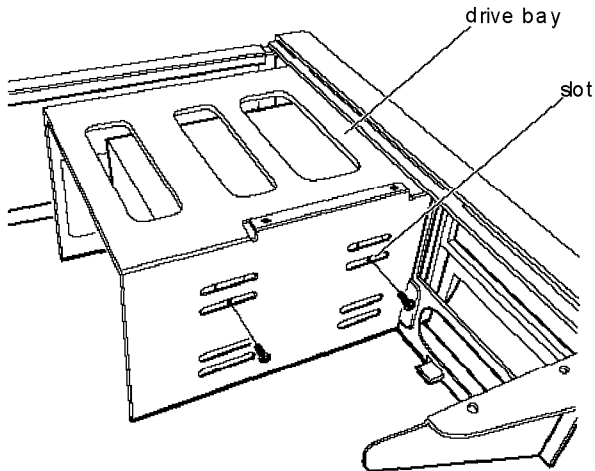


Keep the faceplate in a safe place in case you remove a drive later (or you are installing a hard disk drive).

2. Slide the drive through the slot into the bay until it is flush with the front of the computer.



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



## Connecting the Drive and Power Cables

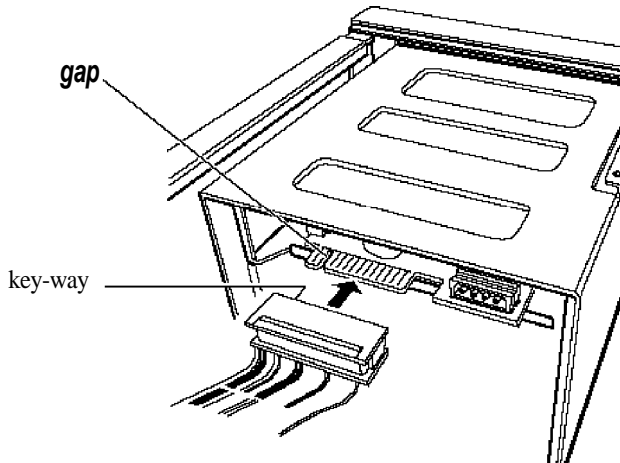
If you are installing a diskette or tape drive, follow all the steps below. If you are installing a hard disk drive, follow the instructions on pages 4-9 through 4-12. Then go to step 5 below.

### Note

If you have one hard disk drive installed in the bracket below the diskette drive and will install and a second hard disk drive in the external bay, you need to purchase a new hard disk drive cable that can reach both drives.

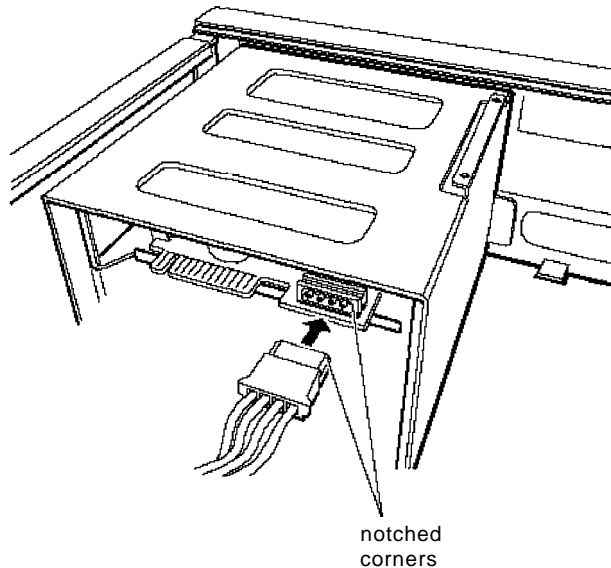
If you are installing another type of drive, see the documentation that came with it to connect the drive cable; then go to step 3 below to connect the power supply cable.

1. Locate the diskette drive ribbon cable; the connector in the middle is already connected to the system board.
2. If you are installing a drive with a card-edge connector, make sure you align the key-way (the plastic divider) with the gap in the drive connector, as shown below.



