System 3000
Model 3333

User's Manual

ST-2124-15

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Model 3333

NCR
An AT&T Company

User's Manual

ST-2124-15

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March 1993
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Preface

The *System 3000 Model 3333 User's Manual* is a comprehensive, easy-to-use guide for your computer.

The user's manual is intended for intermediate and experienced computer users and for system administrators.

The *Model 3333* computer is shipped ready for use out of box with the actual version of the MS-DOS® operating system. However, this manual does ***not*** include information on MS-DOS®, or Microsoft® Windows™, or any operating system. Though online help is provided, novice users may want to get additional help from some of the commercially available computer training guides for beginners.

The following overview shows where to find the directions for your desired operations. If you need more specific directions, consult the index at the end of the manual.

Overview

System 3000 Model 3333 User's Manual

Installing the System

How to assemble the hardware

Positions and functions of the controls and connectors

How to check the system configuration

How to note configuration changes with the SETUP routine

How to start the operating system

Using the System

Selecting and using diskettes

Troubleshooting

Operating the system safely

Replacing the battery

Using Support Software

How to use the utility programs on the *Support Diskettes*

Installing Options

How to install optional components to your PC

Switches and Technical Data

How to change the switch setting if you are not using the PC in the standard configuration Technical data

Introducing the Model 3333

The *System 3000 Model 3333* is a powerful Personal Computer, with a rich range of features that allows the system to be configured to meet a wide range of requirements.

All versions of this system are built into a compact cabinet with the following provisions.

- Connectors for two serial devices, one parallel device, PS/2 mouse, PS/2 keyboard, and VGA monitor.
- Connector for memory cache board
- Three user accessible and two non accessible drive bays
- 3.5-inch flexible disk drive
- Six AT compatible expansion slots
  Two slots are combination slots with VESA video extension.
- Four sockets for memory

All models can be ordered with a variety of Intel 80486 processors.

- i486 SX, 25 MHz or 33 MHz processor clock frequency
- i486 DX, 33 MHz processor clock frequency
- i486 DX/2, 50 MHz or 66 MHz processor clock frequency.

All models contain a switchable power supply, and meet all major emision and safety standards. Simply ensure that you are using a locally approved power cable and your system may be installed worldwide.

For ease of entry, a wide range of language specific keyboards is available.

All systems are delivered with MS-DOS pre-installed. Certain models are provided with a mouse, and with MS Windows pre-installed.

A comprehensive range of device drivers is provided to help you configure the system to your exact requirements.

To protect your investment, the system is provided with password protection, a cabinet lock, and for additional security, provision for a padlock.

Features / Kits

Certain combinations of the features are built in during manufacturing to configure your system that it exactly meets your requirements.

Many of the features offered with this system are also available as kits for self installation after delivery of the system. Thus you can protect your investment by enhancing your system, as and when your requirements demand new or more powerful features.

The following table lists some of the recommended optional equipment and kits.

See your supplier or sales representative for details and a complete list of optional equipment.

Video Displays	Video display, 14 inch enhanced VGA, mono / color Video display, 15 inch enhanced VGA, mono / color
VGA Controllers	SVGA Graphics adapter, 512 KB / 1 MB video RAM, 1024x768 Windows Graphics adapter 1 MB video RAM, 1024x768 Work Station adapter 1 MB / 2 MB video RAM, 1280x1024
Auxiliary Pointing Devices (Mouse)	Serial mouse. Attaches to serial port. PS/2 mouse. Attaches to the mouse port.
Memory	4 MB Memory board (SIMM) 16 MB Memory board (SIMM) 64 KB Cache memory board 256 KB Cache memory board
Adapters	SCSI Host adapter board
Communication Network	NCR Token ring adapter Intel Etherexpress adapter
Processor Upgrade	Intel OverDrive™
Fixed Disk Drives	80 MB Fixed disk drive, IDE/AT 120 MB Fixed disk drive, IDE/AT 160 MB Fixed disk drive, IDE/AT 240 MB Fixed disk drive, IDE/AT 340 MB Fixed disk drive, IDE/AT 520 MB Fixed disk drive, IDE/AT 240 MB Fixed disk drive, SCSI 535 MB Fixed disk drive, SCSI 1 GB Fixed disk drive, SCSI
Flexible Disk Drives	1.44 MB 3.5-inch Flexible diskette drive 2.88 MB 3.5-inch Flexible diskette drive 1.2 MB 5.25-inch Flexible diskette drive
Cassette Tape Drives	525 MB SCSI Cassette Tape Drive 240 MB Cassette Tape Drive, flex disk interface
CD-ROM Drives	600 MB CD-ROM drive, SCSI
Cables	Token ring adapter cable Parallel printer cable Serial printer cable RS-232C communication cable Dual 9-pin serial cable Dual 25-pin serial cable

Contents

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Installing the System

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Using the System

Chapter 3
Using Support Software

Chapter 4
Installing Options

Appendix A
Switches and Technical Data

Glossary

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Federal Communications Commission (FCC) Radio Frequency Interference Statement

Information to User

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

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio/TV technician for help

Caution

NCR Corporation (NCR) is not responsible for any radio or television interference caused by unauthorized modifications of this equipment or the substitution or attachment of connecting cables and equipment other than those specified by NCR. Such unauthorized modifications, substitutions, or attachments may void the user's authority to operate the equipment. The correction of interferences caused by such unauthorized modifications, substitutions, or attachments will be the responsibility of the user.

Use only shielded data cables with this system.

Declaration of Conformity according to EN 45014

Supplier: NCR GmbH, Ulmer Strasse 160, 8900 Augsburg, Germany

NCR GmbH declares that the Personal Computer NCR 3333 conforms to the following specifications.

- Safety: EN 60950
- EMC: EN 55022 Class B, and EN 50082-1

Augsburg, 30 March 1993

E.Sander
Development
Entry Level Business Unit

Canadian Department of Communications Statement

This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe B prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

VCCI - Japan

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しかし、本装置をラジオ、テレビジョン受信機に近接してご使用になると、受信障害の原因となることがあります。

取扱説明書に従って正しい取り扱いをして下さい。

IMPORTANT SAFETY INSTRUCTIONS

1. Read all of these instructions.
2. Save these instructions for later use.
3. Follow all warnings and instructions marked on the product.
4. Unplug this product from the wall outlet before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a damp cloth for cleaning.
5. Do not use this product near water.
6. Do not place this product on an unstable cart, stand, or table. The product may fall, causing serious damage to the product.
7. Slots and openings in the cabinet and the back or bottom are provided for ventilation: to ensure reliable operation of the product and to protect it from overheating, these opening must not be blocked or covered. The openings should never be blocked by placing the product on a bed, sofa, rug, or other similar surface. This product should never be placed near or over a radiator or heat register. This product should not be placed in a built-in installation unless proper ventilation is provided.
8. This product should be operated from the type of power source indicated on the marking label. If you are not sure of the type of power available, consult your dealer or local power company.
9. This product is equipped with a 3-wire grounding-type plug, a plug having a third (grounding) pin. This plug will only fit into a grounding-type power outlet. This is a safety feature. If you are unable to insert the plug into the outlet, contact your electrician to replace your obsolete outlet. Do not defeat the purpose of the grounding-type plug.

10 Do not allow anything to rest on the power cord. Do not locate this product where persons will walk on the cord.

11 If an extension cord is used with this product, make sure that the total of the ampere ratings on the products plugged into the extension cord do not exceed the extension cord ampere rating. Also, make sure that the total of all products plugged into the wall outlet does not exceed 15 amperes.

12 Never push objects of any kind into this product through the cabinet slots, as they may touch dangerous voltage points or short out parts; that could result in a risk of fire or electric shock. Never spill liquid of any kind on the product.

13 Except as explained elsewhere in this manual, do not attempt to service this product yourself. Opening or removing those covers that are marked "Do Not Remove" may expose you to dangerous voltage points or other risks. Refer all servicing in those compartments to service personnel.

14 Unplug this product from the wall outlet and refer servicing to qualified service personnel under the following conditions.

- When the power cord or plug is damaged or frayed.
- If liquid has been spilled into the product.
- If the product has been exposed to rain or water.
- If the product does not operate normally when the operating instructions are followed. Adjust only those controls that are covered by the operating instructions, since improper adjustment of other controls may result in damage and will often require extensive work by a qualified technician to restore the product to normal operation.
- If the product has been dropped or the cabinet has been damaged.
- If the product exhibits a distinct change in performance, indicating a need for service.

Chapter 1

Installing the System

Overview

Installing the System

Assembling the Hardware — Information on how to position the computer and how to connect the keyboard and the display.

What are the Controls ? — Information on the position and functions of the controls and connectors.

Starting the System — What to consider before you start operating your computer for the first time.

Noting the System Configuration — How to make a copy of the system configuration data.

Setup — How to set your system configuration exactly.

Loading the Operating System — Basic information on how to configure the operating system.

Application Software — Additional help for software installation.

Memory Background Information — Hints for customizing the system's memory.

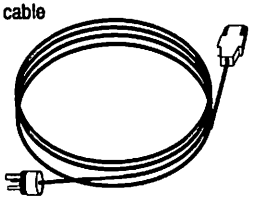
Assembling the Hardware

Check the Parts

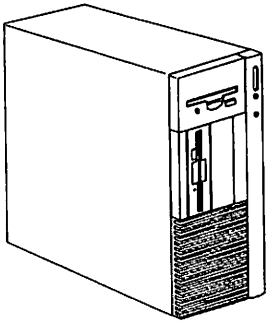
Before starting to assemble the system, make sure that you have all the parts.

Keep the packing material. It will be useful if you wish to move the system later.

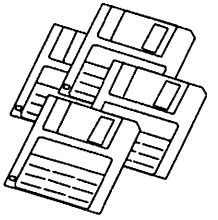
power cable



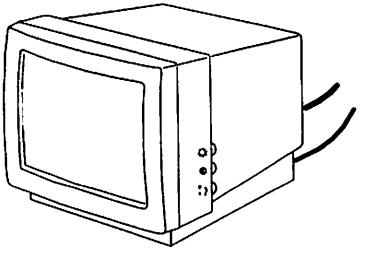
Model 3333 computer



support software and diagnostic diskettes

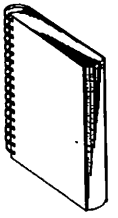


VGA display with power cable and data cable

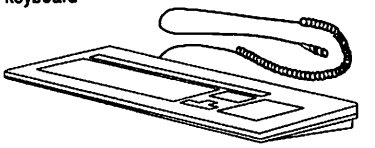


keys and adhesive feet

user's manual



keyboard



Positioning the Computer

When selecting a suitable location for your computer, you should consider the following hints.

Avoid extreme temperatures as well as excessive humidity, dust, and direct sunlight.

Provide sufficient working space around the computer.

Always keep the air circulation vents free and not too close to the wall.

Avoid installing the computer into any type of enclosure. For reliable operation, the system needs free air circulation.

An adequate number of wall outlets (installed according to local regulations) should be available for properly connecting the computer and any additional units you may wish to attach.

Connect radio or TV receivers to a different power circuit than the computer.

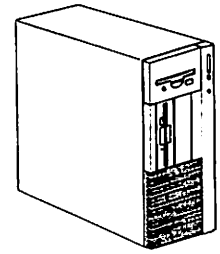
Make sure that the wall outlet is easily accessible, and as close as possible to the system.

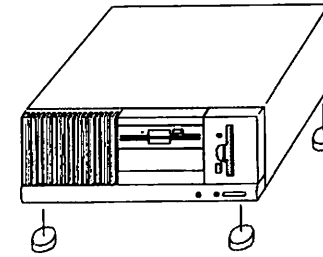
Make sure that the on/off switch is easily accessible.

You may operate your computer in the tower orientation or in the desktop orientation.

Attach the self-adhesive feet only if you operate your computer in the desktop orientation. Do not use the feet when you are operating your computer in the tower orientation.

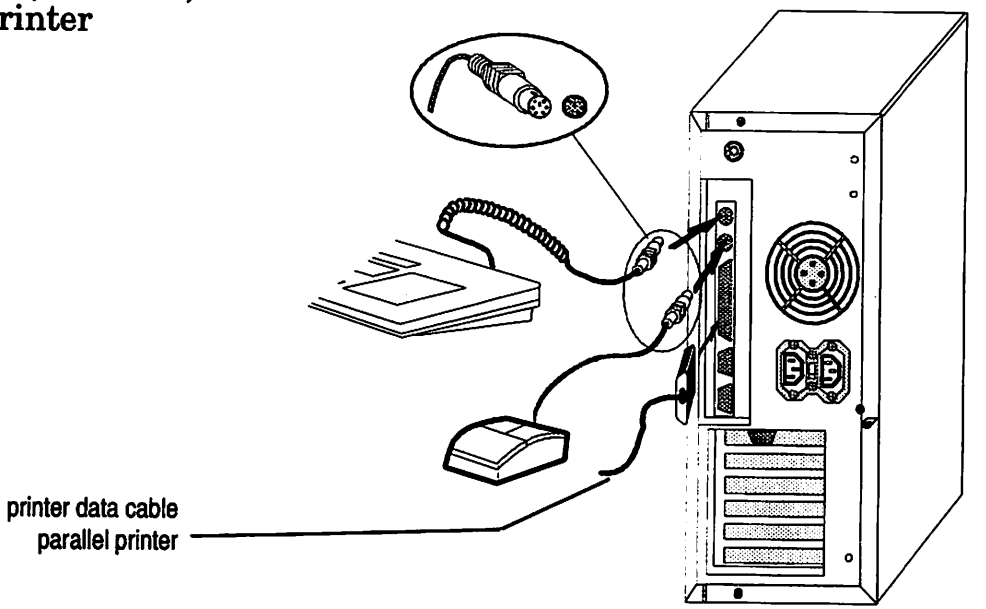
tower orientation





desktop orientation

Connecting the Keyboard, a Mouse, and a Printer



Connect the keyboard to the computer. Also connect your printer and your mouse, if available.

Notes for connecting a printer.

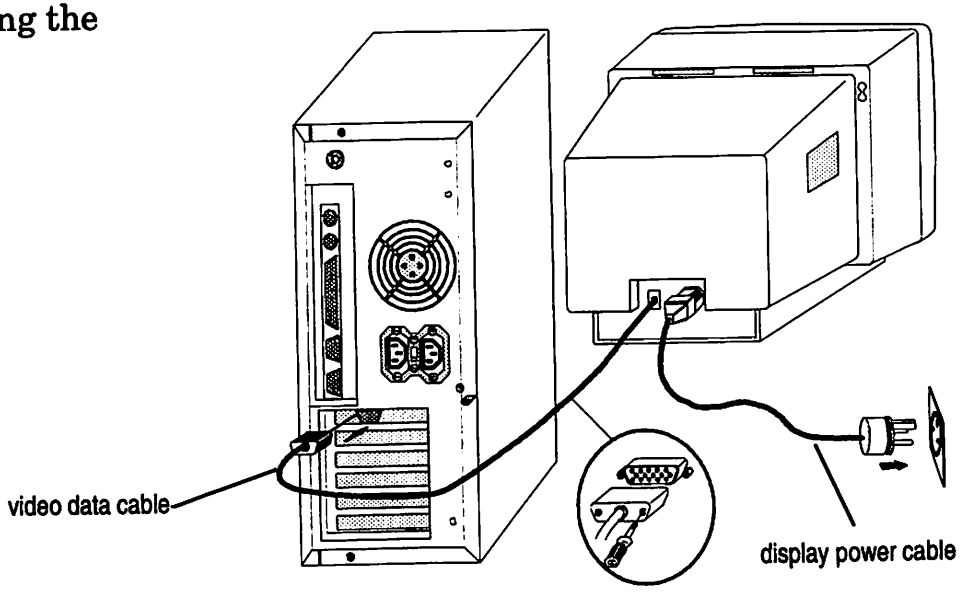
1 Be sure that the printer is turned off.

2 Connect the D-shaped printer data cable connector to the appropriate connector on the computer back panel.

3 Tighten the holding screws.

4 Plug the printer power cable into a properly grounded wall outlet.

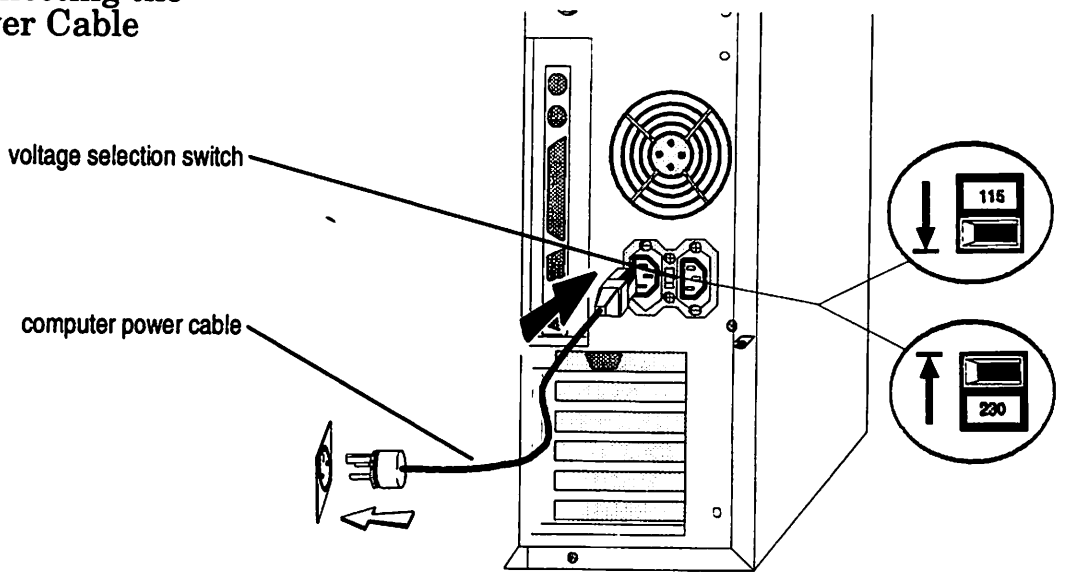
Connecting the Display



1 Connect the video data cable to the computer.

2 Install the display power cable to connect your display to a properly grounded wall outlet.

Connecting the Power Cable



1 Check that the voltage selection switch is set correctly for the local electrical supply.

115 for nominal voltages between 100 Vac and 125 Vac. This is the standard setting for U.S.A.

230 for nominal voltages between 220 Vac and 240 Vac.

Caution Operating the computer with the wrong voltage selection setting can seriously damage the computer.

2 Connect the power cable to the computer and the other end into a properly grounded wall outlet.

What are the Controls ?

Front Panel Controls

Power Switch

- Push the power switch in to switch on.
- Press the power switch again and release it to switch off.

Computer Power Lamp

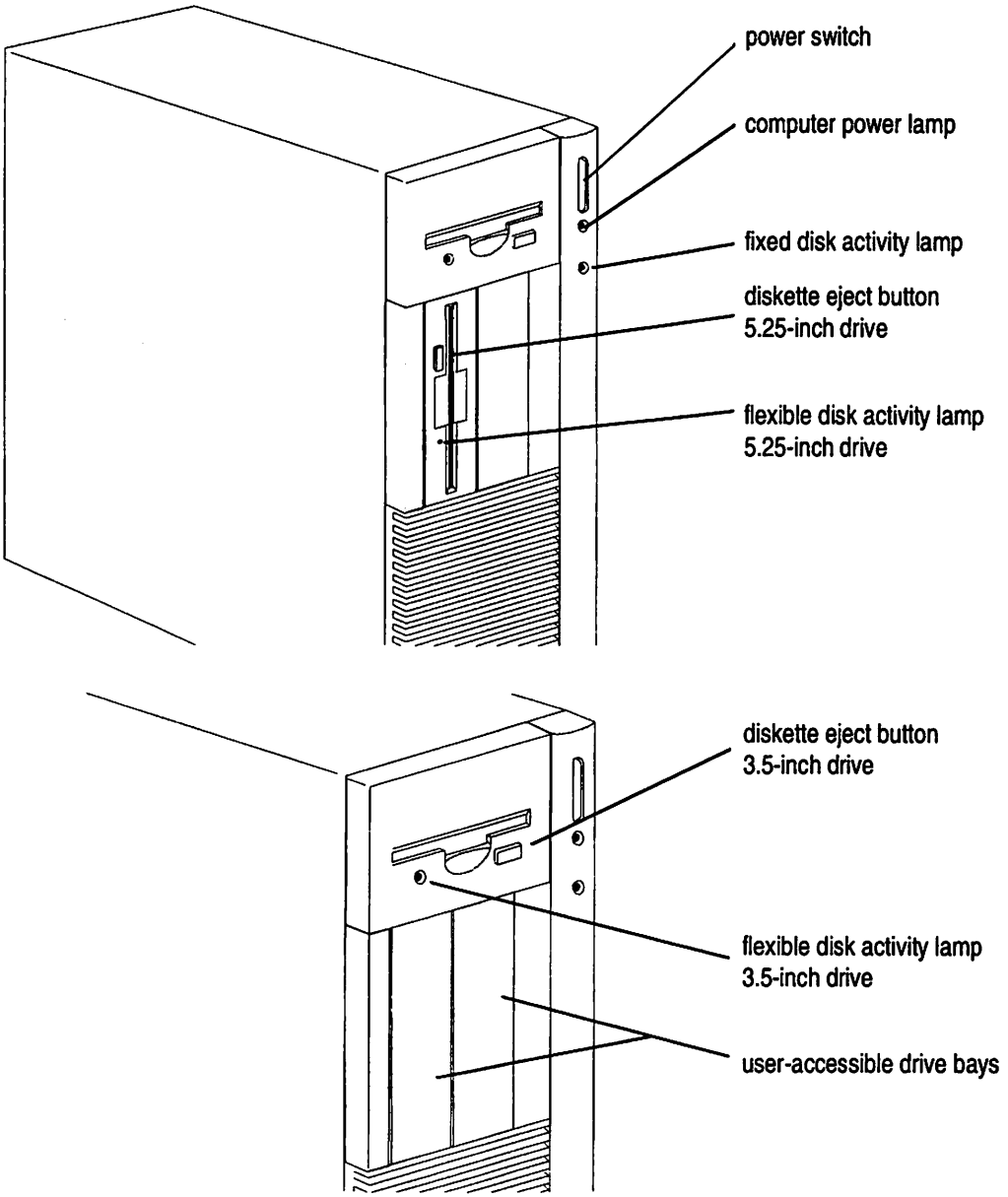
The green LED lights when the computer is *on*.

Fixed Disk Activity Lamp

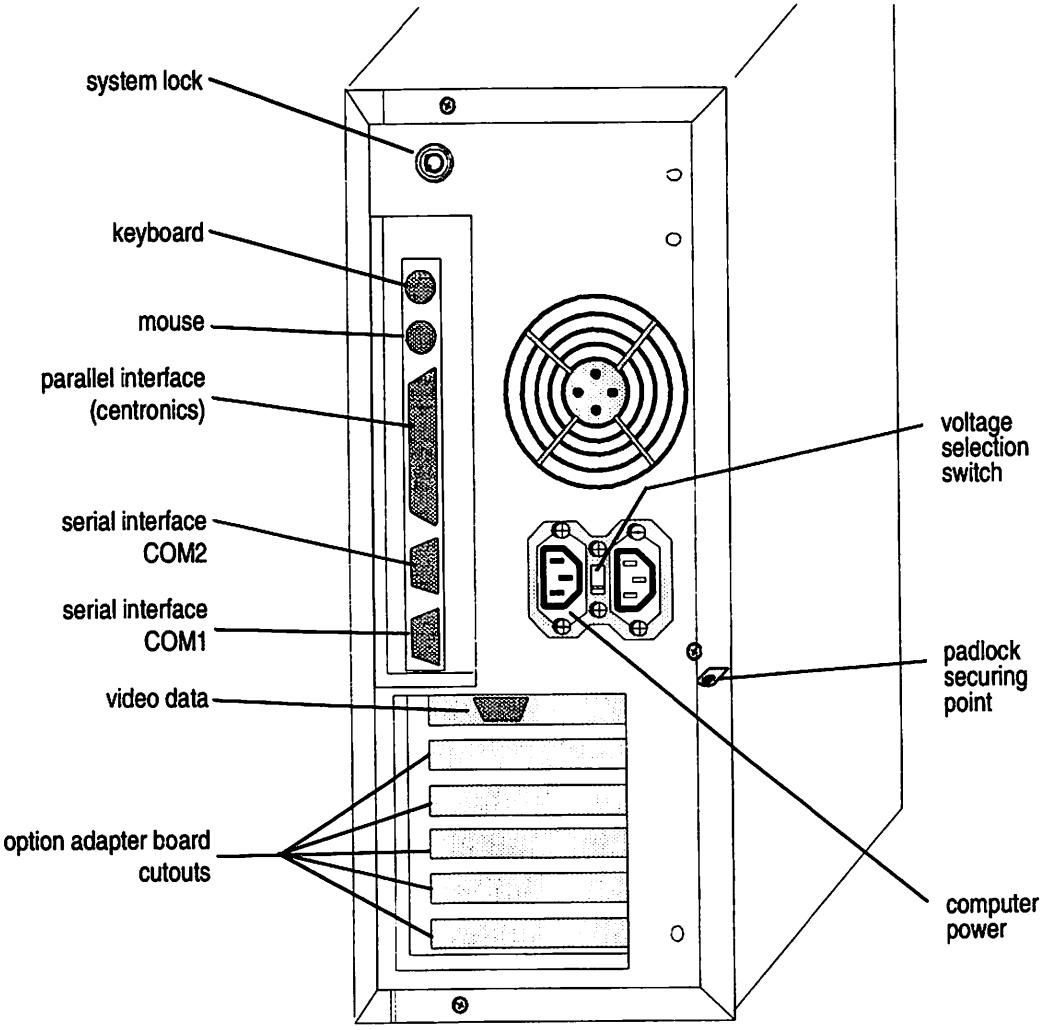
The amber LED lights when the fixed disk drive is operating.
Note: The lamp does not light when a SCSI fixed disk drive is operating.

Diskette Eject Button

To remove a diskette, push on the eject button. The diskette partially pops out.


power switch
computer power lamp
fixed disk activity lamp
diskette eject button
5.25-inch drive
flexible disk activity lamp
5.25-inch drive
diskette eject button
3.5-inch drive
flexible disk activity lamp
3.5-inch drive
user-accessible drive bays

Back Panel Controls and Connectors



Voltage Selection Switch

Match the switch setting with the voltage rating of the electrical outlet, 115 Vac or 230 Vac.

Parallel I/F Connector

Connector for *Parallel Port 1* (LPT1, 378h-37Fh). Use to connect the signal cable of a parallel printer or any other parallel (Centronics) device.

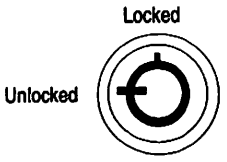
Serial 2 Connector

9-pin connector for *Serial Port 2* (COM2, 2F8h-2FFh) Use to connect the signal cable of a serial (RS-232C) printer, or any other RS-232C device.

Serial 1 Connector

9-pin connector for *Serial Port 1* (COM1, 3F8h-3FFh) Use to connect the signal cable of a serial (RS-232C) printer, or any other RS-232C device.

Caution Make sure that your serial device cable transfers data between corresponding pins on your serial device connector and the computer's serial connector. The appendix "Switches and Technical Data" gives the pin/signal assignment for the computer's serial connectors.



System Lock

Prevents removal of the computer cabinet cover.

The computer is unlocked on delivery.

Keep the computer cabinet locked to prevent unauthorized access to the system.

Video Data Connector

Use to connect the data cable of your VGA display.

Mouse Connector

Use to connect a PS/2- type mouse.

Padlock Securing Point

Use to physically secure your computer to its place to prevent unauthorized moving or removal.

Starting the System

Perform the following steps before you start operating your computer for the first time.

Caution Check the voltage selection switch again before you switch on. Operating the computer with the wrong voltage selection setting can seriously damage the computer.

1 Note the system configuration, as described in the following section "Noting the System Configuration." Thus you identify the type number of your fixed disk drive and you get a copy of the default system configuration data for future reference.

2 Install additional hardware options, if you have any. Some examples of options are a coprocessor, communication adapters, additional drives, and additional memory. Refer to Chapter 4 "Installing Options."

3 Run SETUP, as described in this Chapter in "Setup," and set the system configuration exactly to your requirements.

4 Do one of the following activities.

- Load your operating system. Refer to the section "Starting the Operating System" in this Chapter.
- Read Chapter 2 "Using the System."
- Use the software explained in Chapter 3 "Using Support Software" to make your system more useful.

Noting the System Configuration

In the CMOS RAM the system stores important information about the exact configuration of your system. Before proceeding further, you should copy this information into these pages. To do so, use the following procedure.

1 Switch on the display.

2 Switch on the computer.
The computer automatically performs some internal tests. A display message in the top left corner shows the completed tests.

3 Be prepared to press the **F1** function key when you are prompted to do so. Watch for the message

```
_KEYBOARD
```

4 The next message to appear is

```
PRESS <F1> IF HARDWARE SETUP IS DESIRED
```

Press the function key **F1** immediately.

5 The system will complete the automatic internal tests. Then it will display the first Setup screen.

It may happen that you are too late in pressing the **F1** key, and the Setup screen is not displayed. If this happens, switch off and start again.

6 Copy the **Current Settings** data from this screen into the "Your Setting" column of the Figure below.

Parameter	Your Setting
Date	
Time	
Flexible Disk A:	
Flexible Disk B:	
Fixed disk C:	
Fixed disk D:	
Extended memory size	
Primary display	
Screen width	
Monitor type	

7 When you have copied the data, press the function key **F2** to display the second Setup screen.

Copy the **Current** data from this screen into the "Your Setting" column of the following Figure.

Parameter	Factory Default	Your Setting
Flex Disk Interface:	Yes	
AT-Drive Interface:	Yes	
AT-Bus Speed :	Fast	
Parallel Port:	LPT1	
Serial Port 1:	COM1	
Serial Port 2:	COM2	
486 Internal Cache:	Yes	
Second Level Cache:		
BIOS Cacheable:		
Parallel Bidirect.	No	
Shadow Video BIOS:	Yes	
Shadow C8000 - CBFFF:	No	
Shadow CC000 - CFFFF:	No	
Shadow D0000 - D3FFF:	No	
Shadow D4000 - D7FFF:	No	
Shadow D8000 - DBFFF:	No	
Shadow DC000 - DFFFF:	No	
Shadow E0000 - EFFFF:	No	

8 When you have copied the screen data, press the **Esc** key to exit the Setup procedure.

To learn more about the Setup procedure and how to make changes to it, refer to "Setup." However, note the current configuration, as described above, before attempting to make any changes either to the hardware or to the Setup procedure.

Setup

Use this procedure to store data about the system configuration. During the assembly of the hardware, you used this procedure to determine the exact configuration of the system. The following description provides information on how to make changes to SETUP when required.

Run SETUP if

- you want to check the system configuration or date and time setting of the system
- you have changed the features of the system
- the battery requires replacing or has been exchanged

How to run SETUP

Switch on the display and the computer.
You do not need a diskette to run SETUP.

Be prepared to press the **F1** key immediately when you are prompted to do so.

The system runs several internal tests, called Power-On Diagnostic routines.

After the message

```
_KEYBOARD
```

the screen displays

```
PRESS <F1> IF HARDWARE SETUP IS DESIRED
```

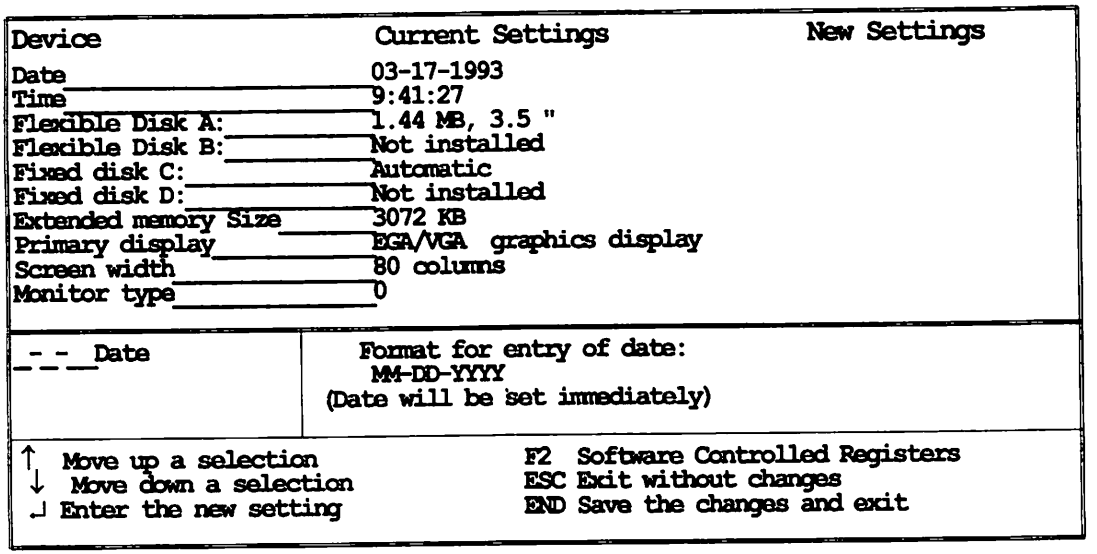
Press the **F1** function key now to start the SETUP routine, display the SETUP screen, and proceed with the program.

When you have defined and enabled passwords, you need the master password to access SETUP. On the prompt

```
Enter Master Password:
```

type in the master password and press **Enter**.

The illustration on the next page shows the first SETUP screen.



If your display doesn't show a SETUP screen similar to the illustration, you were probably too late when pressing the **F1** key. Switch off the computer and start again.

If you cannot get any screen display, turn to "Troubleshooting" in the Chapter "Using the System."

Declaring Parameters

Follow the instructions in this section to declare certain conditions to the operating system.

Move the cursor with the up (↑) and down (↓) cursor keys to select the parameter you want to enter or change (section 1). The portion to the right in section 1 on the screen displays the new entries made by the operator.

The left portion of section 2 on the screen displays a prompting cursor for operator entry while the right portion of section 2 displays the possible entries for the parameter under consideration.

Section 3 and, sometimes, section 2 display messages from the system that help the operator to enter parameters. Sections 2 or 3 of the SETUP screen may contain messages providing information or messages about operator entry mistakes.

Always press the **Enter** (↵) key after you make an entry which displays in the left portion of section 2 of the screen.

The possible entries displayed in section 2 of the screen depend on the firmware installed in your system and may differ slightly from the corresponding description given in this section. In this case follow the screen display for declaring parameters.

Device

Date

Enter the date in the format

month (MM) - **day** (DD) - **year** (YYYY)

Time

Enter the time in the format

hour (HH) : **minutes** (MM) : **seconds** (SS)

Use the 24-hour clock

Flexible Disk A

Enter the parameter for the first or only flexible disk drive (Drive A) of your system.
`1.44 MB, 3.5"` or
`2.88 MB, 3.5"`
Check your copy of the setup data for information on the factory-installed flexible disk drive.

Flexible Disk B

If a second flexible disk drive (Drive B) is installed, select the following setting.
`1.2 MB, 5.25"`

Notes: Do not declare a streaming tape drive during SETUP. The system recognizes a tape drive automatically.

Do not declare a SCSI drive during SETUP. The system recognizes SCSI drives automatically via the SCSI subsystem.

Fixed disk C

Enter the parameter for the first fixed disk drive installed in the unit.

Enter **0** (**Not installed**) for a SCSI fixed disk drive.

If you enter **2** (**Automatic disk parameter detection**) the computer identifies and logs the installed fixed disk drive automatically. Select **P** if you want to display the technical drive parameters of the automatically identified drive.

With the **Manual disk parameter via USERHDD.EXE** selection you can log in your fixed disk drive manually.
First, however, you must define your fixed disk drive with the USERHDD utility that is supplied on *Support Diskette 1*. This is useful only if the automatic disk parameter detection does not recognize your drive type. You need the technical parameters of the drive instead.

For more information refer to "Defining a Fixed Disk Manually" in Chapter 3 "Using Support Software."

An error message when trying to enter **Manual disk parameter via USERHDD.EXE** for a fixed disk drive indicates that you have forgotten to install the drive with the USERHDD utility.

You can also enter the drive type number directly. Check your copy of the setup data for information on the factory-installed fixed disk drive.
If you have installed a fixed disk drive yourself, refer to the instructions provided with the kit for the disk type.

Fixed disk D

Enter the parameter for the second fixed disk drive for D.

If you don't have drive C, you cannot have drive D.

Select **Not installed** for a SCSI fixed disk drive.

For information on automatic drive identification and manual drive definition, refer to the previous section, "Fixed disk C."

Extended memory size

Automatically indicates the amount of memory left for use as extended smemory.

Extended memory is extra memory used for software applications requiring larger amounts of memory, for example, Windows™, or a RAM disk.

Primary display

The **Current settings** display shows the setting (**EGA/VGA**, **alphanumeric**, or **color/graphics**) for the display adapter attached to the unit.

The video selection switch on the main processor board determines an **alphanumeric** or **color/graphics** setting shown in the SETUP message. These settings are possible only with a non-VGA video adapter installed in the computer.

If the SETUP screen prompt goes immediately to this entry, and another video choice appears in the **New settings** section of the screen, press **End** to accept the new entry.

Screen width

This is preset to **80 Columns**.

The **40 Columns** setting is allowed only when you are not using the factory-installed VGA controller.

Monitor type

Define the type of display that is connected to the system.

- Press the **V** key to display a help screen that shows various types of displays.
- Make a note of the type number that corresponds to your display. Then press any key to return to the SETUP screen.
- Enter the type number at the **Monitor type** line and press **Enter**.

Note: The display type definition may not be applicable for the display adapter in your computer. In this case pressing the **V** key has no effect and does not display the help screen. Check the file A:\VGA\README.DOC on *Support Diskette 1* for information on how to define the display type for your display adapter.

F2 Software Controlled Registers

Press the **F2** key to access the second SETUP screen "Software Controlled Registers and Memory Setup" that provides shadow and cache memory setting, I/O port setting, and disk controller setting.

Note: If you have accidentally entered the second screen, press **Esc** to return to the previous SETUP screen.

ESC/END

When you have made all the changes required on the SETUP screen(s), press one of these keys.

Esc = Does not save the changes; keeps the original contents.

End = Saves the changes.

Once the SETUP screen parameters are stored, the computer restarts.

Note: When you have defined and enabled passwords, you need the master password or a user password when the computer starts again after a SETUP session.

Software Controlled Registers and Memory Setup

Use the second screen "Software Controlled Registers and Memory Setup" of the SETUP procedure to change the default parameters of

- the serial and parallel connectors, disk controllers, and
- the shadow memory and the cache memory.

Before starting to modify the default settings, refer to the documentation that is provided with the hardware/software that you want to use, and make sure that you have all the necessary information.

Note: Only experienced users and system administrators should modify the parameters of the shadow and cache memory. You need a profound knowledge of the system's memory structure and of the special shadow and cache memory settings required for your applications.

Flex Disk Interface

Enables/disables the flexible disk controller on the main processor board.

The default setting is **Yes (Enable Flex Disk Controller)**.

AT-Drive Interface

Enables/disables the IDE/AT fixed disk drive controller on the main processor board.

The default setting is **Yes (Enabled)**.

AT-Bus Speed

Use this option to determine the speed of the system's AT-Bus. It allows to adjust the bus speed according to application software, written for slower adapter boards.

The default setting is **Fast**.

Parallel Port

Use this option to select the address range of the parallel port (Centronics), or to disable the parallel port.

LPT1 - address range 378h to 37Fh
LPT2 - address range 278h to 27Fh

The default setting is **LPT1**.

Serial Port 1
Serial Port 2

Set to disable the serial ports, or to define which serial port has the primary address range 3F8h-3FFh, or COM1. The other serial port switches automatically to the secondary address range 2F8h-2FFh, or COM2, if you have not disabled it.