If you are installing a 3.5-inch diskette drive with a header connector, see page 4-13 for instructions on connecting the cable.

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 connector (such as the one shown below). Make sure the holes line up over all the pins and then push in the connector.



### **Caution**

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

5. If you installed a hard disk drive in one of the external bays, replace the faceplate. Insert one side of the plate, then gently press on the other side until it snaps into place.

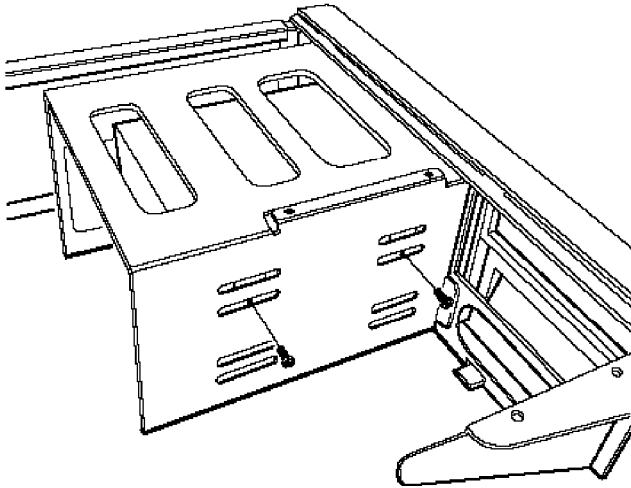
After you have completed installation of the drive in the external bay, you must replace the drive mounting bracket and reconnect the cables. See page 4-8 for instructions.

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## ***Removing a Drive from an External Bay***

To remove a drive from an external bay, follow these steps:

1. Remove the drive mounting bracket. See page 4-2 for instructions.
2. Disconnect both the ribbon cable connector and the power cable connector from the drive you are removing from the external bay.
3. Remove the screws securing the drive.





4. Reach behind the drive and gently push it to the front of the bay; then pull it out of the slot.
5. Once you have removed the drive, replace the faceplate by inserting one side of the plate, then gently pressing on the other side until it snaps into place.
6. Replace the drive mounting bracket and reconnect the cables. See page 4-8 for instructions.

---

## ***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 your new configuration. See Chapter 1 for instructions.

## Chapter 5

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# ***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 Authorized EPSON Servicer or the EPSON Connection. See “Where to Get Help” in the Introduction of this manual for instructions.

---

## ***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 during power-on diagnostics.

**System configuration:** Start SETUP and select the System Summary option to see your system's configuration.

**MS-DOS version:** `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 software manual.

**CONFIG.SYS:** At the MS-DOS prompt, type  
`TYPE C:\CONFIG.SYS` and press **Enter** to see a listing of your CONFIG.SYS file, which contains system configuration commands.

**AUTOEXEC.BAT:** At the MS-DOS prompt, type  
`TYPE C:\AUTOEXEC.BAT` and press **Enter** to see a listing of your AUTOEXEC.BAT file, which contains system startup commands.

---

## ***The Computer Will Not Start***

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

Make sure the boot options in SETUP are set to access drive A. Then place a bootable diskette in drive A 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 powerlight 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 detect memory, it won't start. Check that your SIMM(s) are securely installed in their sockets.

If you replaced the microprocessor, make sure the new processor chip is installed correctly. Also make sure the jumpers are set correctly and pin 1 on the chip is connected with pin 1 on the system board. See Chapter 3.

---

## ***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 SIMMs with an incorrect access speed. Install the correct SIMMs. (See Chapter 3.)

Your system may have over-heated. Make sure you have an adequate heat sink installed on your microprocessor, if necessary. See Chapter 3 for more information.

### ***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 suddenly stops operating.***

You may have overloaded the power supply. 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 keyboard port and not the mouse port. Although these ports look alike, they cannot be used interchangeably.

***Nothing happens when you type on the keyboard.***

The **Lockout Timer** may be set in SETUP. This option inactivates the keyboard for a specified period of time after the system returns to an active mode from a low-power standby mode. This delay gives Energy Star compliant monitors the time they need to return to an active mode. Wait a few seconds and try again.