The default settings are
Serial Port 1 COM1
Serial Port 2 COM2

486 Internal Cache

For higher system performance the microprocessor contains 8 KB of processor-internal fast cache memory, which buffers the processor's memory accesses.

This option allows to enable/disable the caching feature. Caching is sometimes disabled for diagnostic purposes, but disabling it will significantly degrade computer performance.

The default setting is **Yes (Enabled)**.

Second Level Cache

You can optionally install additional cache memory to the main processor board for higher system performance.

When a second level cache board is installed, this option allows to enable/disable the additional cache memory. If installed, this cache memory is typically disabled only for diagnostic purposes.

BIOS Cacheable

The contents of the system's BIOS ROM and video ROM is automatically copied to the main system RAM. Enable **BIOS Cacheable** to speed up processing by transferring these data from the RAM to the second level cache memory, if installed.

Parallel Bidirect.

Select **Yes** if you want to

- run a communication application that requires a bi-directional data line mode on the parallel interface, or
- connect a PS/2 depending file transfer kit to the parallel interface.

Select **No** if you want to connect a parallel printer or any other parallel (Centronics) device.

The default setting is **No**.

Shadow Video BIOS

Enable to speed up processing by transferring the contents of the video ROM to the main system RAM.

The system will use 64 KB of the reserved memory between 640 KB and 1 MB as shadow memory for the video ROM.
So the reserved memory that you can use as extended memory or EMS memory is reduced to 320 KB.

Enabling automatically reduces the extended memory setting in the first SETUP screen by 64 KB.

When you disable the ROM shadowing later, these 64 KB will be automatically added to the extended memory setting in the first SETUP screen.

The default setting is **Yes (Enabled)**.

Shadow C8000 - CBFFF
Shadow CC000 - CFFFF
Shadow DX000 - DYFFF
Shadow E0000 - EFFFF

Enable to copy the ROM of an additional board, for example, a communication board, into RAM. This reduces the extended memory available in the reserved memory area between 640 KB and 1 MB.

For the address refer to the documentation of the additional board.

The default setting is **No (Disabled)**.

ESC/END

When you have made all the changes required on the second SETUP screen, press one of these keys.

Esc = Returns you to the previous SETUP screen. Does not save the changes on the second SETUP screen; keeps the original contents.

End = Returns you to the previous SETUP screen. Saves the changes on the second SETUP screen when you exit the setup routine by pressing **End** again.

Starting the Operating System

Normally the operating system is factory-installed on the fixed disk. You may also have Windows factory-installed. However, systems with the operating system factory-installed are shipped without operating system media (diskettes with software).

For systems where the operating system has not been pre-installed, you must insert the first operating system diskette into drive A before you switch on.
Insert the diskette with the label facing up. Push the diskette in until it clicks into position.

Switch On

1 Switch on all peripherals - display, printer, etc. Refer to the manuals supplied with these devices for more information.

2 Switch on the computer.
The computer will perform a power-on self test that is displayed on the display screen.

3 Follow the instructions displayed on the screen and provided with the operating system documentation.

Operating System Configuration

Backing Up the Operating System

When you switch on your system, a screen message will prompt you to prepare backup copies on diskettes of the operating system files.

If original operating system diskettes are already supplied with your computer, you do not need to prepare backup copies. In this case there is no screen message prompting you to do so.

Note: Using the factory-installed software is subject to the terms and conditions set out in the "Customer Program License Agreement" on the inside rear cover of this manual. Preparing backup copies indicates that you accept the terms of this license agreement.

Follow the menu-driven instructions displayed on the screen to prepare the backup copies on diskettes.

You can install your backup to any system. You may, however, only re-install it to systems for which you have acquired a license.

Adhesive labels are provided to label your backup diskettes.

The following hints provide additional assistance when you follow the screen menus to prepare your backup diskettes.

Delete xxxx Images The images are exact copies of the original software diskettes installed in a special format on your fixed disk. To save disk space on your fixed disk, you can delete the images after you have prepared your backup diskettes.

Note: This option will not delete the software itself, but only the copy installed to make backup diskettes.

Caution Do not execute a **Delete xxxx Images** selection before you have prepared a complete backup copy of the operating system. You cannot create another set of backup diskettes when you have deleted the images.

Disable Backup Autostart With this option you can select that the backup utility DISKBAK.EXE does not start automatically every time you start your system.

Customize Windows With this option you can enter your name and company to be displayed in the Windows information screens.

Note: The file DISKBAK.EXE is no longer useful for you after you have executed the following options of the menu. You may delete it.

```
Backup xxxx
Delete xxxx Images
Disable Backup Autostart
Customize Windows
```

System Configuration

When you start your computer, the MS-DOS operating system reads the CONFIG.SYS file and executes the commands in the AUTOEXEC.BAT file before it displays the system prompt. In the CONFIG.SYS file MS-DOS stores necessary data about the system configuration, for example, installed devices, and how to find device drivers. Some applications require specific entries in the CONFIG.SYS file.

Note: If both, SCSI and IDE fixed disk drives, are installed in your computer, you can only start ("boot") your system from the IDE fixed disk drive. In this case, the operating system and the files CONFIG.SYS and AUTOEXEC.BAT must be installed on the IDE fixed disk drive.

The use of some special hardware, for example, scanners or analog tablets, may require the use of a specific operating system and/or specific utility programs.

You may have to configure the operating system to meet your country-specific requirements, for example, if you are using the English operating system version in Scandinavia.

VGA Display

To use VGA features exceeding standard VGA, You must load extra VGA drivers and VGA support software to your system. Refer to the Chapter "Using Support Software" in this manual.

With a factory-installed Windows on your computer, the VGA drivers and the SetRES utility (for display screen resolution and colors) are already installed.

Multiple Operating Systems

You may want to prepare your fixed disk to use more than one operating system; or you may want to split the storage capacity of the fixed disk into several logical units. For these purposes the operating system offers fixed disk partitioning.

When you are installing more than one operating system, check the documentation for which operating system you must install first.

Networks

When using your computer within a network

- enter the parameters of the communication adapter and the network to the system configuration files of the computer operating system.
- update the network configuration software with the parameters of your computer.

Device Drivers

A device driver is a program that includes information about a device. To operate some special hardware, the installation of specific device driver software into the operating system may be required.

When installing new devices to your computer, software provided with the devices may automatically initiate the required update of the system configuration file; otherwise, a manual update of the system configuration file is required.

Although your computer is delivered to be used out of box, you may still need to install VGA driver software from the *Support Diskettes* to your system. Follow the instructions given in the Chapter "Using Support Software" in this *User's Manual* and in the README files on the *Support Diskettes*.

Operating System Documentation

On-line help utilities are provided on the fixed disk to help you with operating the factory-installed operating system.

The DOSHELP utility provides assistance for using MS-DOS. Type **DOSHELP** on the system prompt C> to start this utility. You can also get helpful information on MS-DOS commands by typing **HELP** on the system prompt C>.

The *WinGuide*™ online document is provided to help you operating Windows. Double-click on the *WinGuide* icon in the "Documentation" window to start *WinGuide*.

Viewing the Latest System Information

If the factory has modified or changed the system and the accompanying software after the print of the *"User's Manual"* you will find the necessary information in the file *readme.doc* on the *Support Diskette 1.*

To display the *readme.doc* file, proceed as follows.

1 Switch on the system and the display. Wait for the system prompt A> or C>.

2 Insert the *Support Diskette 1* into the flexible disk drive.

3 Type the following commands. Press **Enter** after each.

```
A:
README
```

4 When the file appears, use the **PgUp** and **PgDn** keys to view the entire file.

5 To print the file, type the following commands and press **Enter** after each.

```
A:
COPY README.DOC LPT1
```

Application Software

Application software directs the system to perform a specific task, and provide the desired information. The software is supplied on diskettes together with instructions on how to install and use it.

Before you start installing application software, you should know the answer to the following questions.

- What type of operating system does the application require?
- How much disk space does the application require?
- How much random access memory (RAM) is required to run the application?
- Does the application use expanded or extended memory?
- What type of display and display adapter does the application need?
- Does the application require a coprocessor?
- What printers does the application support?
- Does the application require other software or hardware (for example, a mouse) to run smoothly or at all?

Hints for Application Installation

Follow the instructions supplied with your application.

Refer to your operating system documentation for additional help.

Check that all hardware devices you want to use for running the application are installed and configured to meet the requirements of your application.

Check that you know the specific parameters of your hardware devices for use with the application.

Software can be expensive; even with careful handling, it may get accidentally damaged. To avoid the expense and possible delays in buying new copies of your software, the first steps in using the software should be to make copies.

Use copies for your day-to-day use; keep the originals as masters in case the copies become damaged. Store the original diskettes in a safe place. Use them only for preparing copies.

Some diskettes are protected in a way that copying is inhibited. Carefully follow the instructions that come with these diskettes.

Memory Background Information

You can have up to 64 MB of RAM (Random Access Memory) on SIMMs (Single Inline Memory Modules) installed in 4 sockets on the main processor board.

If you don't have 64 MB of RAM factory-installed in your system, you can install additional SIMM memory kits. Each kit contains either one 4 MB SIMM or one 16 MB SIMM.

Total Memory	SIMM Combination	
	4 MB SIMMs	16 MB SIMMs
4 MB	1 x 4 MB	none
8 MB	2 x 4 MB	none
12 MB	3 x 4 MB	none
16 MB	4 x 4 MB	none
16 MB	none	1 x 16 MB
20 MB	1 x 4 MB	1 x 16 MB
24 MB	2 x 4 MB	1 x 16 MB
32 MB	none	2 x 16 MB
36 MB	1 x 4 MB	2 x 16 MB
40 MB	2 x 4 MB	2 x 16 MB
48 MB	none	3 x 16 MB
64 MB	none	4 x 16 MB

AT Bus Memory

You can install additional memory boards with **expanded** memory (EMS) into the system's AT bus.

The system does **not** recognize any **extended** memory on memory boards in the AT bus.

Memory Categories

There are different ways how the system can use its memory, or parts of it.

Conventional Memory

640 KB of memory are required for basic system operation and operating system requirements. You cannot access this memory area. This memory is also referred to as system memory or base memory.

Reserved Memory

The memory between 640 KB and 1 MB. You can use this memory for BIOS shadowing.
The operating system can use the reserved memory to install device drivers. Also, network controllers use reserved memory.
This memory is also referred to as upper memory.

High Memory

The first 64 KB section of the memory beyond 1 MB, that is, the memory between 1024 KB and 1088 KB. You can use the high memory area to load portions of some system files. Only one program can occupy the high memory at a time, even if it uses only a part of the high memory area.
High memory is also referred to as HMA.

Extended Memory

Extended memory is extra memory used for software applications that require larger amounts of memory, for example, a RAM disk.

Shadow Memory

Shadow memory increases the processing speed by transferring the contents of the ROM of the main system, or on a peripheral board, to the main system RAM.

EMS Memory

EMS (Expanded Memory System) memory expands the conventional memory beyond the standard 640 KB. To take advantage of EMS memory, the software must support EMS to access more than one megabyte of memory.

This type of memory does not physically reside in the system memory address space. It is accessed through available sections of reserved memory by using an EMS device driver.

EMS memory can be physically located on an expanded memory board that is plugged into the system's AT bus. However, a specific EMS device driver allows you to use parts of the extended memory as EMS memory.

Follow the instructions supplied with the driver software to install the EMS device driver. It normally requires to copy the driver to your operating system disk and add a statement like

DEVICE=<DRIVERNAME> [PARAMETERS]

to your CONFIG.SYS file. The parameters setting, for example, allows you to specify how much memory you want to use for EMS.

Chapter 2

Using the System

Overview

Using the System

Using Diskettes

How to choose and use diskettes correctly.

Troubleshooting

Help to correct problems with your system and power-on diagnostic.

Operating the System Safely

General safety considerations and hints for routine care.

Replacing the Battery

When and how to replace the battery of the computer.

Using Diskettes

Two types of flexible disk drives are available for your computer.

- 3.5-inch drives with a storage capacity of 1.44 MB (high capacity) and 2.88 MB (extended capacity).
- 5.25-inch drives with a storage capacity of 1.2 MB (high capacity).

A high capacity drive can also handle standard capacity diskettes.

An extended capacity drive can also handle high capacity diskettes and standard capacity diskettes.

Identifying Diskettes

Standard Capacity Diskettes

- 360 KB capacity, 5.25-inch
- 720 KB capacity, 3.5-inch

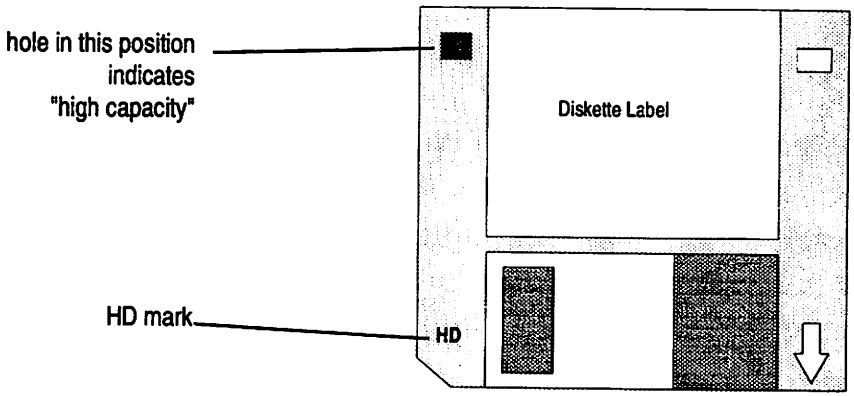
These diskettes normally do not show significant capacity identification marks.

High Capacity Diskettes

- 1.2 MB capacity, 5.25-inch
- 1.44 MB capacity, 3.5-inch

The label on a high capacity 5.25-inch diskette may show HD to indicate the 1.2 MB capacity.

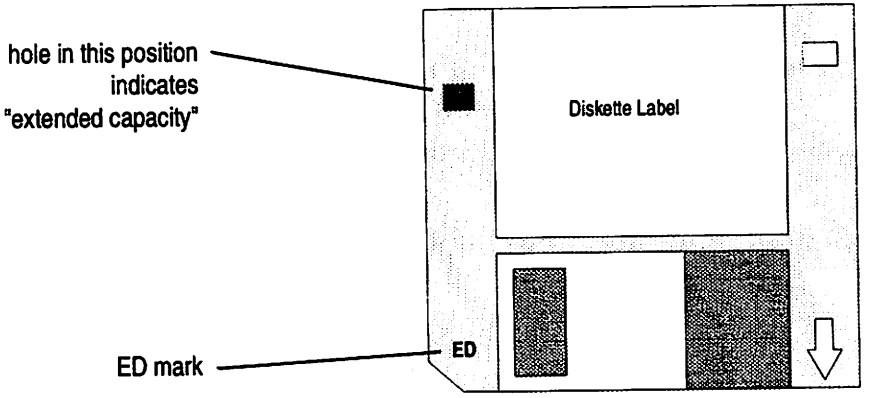
The second hole in the diskette case and the HD mark indicate a high capacity 3.5-inch diskette.



Extended Capacity Diskettes

2.88 MB capacity, 3.5-inch

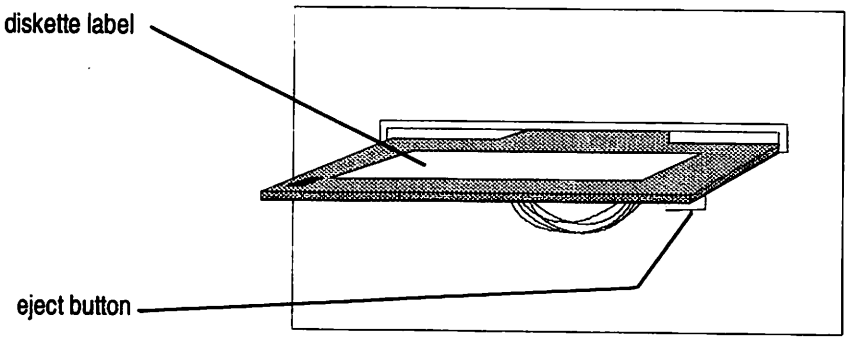
The second hole in the diskette case and the ED mark indicate an extended capacity 3.5-inch diskette.



How to Insert/Remove Diskettes

3.5-inch Diskettes

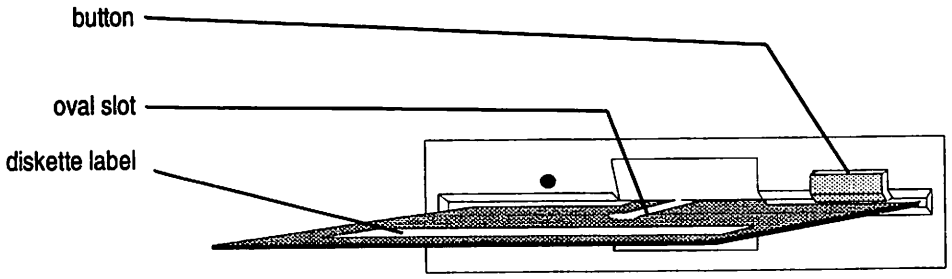
Insert the diskette with the label facing up, as shown in the illustration. Push the diskette in until it clicks into position.



To remove the diskette, push on the eject button. The diskette partially pops out. Now you can remove it and store it in a safe place.

5.25-inch Diskettes

- Take the diskette from the envelope.
- With the label facing up, carefully insert the diskette into the drive until it clicks into position. Be sure that the oval slot in the disk jacket is pointing to the rear.
- Push the button to lock the diskette into the drive.



To remove the diskette, push on the eject button. The diskette partially pops out. Now you can remove it and store it in a safe place.

Formatting Diskettes

To prepare diskettes to accept files, they must be formatted.

You will find detailed information on formatting diskettes in your operating system documentation. Refer to FORMAT in case of MS-DOS.

The following table shows which formatted diskette capacity you can achieve depending on the drive/diskette combination you are using.

Drive / Diskette Combination	Formatted Diskette Capacity	MS-DOS Format Command
2.88 MB Drive 2.88 MB Diskette (ED)	2.88 MB	`FORMAT A: *`
2.88 MB Drive 1.44 MB Diskette (HD)	1.44 MB	`FORMAT A:/f:1440 *`
2.88 MB Drive 720 KB Diskette (Std)	720 KB	`FORMAT A:/f:720 *`
1.44 MB Drive 1.44 MB Diskette (HD)	1.44 MB	`FORMAT A:`
1.44 MB Drive 720 KB Diskette (Std)	720 KB	`FORMAT A:/T:80/N:9`
1.2 MB Drive 1.2 MB Diskette (HD)	1.2 MB	`FORMAT A:`
1.2 MB Drive 360 KB Diskette (Std)	360 KB	`FORMAT A:/4`

* = MS-DOS 5.0 or higher required
ED = extended capacity
HD = high capacity
Std = standard capacity

Caution Do not use 2.88 MB diskettes in 1.44 MB drives.

Write Protection

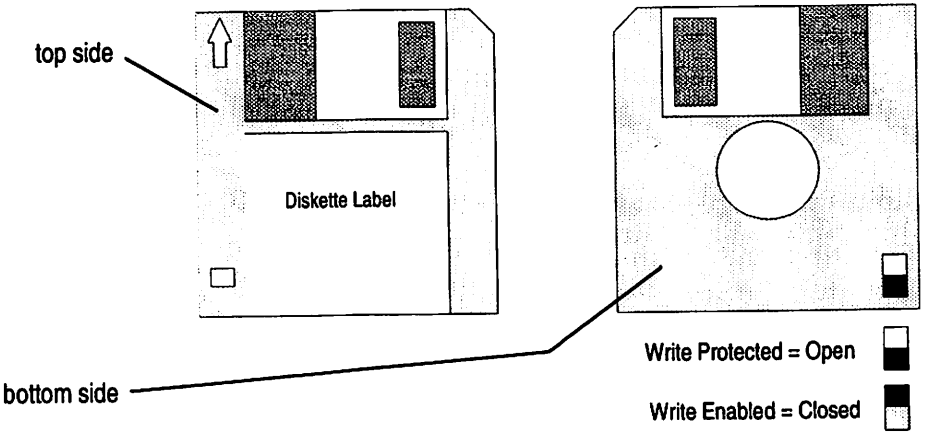
Often diskettes contain important data that you do not wish to change or destroy. You can achieve this by write-protecting these diskettes.

To prevent accidental writing to important software, some software vendors supply diskettes permanently write protected.

3.5-inch Diskettes

To write protect a 3.5-inch diskette push the slide so that the hole is open.

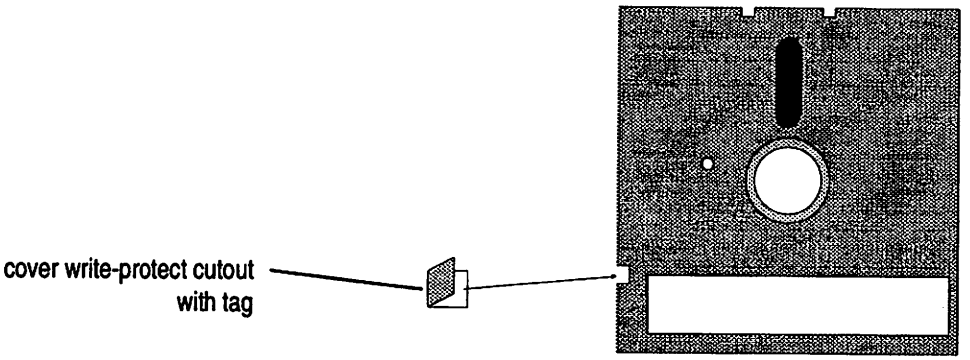
To allow writing to the diskette, push the slide so that the hole is covered.



5.25-inch Diskettes

To write protect a 5.25-inch diskette place a self-adhesive tag over the write-protect cutout on the disk jacket, as shown in the illustration.

To allow writing to the diskette, remove the tag.



Diskette Care

It is useful to store diskettes within easy reach of your computer, but you should observe the handling precautions that are included with the diskettes.

Using a 2.88 MB Flexible Disk Drive

The flexible disk controller on the main processor board allows your computer to operate a 2.88 MB flexible disk drive.

You can use the drive's 2.88 MB capacity only when you are using the operating system MS-DOS 5.0 or higher.

If you don't use MS-DOS 5.0 or higher, you can use the drive as 1.44 MB high capacity drive only. You must then declare the drive as **1.44 MB, 3.5"** drive in SETUP.

Optimizing Windows 3.1 for Your System

For best performance of your system

- The display that is connected to your system must be correctly defined by the Setup procedure.
- The installed VGA driver must be adapted to match your system.

Defining the Display

1 Start the system and press **F1** for Setup

2 Go to **Monitor type**, press **V** and note the type for your display. Return to Setup.

3 Enter your display type and save the changes.

Note: The display type definition may not be applicable for the display adapter in your computer. In this case pressing the **V** key has no effect and does not display the help screen. Check the documentation that came with your display adapter and the file A:\VGA\README.DOC on *Support Diskette 1* for information on how to define the display type for your display adapter.

Adapting VGA Drivers

If your computer has factory-installed Windows

- Wait for Windows to start
- Double-click on the **SetRES** icon in the **VGA Utilities** menu. Set the screen resolution and number of screen colors according to your display and your applications.

If you have non-factory-installed Windows

1. Type WIN to invoke Windows, or wait for Windows to start.
2. From the **Main** menu select **Windows Setup**. Click on **Options** and select **Change System Settings**. Now click on **VGA**.
3. Select **Other display (Requires disk from OEM)** and press **Enter**.
4. Insert *Support Diskette 2* into drive A, type **A:** and press **Enter**.
5. Select **Cirrus 5426 Multi-Resolution**, or **Cirrus 542x Multi-Resolution**, and press **Enter**.
6. Click the **OK** button to quit **Windows Setup**. Restart windows.
7. From the **File** menu select **Run** and specify **A:\install.exe**.
8. Double-click on the **SetRES** icon in the **VGA Utilities** menu. Set the screen resolution and number of screen colors according to your display and your applications.

Optimizing System Performance

(for use other than Windows 3.1)

For best performance of your system consider the following hints.

- The display that is connected to your system must be correctly defined by the Setup procedure.
- The installed VGA driver must be adapted to match your system.

Defining the Display

1 Start the system and press **F1** for Setup

2 Go to **Monitor type**, press **V** and note the type for your display. Return to Setup.

3 Enter your display type and save the changes.

Note: The display type definition may not be applicable for the display adapter in your computer. In this case pressing the **V** key has no effect and does not display the help screen. Check the file A:\VGA\README.DOC on *Support Diskette 1* for information on how to define the display type for your display adapter.

Adapting VGA Drivers

Refer to "Installing VGA Drivers" in Chapter 3 "Using Support Software" and to the README files on the *Support Diskettes* for information on installing and adapting VGA device drivers.

Refer to the documentation that comes with your display for more information about your display.

Troubleshooting

What If ?

You can easily resolve many of the problems that are encountered in the day-to-day use of your system by referring to the following tables.

Perform the activities listed under "Remedy" in the order they appear.

If activity 1 doesn't correct the error, try activity 2. If activity 1 corrects the error, resume using the computer; do not perform activity 2.

If you cannot correct the error, phone your service representative. The symbol of a telephone shown below tells you to phone for help.

Problem	Possible Reason	Remedy
Power lamp not lit	On/off switch set to off position	Set power switch to on position.
	Power cable not connected correctly	Insert cable snugly into computer and wall outlet.
	Power cable is faulty	Replace cable.
	Internal system problem	☎
No prompt at power-on	Display not connected correctly	Insert display cable snugly into computer and power cable snugly into wall outlet.
	Display controls not set properly	Check display controls.
	Operating system not loaded correctly	Install operating system according to operating system manual instructions. When a mix of SCSI and IDE fixed disk drives is installed, the operating system must be on the IDE fixed disk.
	MONISAVE active	Press any key.
Garbled characters on the screen mixed with text	No ANSI.SYS statement in the *config.sys* file	Add statement DEVICE=ANSI.SYS to your *config.sys* file.
High resolution display shows only standard VGA resolution.	Display and/or VGA drivers not configured properly	1. Run SETUP and set **Monitor type** correctly 2. Install VGA drivers as instructed in *User's Manual* and README.DOC (*Support Diskettes*). 3. ☎
Unable to enter data through the keyboard correctly	Keyboard cable not connected	Reconnect the keyboard cable to the system.
	Incorrect type of keyboard to use with this software on this system	Replace the keyboard with a 101-key Workstation Keyboard.
	Num Lock, **Scroll Lock**, or **Caps Lock** set incorrectly	Reset keys.
	Problem with keyboard code transmission	Adapt keyboard code transmission rate on switchable keyboard.
	User password set	Type in user password.
	Forgot user password	Get new password from master.
	Forgot master password	☎
	Keyboard buffer full	Wait until present operation is complete.
	Internal system error	☎

Problem	Possible Reason	Remedy
Unable to read from/ write to flexible diskette	No operating system installed	Install operating system according to operating system manual instructions.
	Damaged diskette	Use different diskette.
	Diskette not formatted	Format diskette according to your operating system instructions.
	Diskette write protected	Disable/remove write protection.
	Access to flexible disk drive denied by password	Get user password with flexible disk access from master.
	Internal system problem	☎
Unable to read from/ write to fixed disk	Incorrect fixed disk type setting	Run SETUP and enter correct fixed disk type.
	No operating system installed	Install operating system according to operating system instructions.
	Fixed disk not formatted	Format fixed disk according to your operating system. Run FDISK and/or FORMAT (MS-DOS) **Caution** **All data on drive will be lost when using these routines.**
	Internal problem with fixed disk drive	1. Inform customer service engineer (depending on cause, data may be retrievable). ☎ 2. Run FDISK and/or FORMAT (MS-DOS). **Caution** **All data on drive will be lost when using these routines.**

Problem	Possible Reason	Remedy
Unable to print	Printer not turned on properly	1. Turn on the printer. 2. Turn on the on-line indicator. 3. Check paper tray and refill, if empty.
	Printer not plugged into working outlet	Check power plug and outlet.
	Signal cable not connected properly	Insert cable snugly into computer and printer.
	Printer not connected to network	Check the correct printer connection to the network.
	Printer port setting incorrect	Run SETUP to get the printer ports enabled and set correctly.
	Incorrect software configuration	1. Check that the type of printer installed on your system is correctly identified in your software installation program. 2. Check that the correct printer drivers for your application are installed.
Undefined problem - unable to continue any processing	Problem with operating system or application	1. Re-install operating system/ application. 2. Check that the statements in the *autoexec.bat* and *config.sys* files are correct and complete. 3. Check that the system memory configuration is correct for your application. 4. Check your applications for conflicting demands on the system.
	System not configured properly	Run SETUP
	Problem with plug-in board e.g. network board	Run SETUP and set **AT-Bus clock** to **Standard (STD)**.
	Cables are not tightly connected	Check all internal and external cables.
	System is overheating	1. Reposition unit so there is sufficient airflow around it. 2. Check that the fan is working properly. 3. Phone your service representative; it may be necessary to replace the fan or the power supply.
	Internal system problem	☎

Power-On Diagnostic

The power-on diagnostic operates each time you switch on the system or restart it by pressing **Ctrl-Alt-Del**. Power-on diagnostic programs test the basic system components.

Failure of a basic system component may cause the system to stop.

A five-beep code indicates a basic system failure error before or during the VGA test.

After the VGA and display pass their tests, the name of the component tested appears on the screen as it is tested.

At the completion of the tests the screen shows a display similar to the one shown below.

```
MAIN BOARD DIAGNOSTICS COMPLETE,
TEST AND INITIALIZE:
_DMA CONTROLLERS
_TIMER ZERO
_INTERRUPT CONTROLLERS
CONVENTIONAL MEMORY TEST
00640 KB
EXTENDED MEMORY SIZE 03072 KB
TOTAL MEMORY 03712 KB
_PROCESSOR SPEED: 33 MHz
_486 INTERNAL CACHE ENABLED
_SECOND LEVEL CACHE NOT INSTALLED
_KEYBOARD
PRESS <F1> IF HARDWARE SETUP IS DESIRED
_FLEX DISK
_FIXED DISK
```

This display may vary slightly according to the features that are installed on your computer.

Error Messages

When the display shows an error message, check if it is repeated after switching the computer off and starting it again after a few seconds.

If you do not understand an error message or cannot correct a displayed error, contact your supplier or customer service representative for assistance.

If the display shows the message

```
Disk configuration not correct
```

after system start, you should run SETUP again to check if you have entered the correct flexible disk and fixed disk type.

If the SETUP screen displays correct disk types, check for correct strapping, installation, and connection of the drives.

If you get the message

```
User defined HDD Table bad
Insert Software Support Disk 1 and Press <ENTER>
```

the parameters for the user defined fixed disk type number 1 are not set correctly. Run USERHDD on *Support Diskette 1* and enter the correct drive parameters.

If the display shows a message like

```
OPERATING SYSTEM NOT FOUND
```

or

```
Non-System disk or disk error
replace and press any key when ready
```

it is most likely that your system cannot load the operating system. Install an operating system backup diskette, restart your system, and check the operating system installation on your fixed disk.

An error message that an installed CD-ROM drive cannot be addressed is issued by SCSI tape drive software when there is no data CD in the CD-ROM drive. Ignore the error message or insert a data CD into the CD-ROM drive.

SCSI specific messages may appear when you are using SCSI fixed disk drives. Refer to the documentation that comes with the SCSI host adapter board.

Utilities

Fixed Disk Check (CHECK_AT)

This utility scans the fixed disks (IDE/AT-type only) of your PC for bad or marginal sectors. It tries to recover data from them, and store it on good areas on the drive. It then marks the bad sectors thus preventing them from being re-used by the operating system.

The drives are very reliable and are automatically self-parking when you switch off the PC. So that under normal conditions you should only run the test once or twice a year, or if you suspect that the drive may have suffered damage in transport, or due to some other mechanical shock.

The program is on the *Support Diskette 1*. To start it, enter

```
CHECK_AT
```

The display shows the main menu. It contains the following items.

```
Test Harddisks
Correct Errors
Help Screen
```

All menus of the program react in the same manner to the keyboard.

1 Select the desired item with the up/down cursor keys or the space key.

2 To execute the item, press the **Enter** key.

3 To view more than 12 errors, use the **PgUp/PgDn** keys.

4 Terminate an option with the **Esc** key.

5 The available key options are also listed at the bottom of each screen.

Test Harddisks This option checks the drive and lists errors, if any, by number, drive, cylinder, head, sector, error code, and status (blank at first).

If you have two IDE/AT-type fixed disks in your system, another menu lets you specify which drives to test (either one, or both).

Correct Errors In the event of an error, you can try to recover the data on the defective drive by choosing this option from the main menu. It displays all the errors found by the test routine and asks whether to recover blocks.

If you answer with **Y**, you can select the error you want to recover. The program then attempts to read the data and relocate it. It displays a message and marks the error status with an R for **Reassigned** if the operation was successful, and with an E for **Error** if the operation was unsuccessful.

Help Screen The help screen lists the IDE/AT-disk drives in the system and the meaning of all error codes.

Drive Utility Diskette

A special drive utility diskette is provided with the 340 MB IDE/AT fixed disk disk drive WD AC2340. When errors occur after prolonged use of the drive, the utility on this diskette recovers, relocates, and rewrites data to the nearest spare sector, and maintains a secondary defect list. The utility does not format the entire drive, it only reformats the defective sector or track.

Perform the following steps to use this utility.

- Install the diskette into the flexible disk drive
- Enter **WDAT_IDE** at the DOS prompt **A>** and press **Enter**.
- Follow the messages that are displayed on the screen

Operating the System Safely

Good operating habits prevent damage to the system and loss of important files. The following suggestions will help insure trouble-free operation.

- To ensure long term reliable operation of your computer, please observe carefully the "Environment" and "Airflow Clearances" data that are set out in the appendix "Switches and Technical Data."
- Locate the system away from direct sunlight and heat ducts. Plug it into an electric circuit with no radio or TV receivers.
- Keep the area around the system free from static electricity and magnetic fields. These forces can scramble programs in the system memory and on diskette. Even jewelry can have magnetic properties.
- Before you touch the system, discharge static electricity on your body by touching a metallic surface.

- Keep food and drink away from the system.
- Don't smoke in the system area.
- Keep the system air circulation vents uncovered.
- Clean the display and cabinets periodically with a slightly dampened cloth. Dust that gets inside the system can adversely affect performance.
- Put diskettes away when not in use. Keep them away from excessive heat and humidity.
- Always switch the computer off and disconnect the power cable before you connect or disconnect external devices, for example, keyboard, display, or printer. Plugging or unplugging any item when the computer is receiving power may damage your computer.

Travel Considerations

When moving the system, insert an old diskette in the flexible disk drive, disconnect peripheral devices, and handle the system and its cables carefully.

The fixed disk drive has an automatic park feature. It does not require special preparation for moving.

When traveling to another country, purchase a compatible ac power cable.

When traveling by airplane take your computer into the passenger compartment. Prevent it from being stored in a non-pressurized storage compartment.

Power Cable Instructions

For installation in the United States with a power source of 115 V ac, use an 18 AWG, type SVT or SJT, three conductor power cable with a maximum length of 15 feet and a parallel-blade grounding plug rated 15 A, 125 Vac.

For installation in the United States with a power source of 230 V ac, use an 18 AWG, type SVT or SJT, three conductor power cable with a maximum length of 15 feet and a tandem-blade grounding plug rated 15 A, 250 Vac.

For international installation with a power source of 230 V ac, use a 1 mm^2 PVC sheathed three-core flexible cord, type H05VV-F3G1, with a green/yellow protective earthing conductor electrically connected to the protective earthing terminal within the equipment and connected to the protective earthing contact of the plug. The cable set should have safety approvals for the international installation and be marked HAR.

For pluggable equipment the socket-outlet shall be installed near the equipment and shall be easily accessible.

Radio / TV Interference

If your computer causes interference with your radio or television, (check by switching your computer off to see if the interference disappears), try correcting the interference by one or more of the following measures.

- Re-orient the radio/television antenna.
- Move the computer away from the radio or television.
- Plug the computer into a different wall outlet so that computer and radio or television are on different branch circuits.

If necessary, consult your supplier or an experienced radio/television technician for additional suggestions.

Replacing the Battery

The battery provides power for the real time clock of the system and several other important internal functions. Normally the power of the battery lasts several years.

When to Replace the Battery

If the date and time displayed during power-on diagnostic are incorrect, the battery may be failing.

The computer may beep during the power-on diagnostic to indicate a weak battery.

When the system displays the message

```
Battery power lost
```

after switching on, you need a new battery.

The computer will operate with an exhausted battery in place if you run SETUP every time you switch on the computer. The system will retain the date and time you set for as long as the power stays on.

How to Replace the Battery

A trained field service engineer must exchange the battery. Contact your supplier or customer service representative.

Warning The battery used in this device may present a fire or chemical burn hazard if mistreated.

Dot not recharge, disassemble, heat above 100°C (212°F), or incinerate. Do not expose the contents of the battery cells to water. Consider local regulations when discarding the old battery.

Replace the battery with an approved battery only. Approved replacement batteries are available from your supplier. Use of another battery may present a risk of fire or explosion.

Chapter 3

Using Support Software

Overview

Using Support Software

Purpose

How to use the utility programs on the *Support Diskettes* to customize the system.

Utilities

Password protection - PC

Display saving - MONISAVE

Changing video display modes - CLMODE

Keyboard code transmission rate KBDPARAM

Fixed disk type - USERHDD

Fixed disk check - CHECK_AT
see Chapter 2 "Using the System"

Password Protection

Why Use the Passwords?

A responsible person ("Master") can control the access to the computer by allocating up to three user passwords. The user passwords then allow only authorized persons to use the system.

As part of the power-on self-test, the system checks to see if a user password is saved in the battery-powered memory. If a password exists, you must type it at the prompt. The system permits only three tries to enter the correct password. After that, it stops all operations. Turn the system off and on to try again.

Each password can have up to eight characters. The system does not distinguish between upper- and lower-case letters. However, it records each key you press. You cannot substitute a 6 from the top row for a 6 on the numeric keypad. To type the passwords, press the exact same keys you used to set them.

Caution Use passwords that are easy to remember. Write your password down and store it in a safe place. Tell a co-worker where it is stored.

If you forget the master password, only a service representative can remove the password. Phone your supplier or service representative for help.

How to Install the Master Password

To install the master password, follow the steps outlined below.

1 Switch on the PC and display.
Wait for the system prompt C>.

2 Insert a working copy of the *Support Diskette 1* into drive A and type the following commands. Press **Enter** after each.

```
A:
FC
```

3 Select **Install/Change Passwords** from the menu and press **Enter**. A message on the screen will ask you to define the master password.

4 Type a password with no more than eight characters. For each character you type, the screen will replace the displayed asterisk by a hyphen. When you have typed the password, press **Enter**. To confirm the master password entry, type the master password again and press **Enter**.

5 Press **Esc**. Then enter **1** at the **Do You Want To Save** prompt and press **Enter** to save and store the defined master password.

6 With the **Password Enable/Disable** selection of the password utility menu, select **Enable** to enable the master password and the user passwords to be defined later.

To access the password utility in future, you must enter the correct master password.

You need the latest-defined master password to access the password utility, even if you have disabled all passwords.

For a more frequent use of the password utility, you may prepare a separate diskette containing an operating system and the file PC.EXE. Make sure no keyboard driver is loaded when you are using this diskette to start the system.

How to Install User Passwords

To install the user passwords, follow the steps outlined below.

1 Insert a working copy of the *Support Diskette 1* into drive A and switch on the PC and display.

Wait for the system prompt **A>**.

Now enter

```
PC
```

and press **Enter**.

On the screen prompt type in the correct master password, and press **Enter**.

2 Select **Install/Change Passwords** from the menu and press **Enter**.

3 With the cursor keys select the field for the first password and press **Enter**. Type a password with no more than eight characters. For each character you type, the screen will replace the displayed asterisk by a hyphen. When you have typed the password, press **Enter**. To confirm the user password entry, type the password again and press **Enter**.