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.

---

## ***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 and not the keyboard (**K/B**) port. Also make sure you installed the mouse driver correctly (if necessary). See the documentation that came with your mouse for instructions. (Windows automatically installs a mouse driver when you install the program.)

---

## **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.

Also, the computer may be in low-power standby mode. When you press a mouse button or a key on the keyboard, see if the monitor displays an image.

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

Press a mouse button or a key on the keyboard to see if the computer is in low-power standby mode. Also, 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 installed a display adapter card, make sure your monitor type matches the card type. Also be sure you set the correct display type in SETUP (see Chapter 1) and that the main system board jumpers are set correctly (see Chapter 3).

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.

### ***The powerswitch is on but the powerlight is not on.***

If the monitor is Energy Star compliant, it may be in low-power standby mode. Press a mouse button or a key on the keyboard to activate the monitor.

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.

If 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 tight 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.

The system may have the Diskette Access option in SETUP enabled. If you entered a User level password when you started the system but this option is set to a Supervisor level, you see an error when you access the drive.

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 Authorized EPSON Servicerc or the EPSON Connection.

---

## ***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.

Some hard disk drives do not support the Energy Star features on your system. You may need to disable these features in SETUP.

### ***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 1.

Make sure the jumpers on the system board are set correctly. Jumpers JB and JE enable or disable the IDE hard disk drive controller. See Chapter 3 for jumper information.

Make sure the jumpers on the hard disk drive are set correctly. See the documentation that came with the drive for more information.

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

If the hard disk drive has been in low-power standby mode, make sure the drive has had time to achieve its full operating speed before you try to write data to it.

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.

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 Authorized EPSON Servicer or the EPSON Connection.

---

## ***Password Problems***

***You have forgotten your password.***

You must discharge your CMOS memory. To do this, you need to change the setting of jumper J30 to position 3-4. See Chapter 3 for details on changing the jumper setting.

After you have changed J30, restart your system, leave it on for a few seconds, then turn it off again. This resets the SETUP values to their factory defaults. Both the Supervisor and the User passwords are disabled.

Set J30 back to position 2-3. Then turn the computer on again. Use SETUP to set a new password, if you want one.

---

## **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. Change your processor speed using the keyboard commands described in Chapter 2.

### ***The application program is having trouble reading from or writing to the hard disk drive.***

If you have enabled the Fixed Disk Timeout option in SETUP, your application may be timing out during the few second delay when the hard disk drive returns to its operating speed after being in standby mode. Disable this option in SETUP (see Chapter 1).

### ***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®, needs a minimum of 8MB to 16MB of RAM to work correctly. Check your software documentation for the minimum memory requirements. If necessary, add additional memory using the instructions in Chapter 3.

---

## ***Printer Problems***

### ***The printer or scanner does not work at all.***

Check that the printer or scanner has power and is properly connected to the computer. Also make sure your printer has paper in it. If you are using more than one serial port and one is for your printer, check the primary and secondary port settings (COM1 and COM2) in your application program.

If you connected a scanner or a parallel port network adapter to the parallel port, make sure you set the port for bidirectional operation (PS2 mode) in the SETUP program, as described on pages 1-11 and 1-13.

### ***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 newly installed option card is not working correctly.***

Make sure the option card is installed correctly and is well-seated in its slot. Run SETUP to update your configuration after you install the card and perform setup procedures for any software you are using with the 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 3 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 2).

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

Make sure the option card is not touching any other card. Also make sure the card isn't touching the CPU or any fan or heat sink you have attached to the CPU.

If a fan or heat sink is attached to the CPU, don't install an option card in the lowest 16-bit option slot.

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

Make sure you are using the proper cable to securely 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 3 for information on installing SIMMs.

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

---

## ***Controller Problems***

***You see a controller error for the drive controllers 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 amount of 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, make sure the tag chip you've installed has a 20ns access speed.

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. You can access these options from the Memory Cache and Memory Shadow options on the Advanced System Setup screen.