4 You can also define the level of application use, allowed for the owner of the password. With the cursor keys select **Level** from the menu and with the spacebar set the application use level.

To help preparing application software,the password user information byte holds information for the programmer. Refer to the Appendix "Switches and Technical Data" for the details.

5 You can allow the owner of each user password to access the system via the flexible disk drive. With the cursor keys select **Flex Access** from the menu and with the spacebar set

YES to allow unrestricted flexible disk access for the user

NO to prevent any flexible disk access by the user

No Boot to allow flexible disk access but prevent to start the computer with the user's own operating system diskette

6 Define the other user passwords in the same way.

7 If you need help with the password installation, press the **F1** key to display a help screen. Also the menu screens will display additional instructions and information. If you want to quit the password utility before saving your entries, press **Esc**. Then enter 0 at the **Do You Want To Save** prompt and press **Enter**.

8 When you have defined all required user passwords, press **Esc**. Then enter 1 at the **Do You Want To Save** prompt and press **Enter** to save and store the defined passwords.

9 The next time you turn on the system, the user password prompt will appear and you must type the correct password.

How to Change the User Password

If you want a new password, turn the system off and on. When the user password prompt appears, type the current user password, press the **Esc** key, and the new password. Press **Enter**. To confirm the new user password entry, type the password again and press **Enter**.

For example, if your current password is OLD and you want NEW to be the password, type the following commands and press **Enter** after each.

```
OLD <Esc> NEW
NEW
```

The next time you turn on the system and display, enter the new password at the password prompt.

How to Change the Master Password

Select **Install/Change Passwords** from the password utility menu and press **Enter**. In the displayed menu select the field for the master password. Enter the new master password in the same way as if installing a user password.

If You Want No Passwords

The master password owner can use the **Password Enable/Disable** selection of the password utility menu on the *Support Diskette 1* and disable all passwords.

After that, a password prompt will not appear.

What if You Forget the Passwords?

The battery-supported memory retains the passwords. If you forget your user password, get a new password allocated by the master.

If you forget the master password, contact your supplier or service representative for help.

Using the Display Saving Utility

The MONISAVE utility will automatically switch off your display when you did not make keyboard entries to your computer for more than five minutes. Press any key to switch on the display again for normal computer operation.

Perform the following steps to install the display saving utility to your system.

1 Switch on the PC and display.
Wait for the system prompt C>.

2 Insert a working copy of the *Support Diskette 1* into drive A, type the following command, and press **Enter**.

```
COPY A:MONISAVE.COM
```

3 Type **MONISAVE** on the system prompt C> to enable the display saving utility.

4 If you want to enable the display saving utility automatically when you start your computer, add the **MONISAVE** command to your AUTOEXEC.BAT file.

Changing Video Display Modes

The video graphics array (VGA) controller supports a color or monochrome VGA display. It automatically configures itself to operate the display attached at power-on.

The CLMODE utility on the *Support Diskette 3* permits you to change display modes.

Note: The CLMODE utility is not supplied with your system if it is not compatible with the display adapter in your computer. In this case check the file A:\VGA\README.DOC on *Support Diskette 1* for information on how to change video display modes for your display adapter.

Supported Video Standards

The table on the next page lists the video modes and resolutions supported by the VGA controllers.

Applications that support the VESA BIOS can use those video resolutions where a "VESA Mode Number" is given without specific driver installations.

Resolution	Simultan. Colors (1)	Mode	VESA 15-bit Mode Number	CLMODE Mode Number	Notes
40 columns / 25 rows	16	Alphanumeric		00, 01	(3)
80 columns / 25 rows	-----	Alphanumeric		07	monochrome text, (4)
80 columns / 25 rows	16	Alphanumeric		02, 03	(3)
132 columns / 25 rows	16	Alphanumeric	109 h	55	(3)
132 columns / 43 rows	16	Alphanumeric	10A h	54	(3)
320 by 200 dots	4	Graphics		04, 05	(2)
320 by 200 dots	16 / 256	Graphics		0D, 13	(2)
640 by 200 dots	2/16	Graphics		06 / 0E	(2)
640 by 350 dots	16	Graphics		10	
640 by 350 dots	-----	Graphics		0F	monochrome graphics
640 by 480 dots	2 /16	Graphics		11 / 12	
640 by 480 dots	256	Graphics	101 h	5F	
640 by 480 dots	32768	Graphics	110 h	66	(5)
640 by 480 dots	65536	Graphics	111 h	64	(5)
800 by 600 dots	16	Graphics	102 h	58	bi-sync or multi-sync display
800 by 600 dots	256	Graphics	103 h	5C	(6)
800 by 600 dots	32768	Graphics	113 h	67	(5), (6)
800 by 600 dots	65536	Graphics	114 h	65	(5), (6)
1024 by 768 dots	2 / 16	Graphics	104 h	5D	(6)
1024 by 768 dots	256	Graphics	105 h	60	(5), (6)

(1) Simultaneous colors refers to the number of colors and shades that can be displayed at one time.
(2) 200 line vertical resolution modes are double-scanned to display 400 lines on the screen.
(3) The video address area is Color.
(4) The video address area is Monochrome .
(5) 1 MB video memory required
(6) multi-sync display required

Why Use the CLMODE Utility?

The CLMODE utility is useful if you have software that uses the enhanced video modes explained below. Do not install the CLMODE utility or VGA device drivers unless you plan to use the enhanced video modes.

Enhanced text modes enable the screen to show 25 rows or 43 rows with 132 columns on any standard display.

These modes allow you to have much more information on the screen than with the standard VGA modes. They require specific software files (drivers) to take advantage of their capabilities in software applications.

Refer to "Installing VGA Device Drivers" in this Chapter for information on installing software for use with VGA enhanced modes.

How to Install the CLMODE Utility

You can use the CLMODE utility in the following ways.

- from the *Support Diskette 3*
- from an MS-DOS partition on your fixed disk.

If you are using the utility from the *Support Diskette 3*, skip to "How to Use the CLMODE Utility" now.

Follow the instructions listed below to copy the CLMODE utility to the fixed disk.

1 Make sure you have MS-DOS on your fixed disk. The utility is not compatible with other operating systems.

2 Turn on the system or restart it by pressing the **Ctrl-Alt-Del** key combination. Watch for the MS-DOS prompt C> or A>.

3 Place a working copy of the *Support Diskette 3* in drive A.

At the MS-DOS prompt (C> or A>), type the following commands and press **Enter** after each.

```
A:
INSTALL
```

4 Select **CLMODE Utility** from the displayed menu and press **Enter**. Follow the instructions displayed on the screen.

How to Use the CLMODE Utility

You can use the CLMODE utility from your MS-DOS fixed disk directory or from the *Support Diskette 3*.

1 Turn on the computer or restart it using the **Ctrl-Alt-Del** key combination. Wait for the MS-DOS prompt A> or C>.

2 If you are using the utility from the fixed disk, type the following commands and press **Enter** after each.

```
C:
CD \CLUTILS
CLMODE
```

If you are using the utility from the *Support Diskette 3*, put the diskette in drive A, type the following commands and press **Enter** after each.

```
A:
CD \CLUTILS
CLMODE
```

3 A menu driven screen appears. Select the desired item from the screen to continue.

Changing the Mode with CLMODE

Switch to the sub-directory **A:\CLUTILS** on the *Support Diskette 3*, or **C:\CLUTILS** on your fixed disk, respectively.

1 Enter **CLMODE** and press **Enter**.
A menu driven screen appears.

2 Select **Video Modes** and press **Enter**.
A list of various modes is displayed on the screen.

3 Choose the desired mode and then select the **Exit** button.
This selects the chosen mode.

4 If you want to set the mode in a command line, for example, as part of a batch file, make a note of the mode number from the list. Then enter

A:\CLUTILS>CLMODE *nn* or

C:\CLUTILS>CLMODE *nn* respectively,

where *nn* represents the chosen mode number.

Installing VGA Device Drivers

Current versions of many applications contain their own enhanced VGA drivers. If the application includes an enhanced VGA driver, use this driver when installing the application for use with the VGA enhanced modes.

The *Support Diskettes* include drivers that allow you to use enhanced VGA modes with some popular application programs.

1 Check the file README.DOC in the subdirectory VGA of the *Support Diskette 1* for the following information.
   - which diskette holds the VGA drivers for your applications?
   - which drivers do you need for your applications?

2 Install the required VGA drivers.

a Turn on the system and wait for the MS-DOS prompt A> or C>.

b Place the *Support Diskette 3* in drive A.

c Type the following commands. Press **Enter** after each.

```
A:
cd \
INSTALL
```

d Select the driver you need from the displayed menu and press **Enter**. Follow the instructions displayed on the screen.

3 In case of problems with the VGA driver installation check that

- the driver is compatible with the display that is connected to your computer.
- the display is correctly defined by the SETUP procedure.

Refer to the documentation that comes with your display for more information about your display.

The section "Monitor type" in Chapter 1 "Installing the System" describes how to define the display that is connected to your computer.

Adapting the Code Transmission Rate of the Keyboard

It may happen that the keyboard does not transmit your entries correctly to the system. For example, you get numeric characters when you are using the cursor keypad and the NumLock is on.

If you have a switchable keyboard, you can adapt the code transmission rate of your keyboard to overcome these problems. Check the documentation that came with your keyboard to determine if your keyboard is switchable or not.

Adapt the code transmission rate of your keyboard with the utility KBDPARAM.COM on the *Support Diskette 1*. Proceed as follows to use this utility.

1 Switch on the system and the display. Wait for the system prompt **A>** or **C>**.

2 Insert the *Support Diskette 1* into the flexible disk drive.

3 Type the following commands. Press **Enter** after each.

```
A:
KBDPARAM
```

4 The screen displays information on how to use the utility and the selectable options. Try all possible combinations until the keyboard transmits your entries correctly to your system.

For future use copy the file KBDPARAM.COM to your operating system disk and include the appropriate KBDPARAM statement into your *autoexec.bat* file.

You can also adapt the code transmission rate of the keyboard by pressing the **Pause** key and the appropriate function key every time you start the system.

Defining a Fixed Disk Manually

You can define a fixed disk drive in your computer yourself by using the utility USERHDD on *Support Disk 1*.

You need the following technical parameters of your fixed disk drive.

- Number of cylinders
- Number of heads
- Starting write precompensation
- Number of ECC bytes
- Landing zone
  (0 for drives with automatic parking)
- Number of sectors per track

Perform the following steps to define a newly installed fixed disk drive manually.

1 Start the computer with the *Support Disk 1* in drive A. Thus the utility USERHDD starts automatically and displays the **HDD INSTALLATION UTILITY** screen.

2 Enter the corresponding parameter of your drive for each request. Then select **Return to DOS** and press **Enter**.

3 Start your computer again and run SETUP. Select

```
Manual Disk parameter via USEDHDD.EXE
```

for the fixed disk drive that you've specified with the USERHDD utility, press **Enter**, and quit SETUP by pressing **End**.

Note: You may also use the USERHDD utility in the following command line format.

USERHDD [*No of Cylinders*] [*Start Precomp.*] [*ECC Bytes*] [*Landing Zone*] [*Sectors/Track*]

For example, **USERHDD 615 4 300 0 615 17**
You must enter all parameters! No validation check!

You may also start the USERHDD utility from a batch file with the appropriate USERHDD command.

Chapter 4

Installing Options

Overview

Installing Options

Purpose

Upgrading the computer by installing optional components that are available in kit form.

Some examples of options are a processor upgrade, communication adapters, and additional memory.

Points to Watch

What to consider when you are installing options to your PC.

Installation Procedures

Opening the Cabinet

Installing a Board

Replacing Boards

Installing the Processor Upgrade

Installing Cache Memory

Installing Memory Modules (SIMMs)

Installing Disk Drives

Removing Drives

Reassembling the Computer

Points to Watch

Compatibility Considerations

Only install kits or options which have been approved for use with this personal computer.

The installation of non-approved options may cause damage to the equipment. Such options may also violate local safety or radio interference regulations.

Consult your customer service representative or supplier for further information regarding the suitability of kits and options.

Safety Precautions

Switch off the computer and unplug the power cable before starting option installation work.

Unless you are a trained engineer, do not disconnect more than the installation instructions indicate.

Electrostatic Precautions

If you handle them incorrectly, you may damage some of the components used in some options by an electrostatic discharge. The following precautions will help to avoid that problem.

- Do not install options in an area known to give electrostatic problems. For example, in a room with carpet that is not anti-static.
- Wear an electrostatic discharge (ESD) strap and touch a metal surface to ground yourself before you handle boards or components. Do not handle printed circuit boards (PCBs) more than necessary. When you do, hold them by their edges and do not touch the components.
- Before disconnecting the computer from the power source, touch a metal part of the personal computer. This ensures that there is no potential difference between you and the computer.
- Do not move away from the work area until you have completed installation and replaced the cabinet.

Preparing for Installation

This chapter describes how to install the various options. Refer to the illustrations for each description - normally on the facing page - for additional help.

The installation of a particular option may require only some of the procedures described here. The *Kit Information* specifies, which procedures to use and describes unique option features.

Separate the parts for each kit you are installing. Check off each installation procedure as you perform it for each kit.

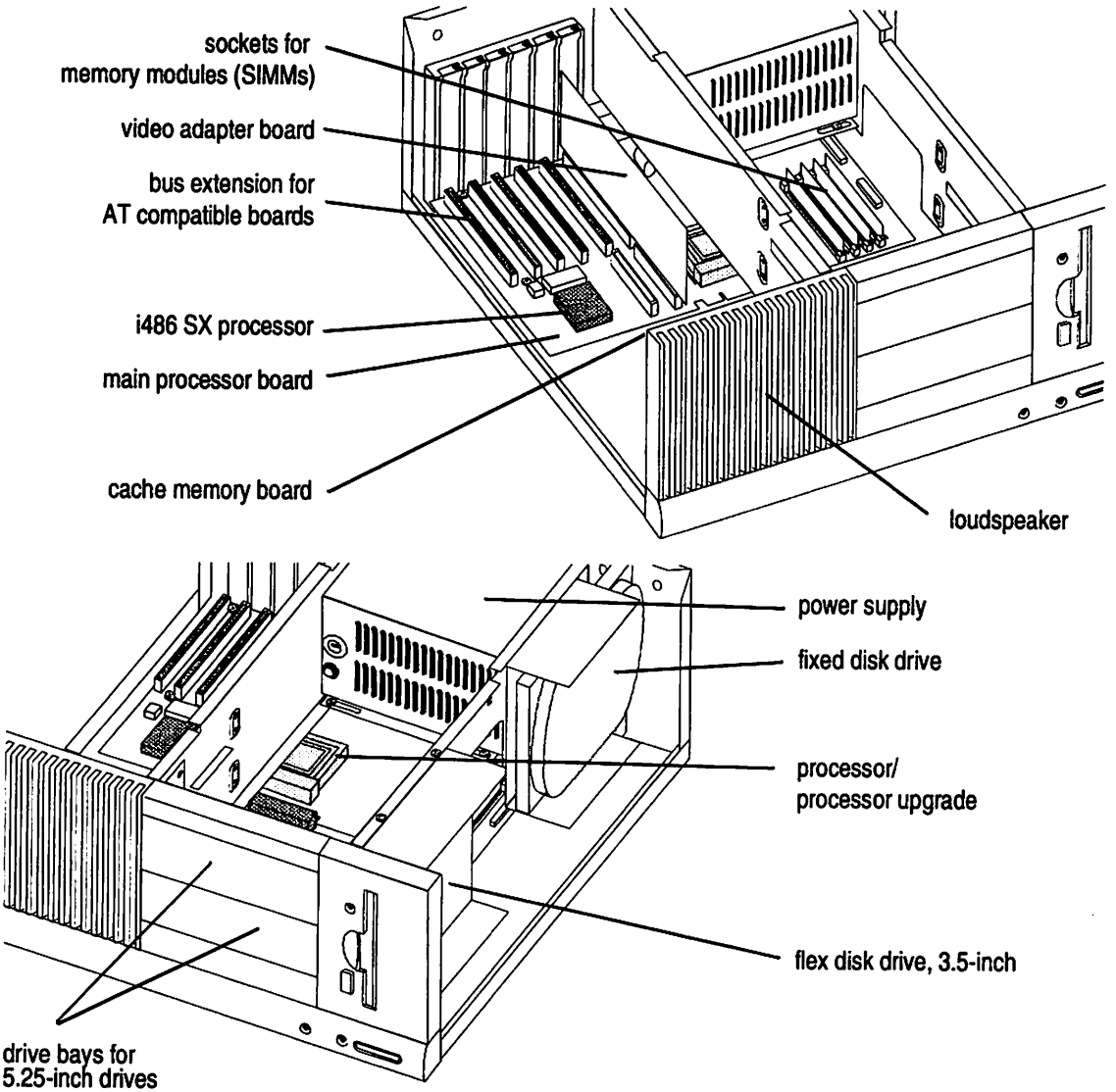
Except where stated, dismantling and re-assembly are reverse procedures. You may need screwdrivers (for Phillips and slotted screws) for the installation procedures.

When instructed to remove cable connections, note the positions of the connectors and the direction in which the connectors are connected to the boards.

Use SETUP to declare the new system configuration after you have installed the options. The Chapter "Installing the System" describes how to run SETUP.

Major Components Inside the Computer

The illustrations show the major system components that are accessible when the computer cabinet is open.



Opening the Cabinet

1 Disconnect the computer.

Switch off the computer and unplug the power cable from the wall socket.

Disconnect all cables connected at the back of the computer.

2 Place the computer in flat desktop position on a level surface.

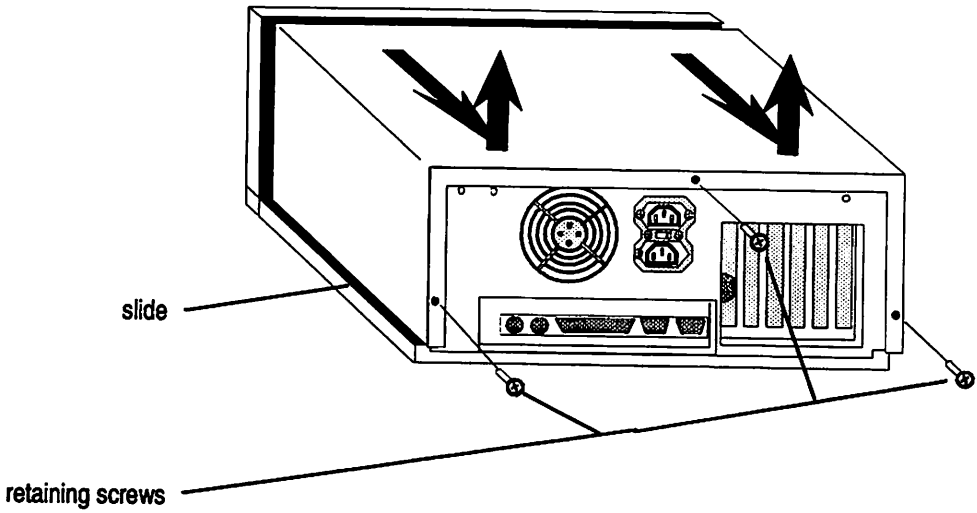
3 Unlock the computer.

Turn the key clockwise, if the computer is not already unlocked. The system is shipped unlocked.

4 Remove the three cabinet retaining screws.

5 Remove the cabinet top.

Holding the sides of the upper cabinet, slide it slightly backward and then lift it away.


slide
retaining screws

Installing a Board

1 Open the cabinet (Procedure A).

2 Remove the blanking plate for the slot you are going to use.

A single screw holds each blanking plate in place.

Save the plate, in case you decide to remove the board in the future.

3 Plug the board into the slot(s) facing vertically from the main processor board.

Make sure that the edge connectors engage properly in the sockets of the main processor board. Then push the board carefully into place.