See Chapter 3 for instructions on changing the jumper settings or information on installing external cache; see Chapter 1 for instructions on using the SETUP program.

## Appendix A

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# Specifications

### **CPU and Memory**

#### *32-bit CPU*

Intel or Cyrix 486SX, DX, or DX2 processor; upgradable to faster, more powerful processors, including the SX2/50, DX4/ 75 or /100, or Pentium OverDrive

#### **Green PC energy saver**

Energy Star compliant, low-power standby mode (using less than 30 Watts) for the hard disk drive and the video signals the computer sends to the monitor; time periods selectable in SETUP

#### **System speed**

Fast and slow processor speeds available; fast speed is the speed of your processor and slow speed is 8 MHz; speed selection through keyboard commands

ISA bus speed for all processors is 8.33 MHz; local bus video operates at the speed of your processor; at fast speed, DX2/ 50 and DX2/ 66 processors run internally at 50 and 66 MHz, and externally at 25 and 33 MHz, respectively; local bus speeds for DX2 processors are 25 and 33 MHz, respectively



<b>Memory</b>	4MB or 8MB 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 or faster
<b>ROM</b>	128KB Phoenix® system BIOS, video BIOS, and SETUP code located in EPROM on main system board
<b>Video RAM</b>	512KB or 1MB DRAM; expandable to 1MB using four, 20-pin, 70ns, 256KB DIP chips
<b>Shadow RAM</b>	Supports shadowing of system and video BIOS ROM into RAM
<b>Memory relocation</b>	Supports relocation of 256KB of memory from A0000h to BFFFFh and D0000h to EFFFFh to extended memory
<b>Cache</b>	8KB of internal cache; supports 64KB, 128KB, or 256KB of external cache using 28-pin, 8K x 8 or 32K x 8, 20ns DIP chips
<b>Math coprocessor</b>	Math coprocessor built into the microprocessor for DX, DX2, and systems upgraded to a Pentium OverDrive processor
<b>Clock/calendar</b>	Real-time clock contained in the 82C491 system controller chip along with 64 bytes of CMOS RAM backed up by an integrated battery

## **Controllers**

<b>Video</b>	Cirrus Logic® GD5426 high-speed SVGA local bus controller supports resolutions up to 1280 x 1024 in 16 colors (with 1MB of VRAM); True Color support in 640 x 480 resolution (with 1MB of VRAM)
<b>Diskette</b>	Controller on main system board supports up to two diskette drives or one diskette drive and one tape drive
<b>Hard disk</b>	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

## **Interfaces**

<b>Monitor</b>	VGA interface for fixed or multi-frequency monitor built into system board; low-power standby mode for Energy Star compliant monitors; 15-pin, D-shell connector
<b>Parallel</b>	One standard S-bit parallel bidirectional interface built into main system board; 25-pin, D-shell connector; operation controllable by SETUP option
<b>Serial</b>	Two RS-232C, programmable, asynchronous interfaces built into main system board; 9-pin, D-shell connectors
<b>Keyboard</b>	PS/ 2 compatible keyboard interface built into main system board; 6-pin, mini DIN connector

<b>Mouse</b>	PS/ 2 compatible mouse interface built into main system board; 6-pin mini DIN connector
<b>Option slots</b>	Three full-length and two half-length, 16-bit I/O expansion slots; ISA compatible, 8.33 MHz bus speed; on DX/ 50, DX2, or Pentium OverDrive systems, one slot may be unavailable because of the CPU heat sink/ fan assembly
<b>Game port</b>	10-pin game port header on main system board; accessible by removing game port slot cover on back panel; operation selectable by jumper
<b>Speaker</b>	Internal

## **Mass Storage**

Internal mounts for:  
One 3½-inch wide, one-inch high internal drive

Externally accessible mounts for:  
One 3½-inch wide, one-inch high drive and two 5¼-inch wide, half-height drives

<b>Diskette drives</b>	3.5-inch diskette drive, 720KB or 1.44MB storage capacity
	5.25-inch diskette drive, 360KB or 1.2MB storage capacity
	Combination 3.5-inch/ 5.25-inch diskette drive