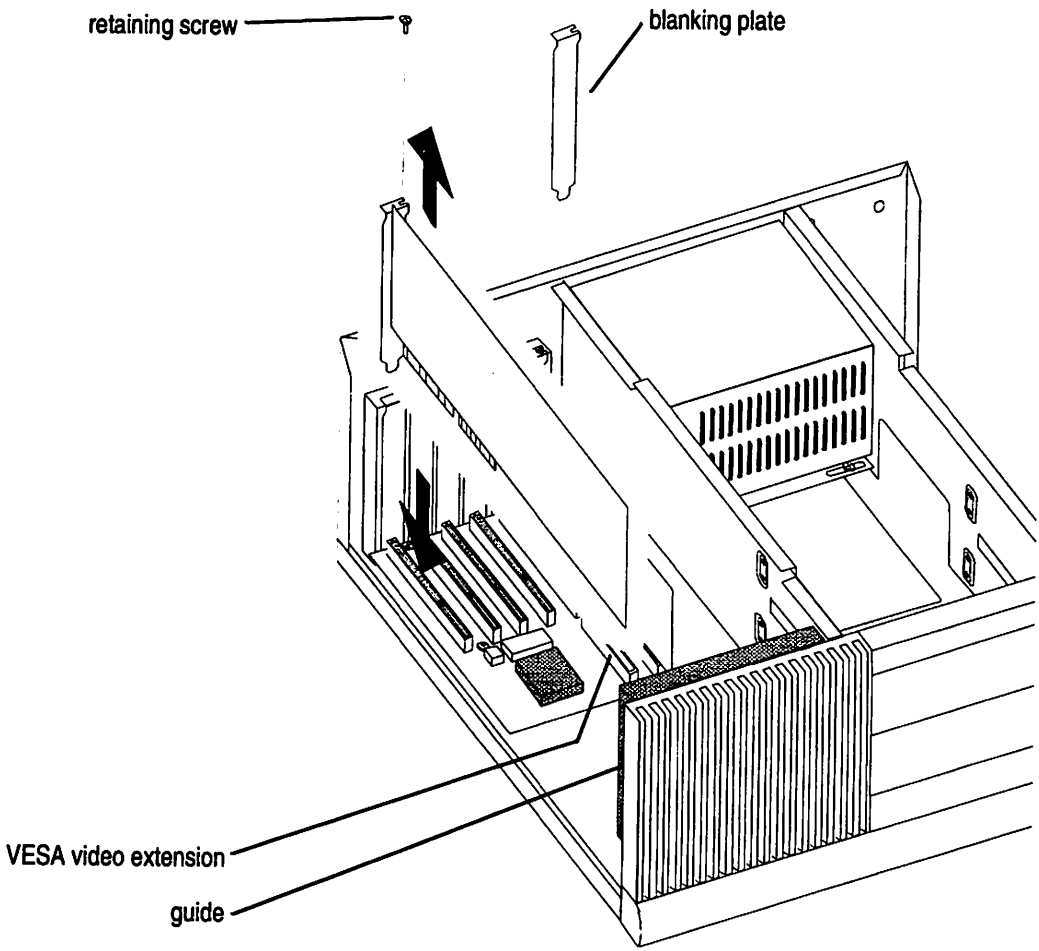
If the board is "full-length," be sure that the edge of the board engages into the guide.

Note: The two slots next to the blue processor socket have VESA video extensions.

4 Fasten the board.

Use the screw which previously held the blanking plate in place to fasten the new facing plate attached to the board.

5 Re-install the cabinet top.


retaining screw
blanking plate
VESA video extension
guide

Replacing a Board

1 Open the cabinet (Refer to "Opening the Cabinet").

2 Remove the cables from the old board.
If necessary, remove any cable that connects the board with other parts of the computer.

Note which cable is connected to which connector block on the board. For example, write the "J" number of the connector block (printed on the board) on the corresponding ribbon cable, using a felt-tip pen.

3 Remove and save the retaining screw that fastens the board to the cabinet.

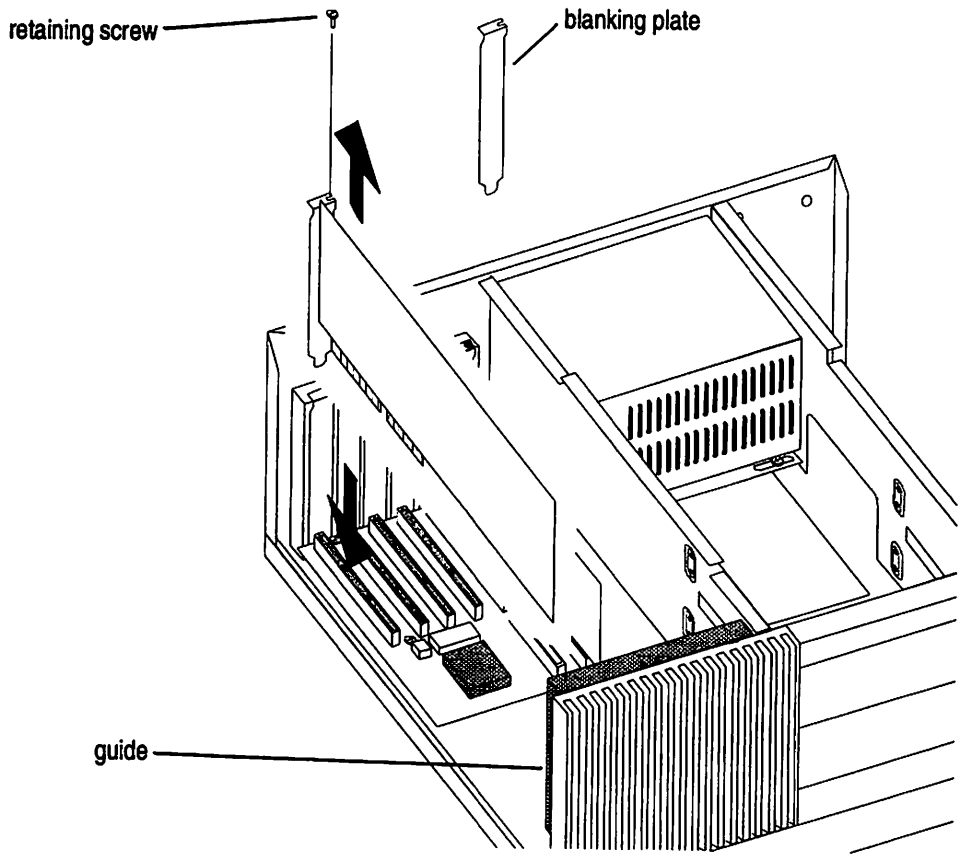
4 Grasp the board and with a slight rocking motion carefully pull it from its socket.

5 Install the new board. Refer to "Installing a Board."
Be sure to place it correctly in the guide before pushing it into place.
Also make sure that the edge connectors engage properly in the sockets of the main processor board. Then press the board carefully into place.

6 Connect all previously removed cables to the board.

7 Fasten the board to the cabinet using the retaining screw from the old board. If you permanently remove a board from the computer, cover the empty slot in the computer cabinet with the blanking plate removed when the board was installed.

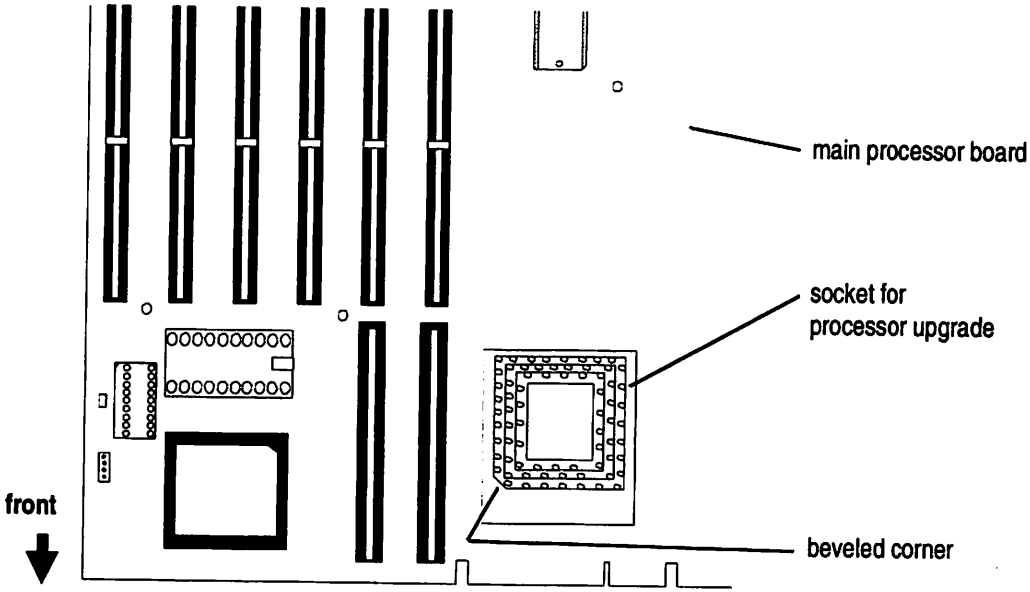
8 Re-assemble the computer.

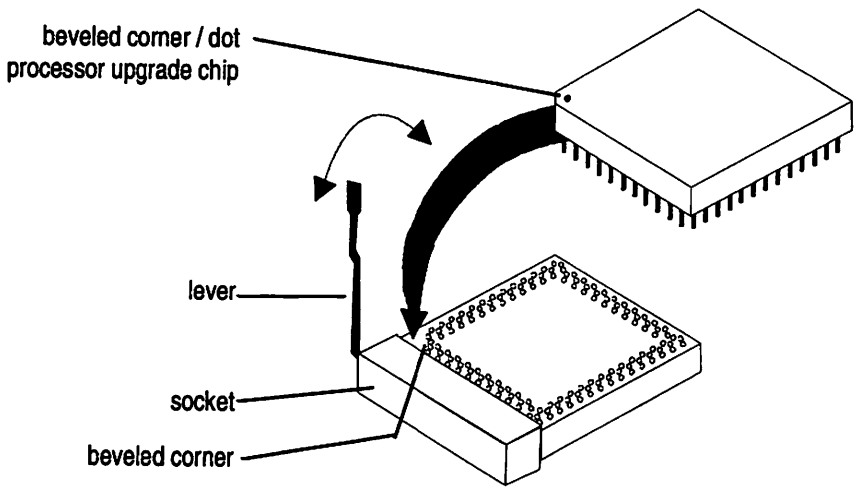


Installing the Processor Upgrade

The processor upgrade socket is located on the main processor board. Before installation, carefully examine the processor upgrade chip and the socket where you are going to install it to. Familiarize yourself with these components, handle them carefully and observe the precautions about static electricity given in "Points to Watch."

1. Open the cabinet and remove any drive from the front center drive bays. Refer to "Opening the Cabinet" and "Removing Drives."
2. See the illustrations and find the blue square socket with a lever on the main processor board.
3. Unsnap the lever and swing it about 90 degrees into a vertical position.
4. Position the processor upgrade chip so that its beveled corner, which has a painted or depressed dot, matches the beveled corner of connector receptacles on the processor upgrade socket.
5. Insert the chip into the socket. If it does not go in easily, check that it is positioned correctly. Do not force it into the socket.
6. Swing the lever back and snap it in. This locks the chip in the socket.
7. Reassemble the computer.


main processor board
socket for
processor upgrade
front
beveled corner


beveled corner / dot
processor upgrade chip
lever
socket
beveled corner

Installing Cache Memory

1 Open the cabinet and remove any drive from the central front drive bays to access the cache memory connector on the main processor board. Refer to "Opening the Cabinet" and "Removing Drives."

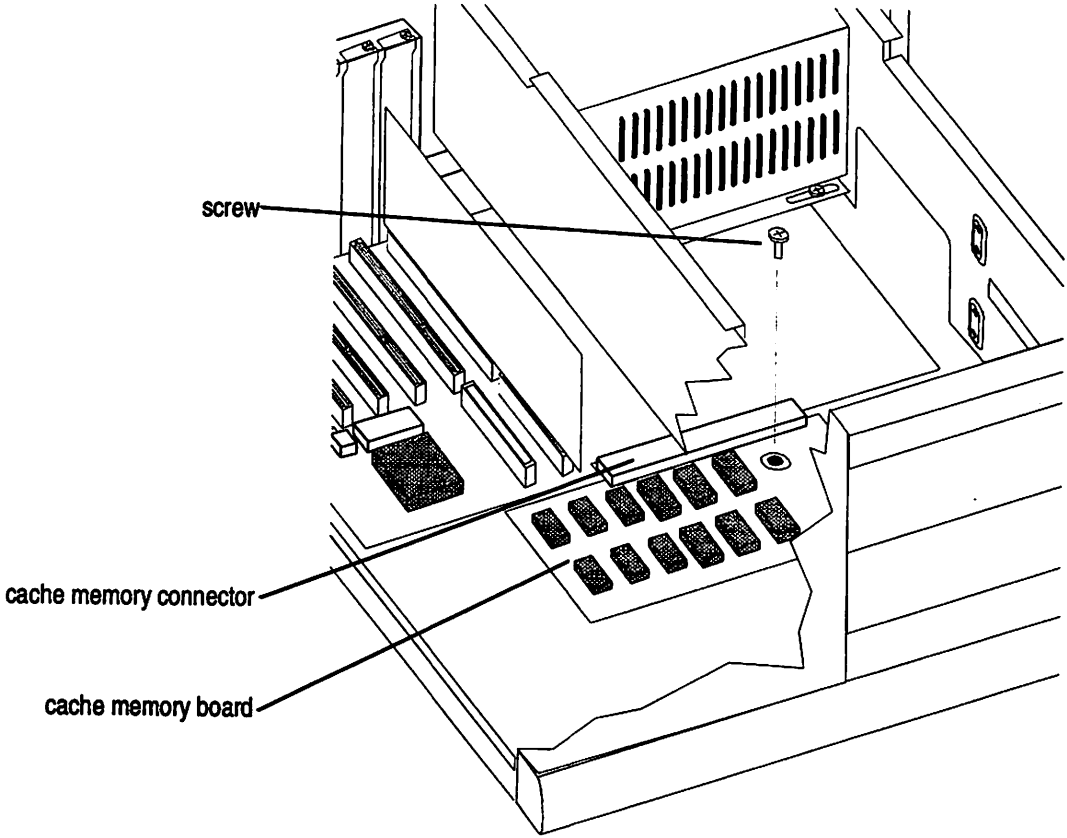
2 Plug the cache memory board onto the cache memory connector on the main processor board. Make sure that the board connector is fully seated onto the main processor board.

3 Secure the upgrade board installation.

   Install the screw that came with the kit vertically through the cache memory board into the cabinet base.

4 Re-assemble the computer.

5 Run SETUP and set **Second Level Cache** to **YES**.


screw
cache memory connector
cache memory board

Installing Memory Modules (SIMMs)

You can install four single inline memory modules (SIMMs), available as kits, on the main processor board.

To access the SIMM sockets on the main processor board, open the cabinet and remove any drive from the central front drive bays. Refer to "Opening the Cabinet" and "Removing Drives."

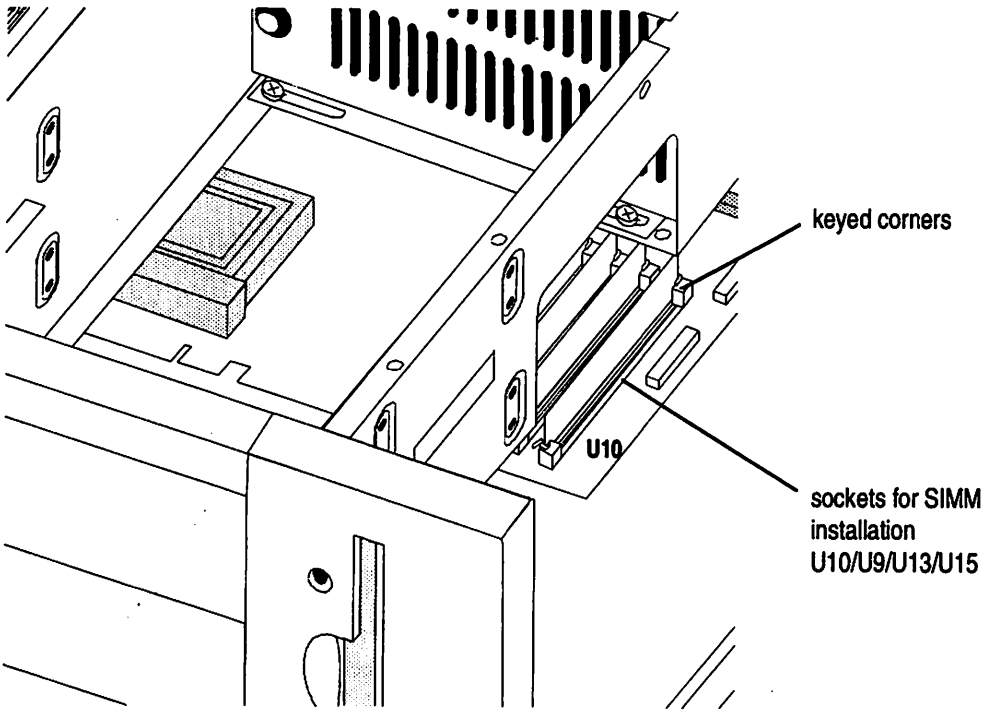
The first SIMM, normally factory-installed, must be in the socket *U10*.

The table below lists all allowed SIMM installation combinations.

Total Memory	U 10 Bank 0	U 9 Bank 1	U 13 Bank 2	U 15 Bank 3
4 MB	4 MB	none installed	none installed	none installed
8 MB	4 MB	4 MB	none installed	none installed
12 MB	4 MB	4 MB	4 MB	none installed
16 MB	4 MB	4 MB	4 MB	4 MB
16 MB	16 MB	none installed	none installed	none installed
20 MB	4 MB	16 MB	none installed	none installed
24 MB	4 MB	4 MB	16 MB	none installed
32 MB	16 MB	16 MB	none installed	none installed
36 MB	4 MB	16 MB	16 MB	none installed
40 MB	4 MB	4 MB	16 MB	16 MB
48 MB	16 MB	16 MB	16 MB	none installed
64 MB	16 MB	16 MB	16 MB	16 MB

Install the memory modules SIMM by SIMM.

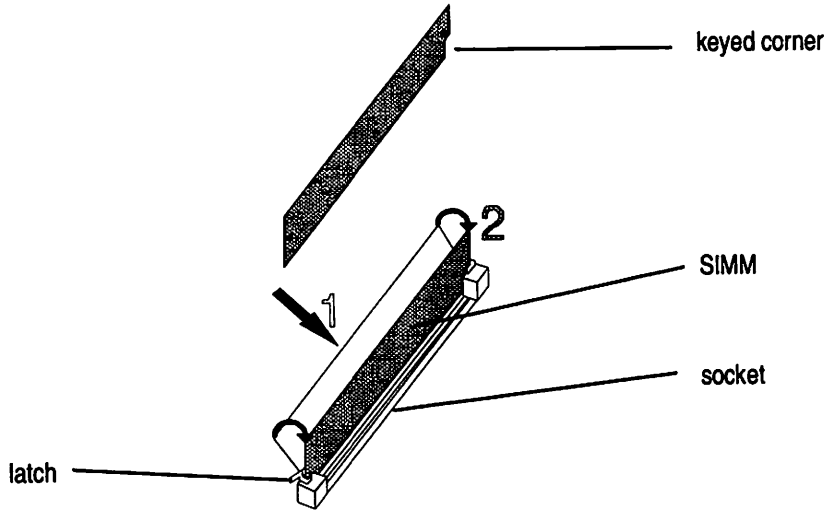
Begin installation with ***U10*** for the **first** SIMM. Install more SIMMs in the following sequence to their sockets.
second SIMM - *U9*,
third SIMM - *U13*,
fourth SIMM - *U15*.



1 Hold the SIMM board at an angle of approximately 45 degrees near the SIMM socket. The key on the SIMM board must match the key on the socket.

2 Insert the connectors on the SIMM board into the guide slot on the socket.

3 Rotate the SIMM board into a vertical position. Make sure that the latches on either side of the socket engage the side edges of the board.



Installing Disk Drives

This section is divided into several subsections. Check at the beginning of each subsection for a note about whether it pertains to the type of drive you are installing.