<b>Hard disk drives</b>	3½-inch or 5¼-inch hard disk drive(s), up to half-height size
-------------------------	---

**Other devices** Half-height tape drive, CD-ROM, optical drive, or other storage device; 5¼-inch or 3½-inch wide with mounting frames

**Keyboard** Detachable, two-position height; 101 or 102 sculpted keys; country-dependent main typewriter keyboard; numeric/cursor control keypad; four-key cursor control keypad; 12 function keys

**Mouse** Detachable, two-button, PS/ 2 compatible

**SETUP Program** Stored in ROM; accessible by pressing F2 during boot

**System security** User and Supervisor level passwords available for system boot or diskette access

**Virus protection** Write protection feature for the hard disk drive boot sector; periodic reminder message for running virus detection utility

## **Physical Characteristics**

**width** 16.8 inches (430 mm)

**Depth** 15.6 inches (400 mm)

**Height** 4.4 inches (112 mm)

**Weight** 17 lb (7.7 kg) with one diskette drive, but without a keyboard

## Power Supply

<b>Type</b>	200 Watt, UL/ TUV/ CSA listed, fan-cooled
<b>Input ranges</b>	90 to 130 VAC or 180 to 260 VAC; switch-selectable for 115 VAC and 230 VAC input current
<b>Maximum outputs</b>	+5 VDC at 20 Amps, -5 VDC at 0.5 Amp, +12 VDC at 8.0 Amps, -12 VDC at 0.5 Amp
<b>Frequency</b>	47 to 60 Hz
<b>Cables</b>	Two to main system board; five to mass storage devices

## Option Slot Power Limits

Maximum current	+5 Volts	-5 Volts	+12 Volts	-12 Volts
For all slots	12 Amps	0.4 Amp	4 Amps	0.4 Amp

\* Based on a system containing one hard disk drive and one diskette drive

## Environmental Requirements

Condition	Operating range	Non-operating range	Storage range
Temperature	41° to 95° F (5° to 35° C)	-4° to 140° F (-20° to 60° C)	-4° to 140° F (-20° to 60° C)
Humidity (non-condensing)	8% to 80%	10% to 90%	5% to 100%
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)

---

## ***Video Resolutions and Colors***

<b>Resolution</b>	<b>Memory requirements</b>	<b>Color</b>	<b>Vertical frequencies (Hz)</b>	<b>Remarks</b>
640 × 480	512KB	256	60/72	8 bits/pixel
	1MB	32K/64K	60/72	16 bits/pixel
	1MB	16.8M (True Color)	60/72	24 bits/pixel
800 × 600	512KB	256	56/60/72	8 bits/pixel
	1MB	32K/64K	56/60/72	16 bits/pixel
1024 × 768	512KB	16	43.5/60/70/72	4 bits/pixel
	1MB	256	43.5/60/70/72	8 bits/pixel
1280 × 1024 interlaced	1MB	16	87	8 bits/pixel

---

## Hard Disk Drive Types

This computer comes with a hard disk auto-sensing feature. When you press **Enter** with the cursor positioned on the Autotype Fixed Disk option in SETUP, the system detects the type of hard disk drive you have installed and fills in the drive information using values in the following table.

### *Hard disk drive types*

Type	Size* (MB)	Cylinders	Heads	Sectors/track	Landing zone	Write precomp	Drive name
1	85	903	4	46	903	0	CP30084E
2	121	762	8	39	762	0	CP30104H
3	106	1024	12	17	1024	0	ST3123A
4	65	940	8	17	615	300	
5	49	940	6	17	940	512	
6	170	903	8	46	903	0	CP30174E
7	171	332	16	63	332	0	CP30174
8	213	1024	12	34	1024	0	ST3243A
9	117	900	15	17	901	0	
10	341	768	14	62	768	0	ST3390A
11	528	1024	16	63	1024	0	ST3655A
12	52	855	7	17	855	0	
13	170	1010	6	55	1010	0	AC1170
14	255	1010	9	55	1010	0	AC2250
16	341	1010	12	55	1010	0	AC2340
17	212	989	12	35	989	0	AC1210
18	213	685	16	38	685	0	CFS210A
19	62	1024	7	17	1023	512	
20	31	733	5	17	732	300	
21	127	919	16	17	919	0	ELS127A
22	31	733	5	17	733	300	
23	170	1011	15	22	1011	0	ELS170A
24	245	723	13	51	723	0	LPS240A
25	252	895	10	55	895	0	CP30254
26	343	665	16	63	665	0	CP30344

*Hard disk drive types (continued)*

Type	Size* (MB)	Cylinders	Heads	Sectors/ track	Landing zone	Write precomp	Drive name
27	540	1048	16	63	1048	0	CFA540A
28	426	9826	16	63	826	0	CFS420A
29	131	1002	8	32	1002	0	7131A
30	245	967	16	31	967	0	7245A
31	345	790	15	57	790	0	7345A
32	42	809	6	17	809	128	
33	50	830	7	17	830	0	
34	72	830	10	17	830	0	
35	44	1024	5	17	1024	0	
36	71	1024	8	17	1024	0	
37	42	615	8	17	615	128	
38	109	1024	8	26	1024	0	
39	72	925	9	17	925	0	
40	80	1024	9	17	1023	0	
41	119	918	15	17	917	0	
42	130	1001	15	17	1001	0	
43	143	823	10	34	822	0	
44	84	969	5	34	968	0	
45	118	969	7	34	968	0	

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



# Drive Option Information

Hard disk drive options for high-capacity, 1-inch IDE drives

Parameters	Conner®							Quantum®		Western Digital®		
	CP-30084E	CP-30104H	CP-30174E	CP-30254	CP-30344	CFS420A	CFA540A	ELS170AT	LPS240AT	AC1170	AC2250	AC2340
Formatted capacity (MB)	85	120	170	250	340	420	540	170	245	170	240	340
Size, width × height (in)	4 × 1	4 × 1	4 × 1	4 × 1	4 × 1	4 × 1	4 × 1	4 × 1	4 × 1	3.5 × 1	3.5 × 1	3.5 × 1
Weight (lbs)	1.3	1.3	1.3	1.2	1.2	1.16	1.16	0.91	1.05	1.12	1.12	1.12
Cylinders	1806	1524	1806	1895	2116	2388	2805	1536	1818	2233	2233	2233
Disks	1	2	2	2	2	2	2	2	2	1	2	2
Heads	2	4	4	4	4	4	4	4	4	2	3	4
Sectors per track	46	39	46	62	63 - 95	63 - 100	72 - 114	54	44 - 87	56 - 96	56 - 96	56 - 96
Rotational speed (RPM)	3822	3399	3833	4542	4500	3600	4500	3663	4306	3322	3322	3322
Buffer size (KB)	32	32	32	64	64	32	256	32	256	64	64	128
Average seek time (ms)	17	<19	17	14	13	14	12	17	16	<13	<13	<13
Encoding method	RLL 1.7	RLL 1.7	RLL 1.7	RLL 1.7	RLL 1.7	RLL 1.7	RLL 1.7	RLL 1.7	RLL 1.7	RLL 1.7	RLL 1.7	RLL 1.7
Power dissipation (seek)	3.75 W	3.9 W	3.75 W	3.75 W	3.75 W	5-12 W	5.7 W	4.0 W	4.9 W	5.2 W	5.2 W	5.2 W
Logical parameters												
Cylinders	903	762	903	895	655	826	1048	1011	723	1010	1010	1010
Heads	4	8	8	10	16	16	16	15	13	6	9	12
Precomp zone	0	0	0	0	0	0	0	none*	none*	1011	1011	1011
Landing zone	903	762	903	895	655	1048	1048	1011	723	1011	1011	1011
Sectors	46	39	46	55	63	63	63	22	51	55	55	55

\* Select 1 or none for the precomp value. If neither of these options are available, select the maximum available precomp value.