If you are replacing an already installed disk drive, first remove the existing disk drive as described in "Removing Drives."

The following list shows the general drive installation procedure for any type of drive.

1 Select the drive installation position as described in "Selecting the Installation Position."

2 Prepare the drive as described in
"Preparing an IDE Fixed Disk Drive," or
"Preparing a Flexible Disk Drive," or
"Preparing a Tape Drive with Flexible Disk Interface," or
"Preparing a SCSI Drive,"
depending on the drive that you are going to install.

3 Install the drive into your computer as described in
"Installing a 5.25-inch Drive," or
"Installing a Fixed Disk Drive,"
depending on the type of drive that you are going to install.

Selecting the Installation Position

Select the installation bay for a new drive in accordance with the table of drive installation positions below and your drive configuration.

When you complete this section, go to "Preparing an IDE Fixed Disk Drive," or "Preparing a Flexible Disk Drive," or "Preparing a Tape Drive with Flexible Disk Interface," or "Preparing a SCSI Drive," respectively, depending on the drive that you are going to install.

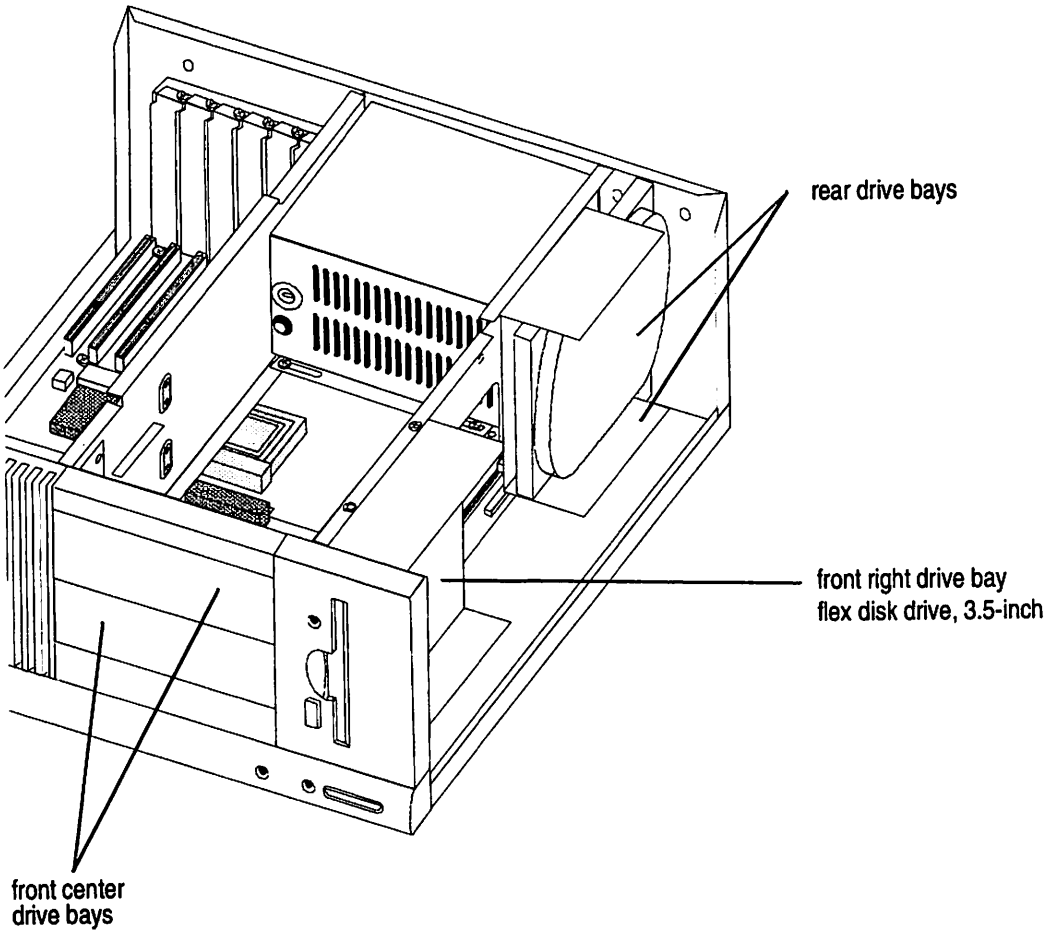
Drive Combination	Drive Bay Position*				
	Front Right [6]	Front Center [1]	Front Center [1]	Rear [2]	Rear [2]
1 Flex	Flex	-----	-----	-----	-----
1 Flex / 1 Fix	Flex	-----	-----	Fix [3]	-----
1 Flex / 1 Fix / 1 Tape /	Flex	Tape [4]	-----	Fix [3]	Fix [3]
1 Flex / 1 Fix / 1 CD-ROM	Flex	CD-ROM (5)	-----	Fix [3]	Fix [3]
1 Flex / 1 Fix / 1 Tape / 1 CD-ROM	Flex	Tape [4]	CD-ROM (5)	Fix [3]	-----
1 Flex / 2 Fix	Flex	-----	-----	Fix [3]	Fix [3]
1 Flex / 2 Fix / 1 Tape	Flex	Tape [4]	-----	Fix [3]	Fix [3]
1 Flex / 2 Fix / 1 CD-ROM	Flex	CD-ROM (5)	-----	Fix [3]	Fix [3]
1 Flex / 2 Fix / 1 Tape / 1 CD-ROM	Flex	Tape [4]	CD-ROM (5)	Fix [3]	Fix [3]

Drive Combination	Drive Bay Position*				
	Front Right [6]	Front Center [1]	Front Center [1]	Rear [2]	Rear [2]
2 Flex	Flex	Flex [7]	-----	-----	-----
2 Flex / 1 Fix	Flex	Flex [7]	-----	Fix [3]	-----
2 Flex / 1 Fix / 1 Tape	Flex	Flex [7]	Tape [4]	Fix [3]	-----
2 Flex / 1 Fix / 1 CD-ROM	Flex	Flex [7]	CD-ROM (5)	Fix [3]	-----
2 Flex / 2 Fix	Flex	Flex [7]	-----	Fix [3]	Fix [3]
2 Flex / 2 Fix / 1 Tape	Flex	Flex [7]	Tape [4]	Fix [3]	Fix [3]
2 Flex / 2 Fix / 1 CD-ROM	Flex	Flex [7]	CD-ROM (5)	Fix [3]	Fix [3]

Flex: Flexible Disk Drive Fix: Fixed Disk Drive
Tape: Streaming Tape Drive CD-ROM: Compact Disk Read-Only Drive

Notes:

(1) Front Center Bays: 5.25-inch drives only
(2) Rear Bays: 3.5-inch fixed disk drives only. Rear bays can accomodate either two 1-inch-high drives or one 1.6-inch-high drive.
(3) Fixed Disk Drives with SCSI interface or IDE interface. For installing SCSI drives you need a SCSI host adapter board.
(4) Tape Drives with SCSI interface or flexible disk interface. For installing SCSI drives you need a SCSI host adapter board.
(5) SCSI Drive - you need a SCSI host adapter board.
(6) 3.5-inch flexible disk drive factory-installed
(7) 5.25-inch, 1.2 MB flexible disk drive only


rear drive bays
front right drive bay
flex disk drive, 3.5-inch
front center
drive bays

Preparing an IDE Fixed Disk Drive

This section explains how to prepare an IDE fixed disk drive.

Skip this section if you are installing a flexible disk drive, or a tape drive with flexible disk interface, or a SCSI drive.

When you complete this section, go to "Installing a Fixed Disk Drive."

Check the following settings before you install the drive.

- Master/Slave configuration jumpers

Drive Configuration

This system supports two IDE fixed disk drives.

Set the *single drive* configuration, if you have only one IDE fixed disk drive installed.

If you have two IDE fixed disk drive installed, you must configure one drive as *master* (primary) drive and the other drive as *slave* (secondary) drive.

Always configure your first fixed disk drive (Drive C:) as master drive.

To set the drive configuration, set the jumpers on the drive configuration jumper block. If you cannot position the jumpers with your fingers, use a long-nose pliers or tweezers.

Factory-installed drives are already set on the correct drive configuration jumpers.
The documentation that comes with a fixed disk drive kit provides drive configuration jumper setting for the new drive, as well as for the factory-installed IDE fixed disk drives.

Preparing a Flexible Disk Drive and a Tape Drive with Flexible Disk Interface

This section explains how to prepare a flexible disk drive and a tape drive with flexible disk interface.

Skip this section if you are installing a fixed disk drive, a SCSI tape drive, or a CD-ROM drive.

When you complete this section, go to "Installing a 5.25-inch Drive."

This system supports three drives connected to the flexible disk interface.
One 3.5-inch flexible disk drive plus
One 5.25-inch flexible disk drive plus
One tape drive with flexible disk interface

Check the following settings before you install the drive.

- Drive selection jumpers/switches

Drive Selection

Refer to the *Kit Information* to set the jumpers, and switches on the drive correctly, if required.

Factory-installed drives are already set on the correct drive select jumpers.

Flexible Disk Drives Always set the jumper or switches at the second setting. The system automatically assigns the appropriate drive address for each flexible disk drive according to the drive's position on the cable.

Tape Drives Always set the jumper or switches at the fourth setting.

Preparing a SCSI Drive

This section explains how to prepare a SCSI fixed disk drive, a SCSI tape drive, and a SCSI CD-ROM drive.

Skip this section if you are installing a flexible disk drive, or a tape drive with flexible disk interface, or a fixed disk drive with IDE interface.

When you complete this section, go to "Installing a 5.25-inch Drive," or "Installing a Fixed Disk Drive," respectively, depending on the type of drive that you are going to install.

You need a separate SCSI host adapter board installed in your computer to operate a SCSI drive. Detailed information on preparing and operating the SCSI host adapter board comes with the board.

Check the following settings before you install the drive.

- Drive identification jumpers
- Terminating resistors

Drive Identification

Your computer supports four internal SCSI drives.

The SCSI controller on the SCSI host adapter board of this system is assigned ID number 07.

Each SCSI device must have its own ID number. Setting more than one SCSI device with the same ID will cause improper operation of the SCSI subsystem. The SCSI host adapter board is considered a SCSI device.

You may reduce the start-up time of your computer by setting one SCSI drive to drive ID number 00.

If you want to start your computer with the operating system on a SCSI fixed disk drive, set the drive ID number of this drive to 00.

Note: If both, SCSI and non-SCSI fixed disk drives, are installed in your computer, you can only start ("boot") your system from the non-SCSI fixed disk drive.

The SCSI host adapter board supports two SCSI fixed disk drives.
To operate SCSI tape drives, SCSI CD-ROM drives, or additional SCSI devices you need special software programs called device drivers.
These drivers are normally included in separate user/application software packages.
Contact your supplier or sales representative for information on which SCSI support software you need.

Record the ID number you set for each SCSI device attached to your system.

To set the drive ID number, set the jumpers on the drive ID jumper block. The ID number is usually set according to the binary numbering system. If you cannot position the jumpers with your fingers, use a long-nose pliers or tweezers.

Refer to your drive documentation for drive ID jumper setting. The illustrations following the next section show the drive ID settings on factory-installed SCSI drives. If your SCSI drive does not conform to any of the drives shown there, extra information is provided with the drive.

Terminating Resistors

The *last* drive on an internal or external SCSI cable *must have* terminating resistors installed/enabled.

If more than one drive is attached to an internal or external SCSI cable, the drive on the *middle connector* must *not* have terminating resistors installed.

If internal and external SCSI devices are attached to the computer, the SCSI host adapter board must not have terminating resistors installed/enabled.

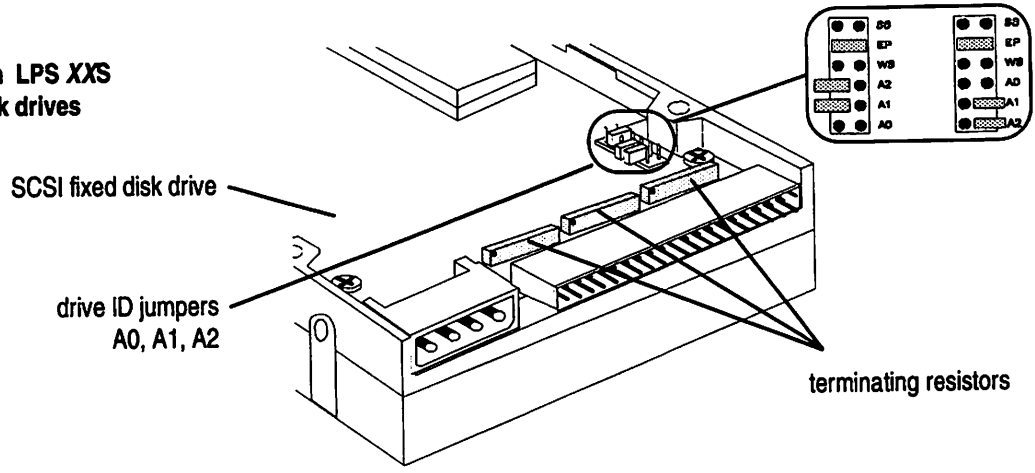
Terminating resistors should be on only two devices in any configuration. They should be installed/enabled on the devices on the extreme ends of the SCSI cable. The SCSI host adapter board is considered a SCSI device.

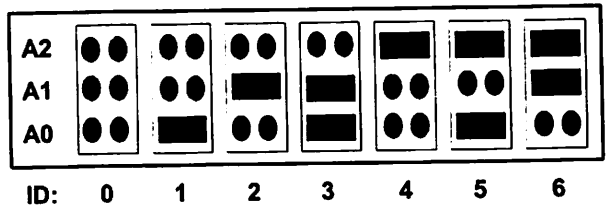
- If you replace an already installed drive with terminating resistors, leave the terminating resistors on the new drive.
- If there is no internal SCSI drive and you add an external disk drive, leave the terminating resistors on the SCSI host adapter board and on the new drive.
- If there is an internal SCSI drive and you add an external disk drive, disable the terminating resistors on the SCSI host adapter board and leave the terminating resistors on the last internal and external drives or devices.

Refer to the documentation packaged with the drive or device for the location of its terminating resistor(s). The illustrations on the following pages show the position of the terminating resistors on the factory-installed SCSI drives. If your SCSI drive does not conform to any of the drives shown there, extra information is provided with the drive.

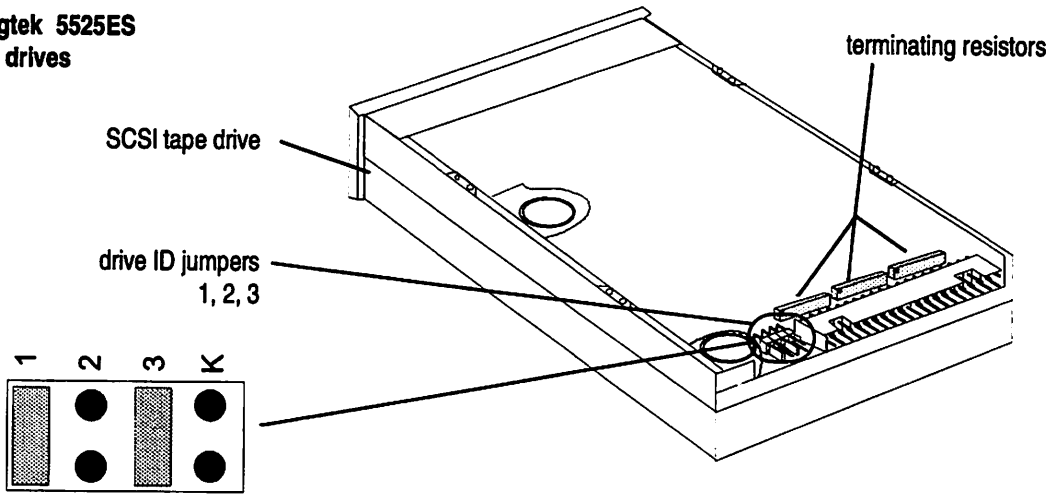
Remove the terminating resistors with a long-nose pliers or tweezers, if appropriate.
Save the terminating resistors in case you change the configuration of the SCSI drives in your system.

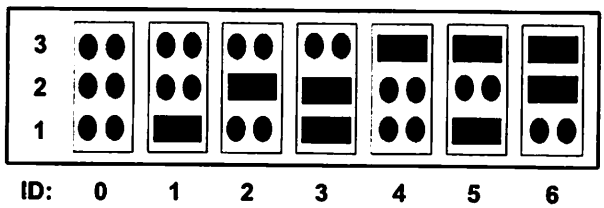
Quantum LPS *XX*S fixed disk drives



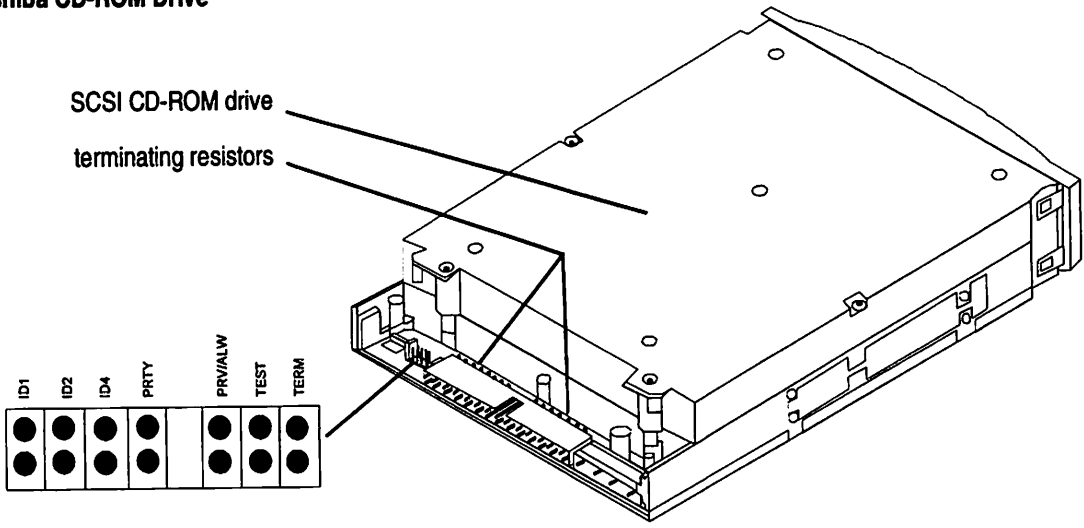


wangtek 5525ES tape drives



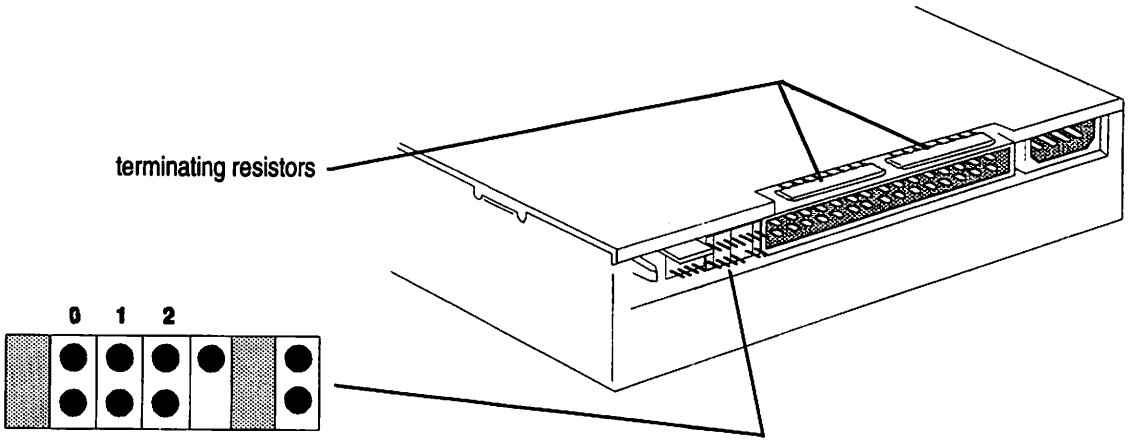


Toshiba CD-ROM Drive



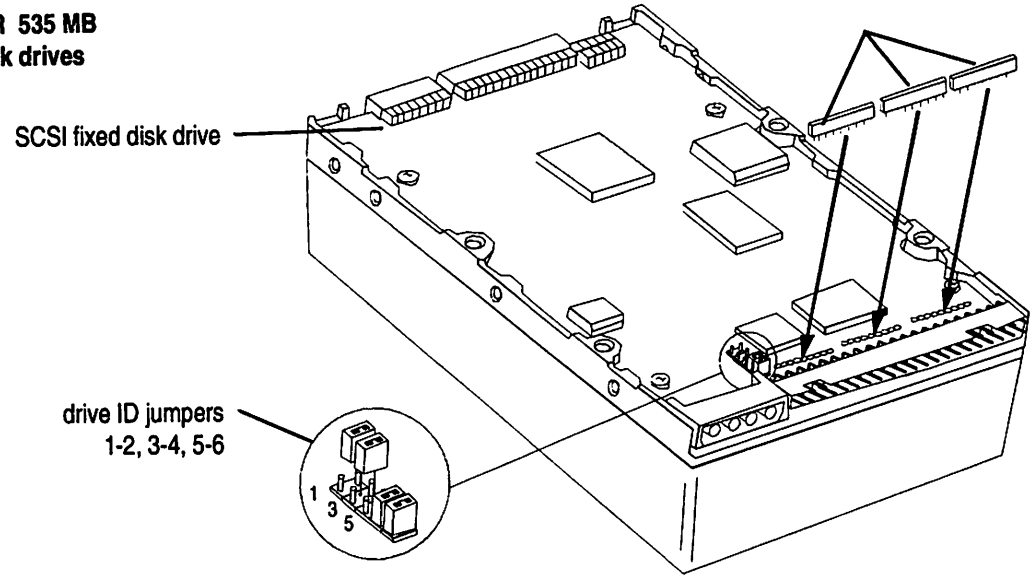
DRIVE NUMBER SCSI ID	Jumper ID1	Jumper ID2	Jumper ID4
0	Removed	Removed	Removed
1	Installed	Removed	Removed
2	Removed	Installed	Removed
3	Installed	Installed	Removed
4	Removed	Removed	Installed
5	Installed	Removed	Installed
6	Removed	Installed	Installed
7	Installed	Installed	Installed