### *IDE hard disk drive jumpersettings*

<b>Model number</b>	<b>Single drive</b>	<b>Master drive</b>	<b>Slave drive</b>
Conner CP30084E	C/D jumpered	C/D jumpered	No jumpers
Conner CP30104H	C/D jumpered	C/D, DSP jumpered	No jumpers
Conner CP30174E	C/D jumpered	C/D jumpered	No jumpers
Conner CP30254	C/D jumpered	C/D jumpered	No jumpers
Conner CP30344	C/D jumpered	C/D jumpered	No jumpers
Conner CFS420A	C/D jumpered	C/D jumpered	No jumpers
Conner CFA540A	C/D jumpered	C/D jumpered	No jumpers
Quantum ELS170AT	DSjumpered	DS, SP jumpered or DSjumpered	No jumpers
Quantum LPS240AT	DSjumpered*	SP and DS jumpered*	No jumpers
Western Digital AC1170	No jumpers	MA jumpered	SL jumpered
Western Digital AC2250	No jumpers	MA jumpered	SL jumpered
Western Digital AC2340	No jumpers	MA jumpered	SL jumpered

\* CS(cable selection) can be jumpered for any configuration. When CSis used, the drive is a master if pin 28 is grounded and a slave if pin 28 is not grounded.

## ***Options Available from EPSON***

Many options for supplementing this product are available from EPSON, including the following:

- Monitors
- Keyboards
- Mass storage devices
- Printers
- Operating system software

Call your nearest marketing location for more information about specific options.

---

## ***Tested Operating Environments***

Although your system will run most software applications, the following operating environments have been tested for compatibility with your system.

Microsoft MS-DOS 3.1 and later  
Novell® DR DOS®  
Novell NetWare 2.2, 3.12, and 4.01  
Novell NetWare Lite  
IBM® OS/ 2  
SCO® UNIX  
SCO Open Desktop  
Microsoft Windows 3.0 and later  
Microsoft Windows WorkGroups  
Microsoft Windows NT

Your system has also received Novell's "Yes, NetWare tested and approved" certification as a workstation and a server. As new environments become available, these also will be tested.

---

## ***DMA Assignments***

<b>Level</b>	<b>Assigned device</b>
DMA0	Reserved (8-bit)
DMA1	Reserved (8-bit)
DMA2	Diskette drive controller (8-bit)
DMA3	Reserved (8-bit)
DMA4	Cascade for DMA controller
DMA5	Reserved (16-bit)
DMA6	Reserved (16-bit)
DMA7	Reserved (16-bit)

---

## ***Hardware Interrupts***

<b>IRQ no.</b>	<b>Function</b>
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

Memory address range	Usage
000000h to 09FFFFh	640KB base memory
0A0000h to 0BFFFFh	128KB video memory
0C0000h to 0C7FFFh	32KB video ROM BIOS
0C8000h to 0DFFFFh	32KB external adapter ROM BIOS
0E0000h to 0FFFFFFh	128KB system ROM BIOS
100000h to FFFFFFFh	Extended memory
FE0000h to FFFFFFFh	128KB of ROM remapped from 0ED000h to 0FFFFFFh

---

## System I/O Address Map

Hex address	Assigned device
000-01F	DMA controller 1,8237
020 - 03F	Interrupt controller 1,8259
022 - 024	Chip set configuration registers
034, 038, 03C	AD12 chip set configuration registers
040 - 05F	Timer, 8254
060 - 06F	Keyboard controller, 8042
070 - 07F	NMI (non-maskable interrupt)
080 - 09F	DMA page register, 74LS612
0A0 - 0BF	Interrupt controller 2,8259A
0C0 - 0DF	DMA controller 2,8237
0F0	Clearmath coprocessor
0F1	Reset math coprocessor
0F8 -0FF	Math coprocessor
1F-1F8	Hard disk
200 - 207	Game I/O
278 - 27F	Parallel printer port 2
280 - 2DF	Alternate enhanced graphics adapter

*System I/O address map (continued)*

Hex address	Assigned device
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)
378 - 37F	Parallel printer port 1
380 - 38F	SDLC, bisynchronous 1
390 - 393	Cluster
3A0 - 3AF	SDLC, bisynchronous 2
3B0 - 3BF	Monochrome display and printer port
3C0 - 3CF	Enhanced graphics adapter
3D0 - 3DF	Color graphics monitor adapter
3F0 - 3F7	Diskette drive 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)
42E1	GPiB (adapter 2)
63E1	GPiB (adapter 3)
82E1	GPiB (adapter 4)
A2E1	GPiB (adapter 5)
C2E1	GPiB (adapter 6)
E2E1	GPiB (adapter 7)

## Connector Pin Assignments

### Parallelport connectorpin assignments (CN5)

Pin	Signal	Pin	Signal	Pin	Signal
1	Strobe	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	AFD*	23	Signal ground
6	Data 4	15	Error*	24	Signal ground
	Data 5	16	Init *	25	Signal ground
8	Data 6	17	Selectin *		
9	Data 7	18	Signal ground		

\* Active low logic

### Serial port connectorpin assignments (CN7 and CN6)

Pin	Signal	Pin	Signal
1	Data carrierdetect	6	Data set ready
2	Receive data	7	Request to send
3	Transit data	8	Clear to send
4	Data terminal ready	9	Ring indicator
5	Ground		

---

# **Glossary**

## ***AUTOEXEC.BAT file***

A batch file that MS-DOS executes automatically each time you turn on or reset the computer. This file contains startup commands that tell the computer what to do each time you turn it on.

## ***BIOS***

Basic Input/ Output System. Routines stored in ROM that handle the basic input/ output functions of the operating system.

## ***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 in the microprocessor and has support for up to 256KB of external cache on the main system board.

## ***CONFIG.SYS file***

A special system file that MS-DOS executes each time you turn on or reset the computer. You use this file to customize your system by installing device drivers, setting limits for files and buffers, and specifying MS-DOS commands to be run during startup.

## ***CPU***

Central Processing Unit. The integrated circuit (chip) responsible for integrating program instructions, performing calculations, and controlling all input and output operations.



## ***Driver***

A program that controls a specific piece of equipment in the system. Examples of drivers include expanded memory managers, display drivers, printer drivers, and mouse drivers.

## ***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.

## ***ISA***

Industry Standard Architecture. The 8- or 16-bit bus standard developed for IBM compatible computers.

## ***Jumper***

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

## ***Local bus***

An internal group of wires that sends information from the microprocessor directly to the video controller in the computer. Local bus video provides increased performance.

## ***Memory module***

A small circuit board, commonly called a SIMM (single in line 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**

*See CPU.*

## **Parallel**

A way of organizing communications between two pieces of computer equipment, in which the signals that make up each character are sent simultaneously. See also *Serial*.

## **Power-on diagnostics**

A set of testing routines the computer performs automatically every time you turn it on.

## **RAM**

Random Access Memory. The portion of the computer's memory that runs programs and temporarily stores data while you work. See also *ROM*.

## **Real-time clock**

A battery-powered clock in the computer that keeps track of the current time and date even when the computer's power is off.

## **ROM**

Read Only Memory. The portion of the computer's memory that contains permanent instructions and cannot be modified. Unlike RAM, ROM retains its contents even after you turn off the computer. See also *RAM*.

## **RS-232C**

A standard serial interface. The computer has a connector that lets you attach an RS-232C-compatible device to your computer.

## **Serial**

A way of organizing communications between two pieces of computer equipment in which the signals that make up each character are sent sequentially. See also *Parallel*.

## **Shadow RAM**

The function that copies the system BIOS and video BIOS from ROM into RAM to speed up performance.

## **SIMM**

*See Memory Module.*

## **VGA**

Video Graphics Array. A high-resolution (640 x 480) display adapter standard.

## **Write-protect**

To prevent a diskette from being overwritten. When a diskette is write-protected, you cannot erase, change, or record over its contents.

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