SONY CDU-561
CD-ROM Drive



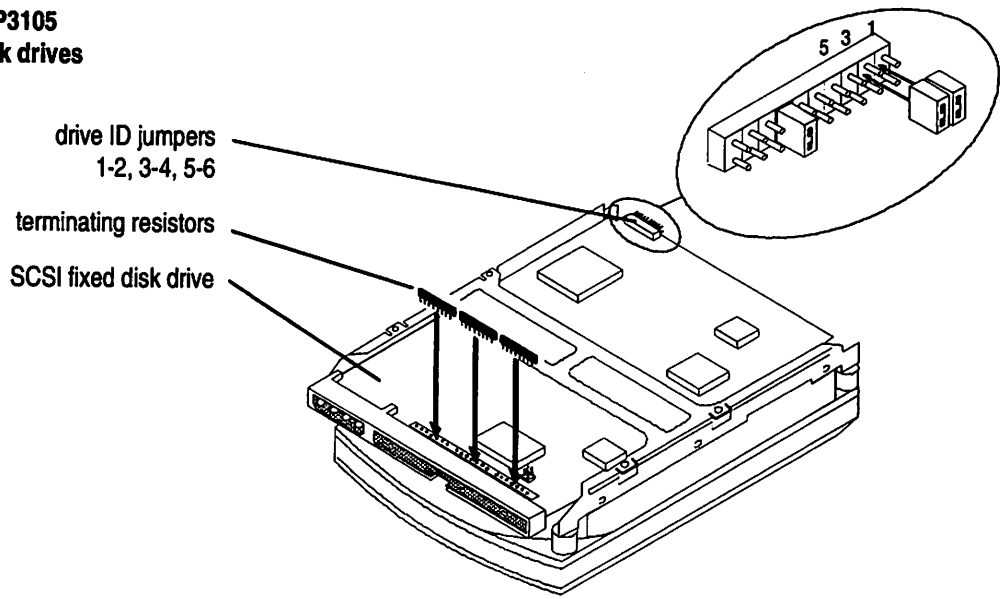
DRIVE NUMBER SCSI ID	Jumper 0	Jumper 1	Jumper 2
0	Removed	Removed	Removed
1	**Installed**	Removed	Removed
2	Removed	**Installed**	Removed
3	**Installed**	**Installed**	Removed
4	Removed	Removed	**Installed**
5	**Installed**	Removed	**Installed**
6	Removed	**Installed**	**Installed**
7	**Installed**	**Installed**	**Installed**

MAXTOR 535 MB fixed disk drives



DRIVE NUMBER SCSI ID	Pins 1 & 2	Pins 3 & 4	Pins 5 & 6
0	Removed	Removed	Removed
1	**Installed**	Removed	Removed
2	Removed	**Installed**	Removed
3	**Installed**	**Installed**	Removed
4	Removed	Removed	**Installed**
5	**Installed**	Removed	**Installed**
6	Removed	**Installed**	**Installed**
7	**Installed**	**Installed**	**Installed**

DEC DSP3105
fixed disk drives



DRIVE NUMBER SCSI ID	Pins 1 & 2	Pins 3 & 4	Pins 5 & 6
0	Removed	Removed	Removed
1	**Installed**	Removed	Removed
2	Removed	**Installed**	Removed
3	**Installed**	**Installed**	Removed
4	Removed	Removed	**Installed**
5	**Installed**	Removed	**Installed**
6	Removed	**Installed**	**Installed**
7	**Installed**	**Installed**	**Installed**

Installing a 5.25-inch Drive

Use the following procedure to install a 5.25-inch flexible disk drive, or a 5.25-inch tape drive (flexible disk or SCSI interface), or a CD-ROM drive into the front center drive bays.

Skip this section if you are installing a fixed disk drive.

When you complete this section, go to "Reassembling the Computer."

1 Open the cabinet and remove any full-length board. Refer to "Opening the Cabinet" and "Replacing a Board."

2 Remove the drive bracket with the 3.5-inch flexible disk drive.

   a Detach the data cable and the power harness from the 3.5-inch flexible disk drive.

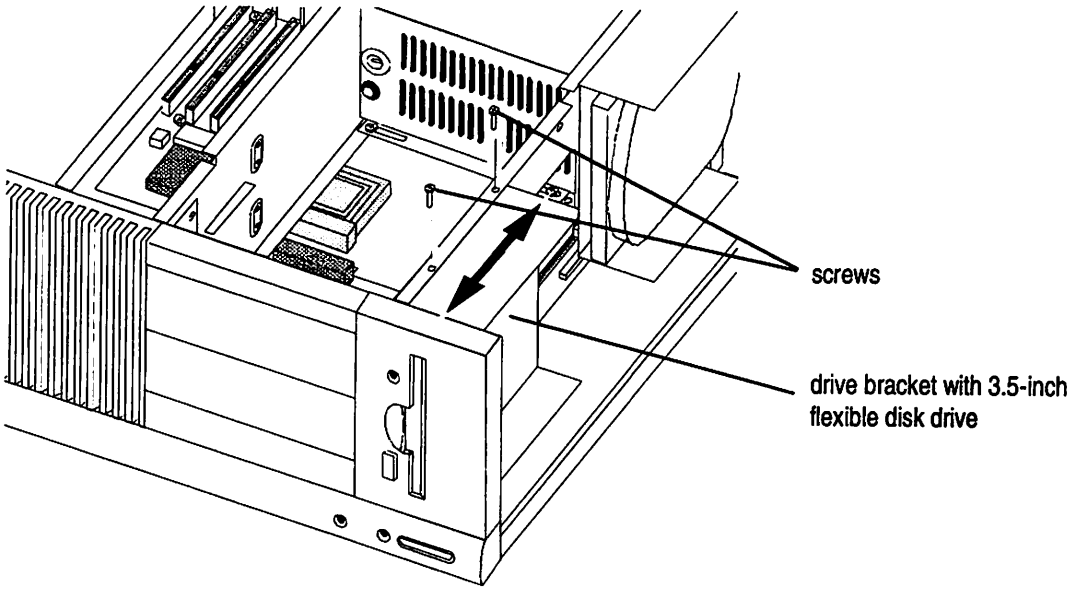
   b Remove the screws that fix the drive bracket to the computer cabinet.

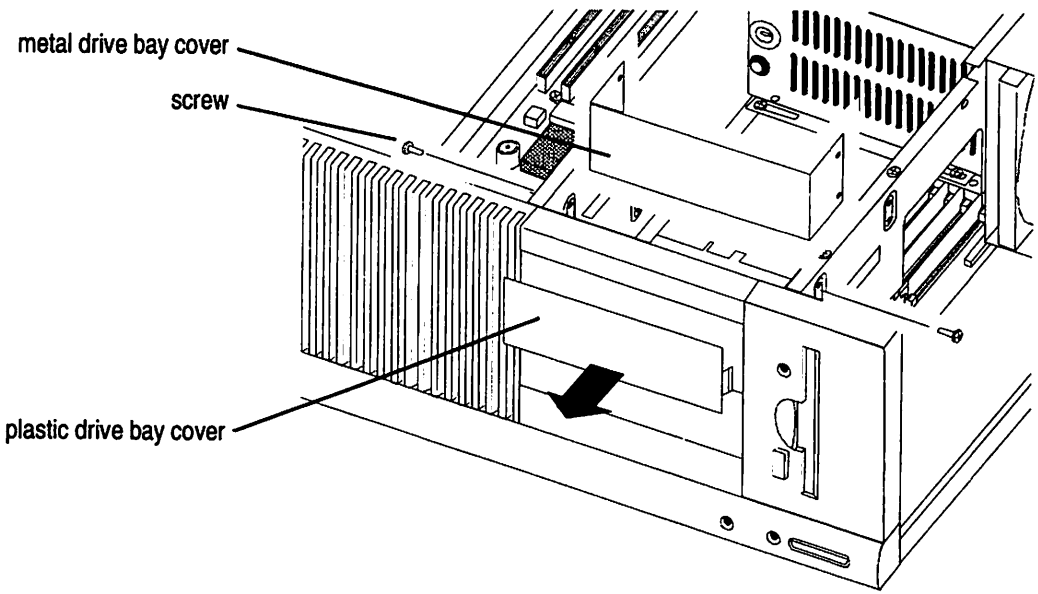
   c Slide the drive bracket to the rear of the computer cabinet, lift it out and put it aside.

3 Remove the drive bay cover to allow access to the drive that you want to install.

   a Remove the fixing screws and lift out the metal drive bay cover.

   b Unsnap the plastic drive bay cover from the front panel and remove it.


screws
drive bracket with 3.5-inch flexible disk drive


metal drive bay cover
screw
plastic drive bay cover

4 Slide the drive into the drive bay and fix it with the screws that came with the kit.

5 Re-install the drive bracket with the 3.5-inch flexible disk drive.

6 Connect the previously removed power harness to the 3.5-inch flexible disk drive.
Connect a spare connector of the power harness to the newly installed drive.

7 If you are installing flexible disk drives and tape drives with flexible disk interface,
continue with **steps 8 through 11**.

If you are installing SCSI tape drives and SCSI CD-ROM drives,
continue with **steps 12 through 14**.

8 Detach the ribbon data cable from connector **J4** on the main processor board. You may discard the cable.

9 Connect the data cable to the drives.

a Take the data ribbon cable that came with the kit. Connect the connector **1 J-BOARD** in the middle of the cable to connector **J4** on the main processor board.

b The connector **1 J-DRIVE B** on the ribbon cable is to connect the 5.25-inch flexible disk drive.

c The connector **1 J-STR** on the ribbon cable is to connect the tape drive.

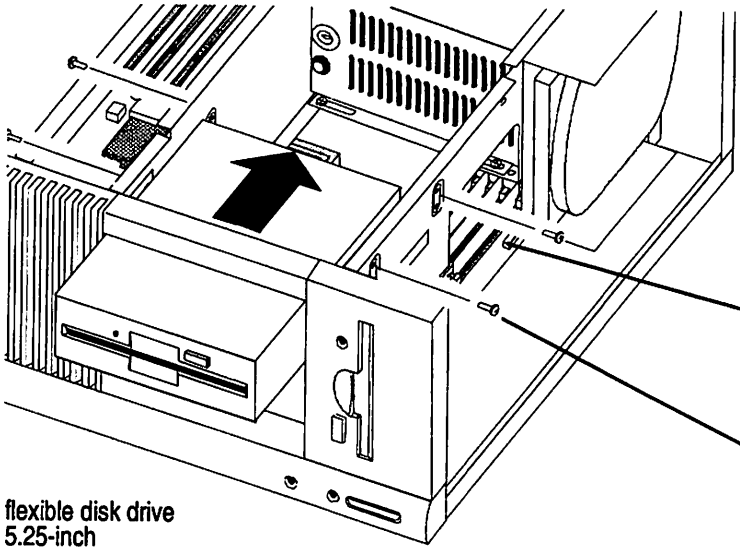
d The connector **1 J-DRIVE A** on the ribbon cable is to connect the 3.5-inch flexible disk drive in the drive bracket.

Make sure that line 1 of the ribbon cable, marked with a colored tracer, connects to pin 1 on the drive data cable connectors.

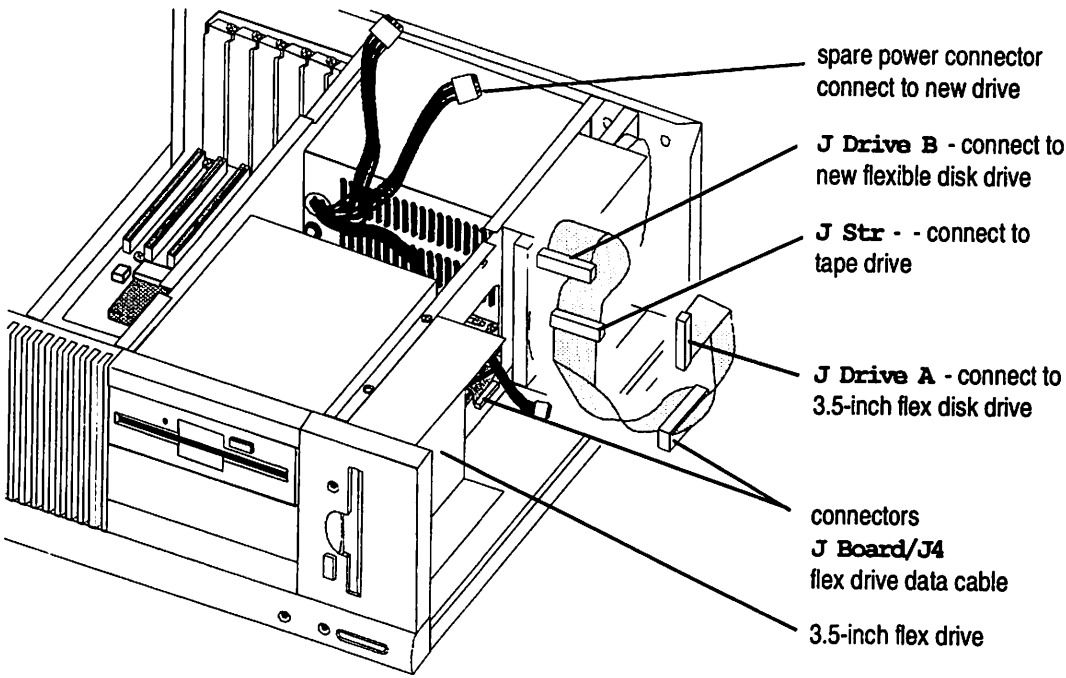
Note: Refer to the *Kit Information* for the exact connector positions on the drive.

10 Reassemble the computer.

11 If you have installed a 5.25-inch flexible disk drive, run SETUP and set **Flexible disk B** to **1.2 MB, 5.25"**.



flexible disk drive
5.25-inch



12 Connect the previously removed data cable to the 3.5-inch flexible disk drive.

13 Connect the SCSI data cable to the drives.

a If you have added a SCSI drive to a system with SCSI drives already installed, connect a free connector of the SCSI data cable to the newly installed drive.

b If the newly installed drive is your only SCSI drive, take the SCSI data ribbon cable that came with the SCSI host adapter board.

Connect the connector **J-BOARD** at one end of the cable to the SCSI host adapter board.

Connect the connector **J-Drive 1** at the other end of the cable to the newly installed drive.

c If you are installing more than one SCSI drive, take the SCSI data ribbon cable from one of the kits. Use the following table to correctly connect the SCSI data cable.

SCSI Cable Connector	Connect to
J-BOARD	SCSI host adapter board
J-Drive 1	SCSI drive in outer rear bay
J-Drive 2	SCSI drive in inner rear bay
J-Drive 3	SCSI drive in upper front bay
J-Drive 4	SCSI drive in lower front bay

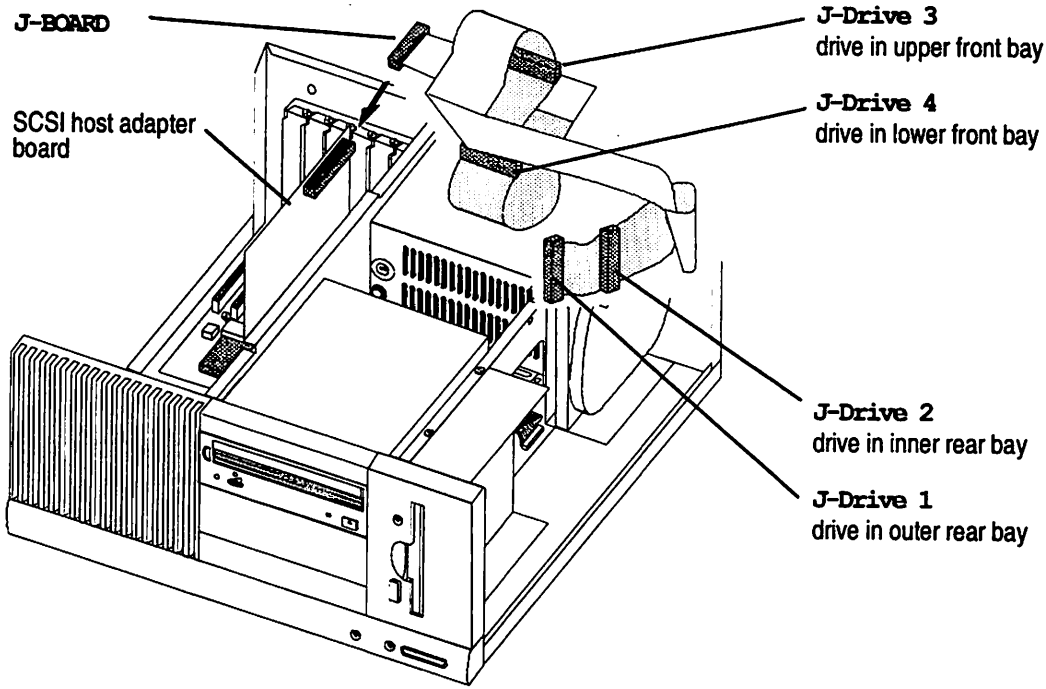
Note: Connector **J-Drive 1** at the end of the SCSI data cable must always be connected to a SCSI drive to ensure correct termination of the SCSI subsystem.

d From the SCSI host adapter board, run the data cable on top of the power supply to connect the drives in the front center bays. Then run the end of the cable above the stabilizing brace to connect the drives in the rear bays.

Refer to the *Kit Information* for the exact connector positions on the drive.

Match the keys on mating connectors.

14 Reassemble the computer.



Installing a Fixed Disk Drive

Use the following procedure to install a fixed disk drive, with IDE or SCSI interface, into the rear drive bays.

Skip this section if you are installing a flexible disk drive, a tape drive, or a CD-ROM drive.

When you complete this section, go to "Reassembling the Computer."

1 Open the cabinet as described in "Opening the Cabinet."

2 Remove the drive bracket with the fixed disk drive.

   a Detach the data cable and the power harness from the existing fixed disk drive.
   Remove the ribbon data cable from the drive bracket, if there is no fixed disk drive already installed.

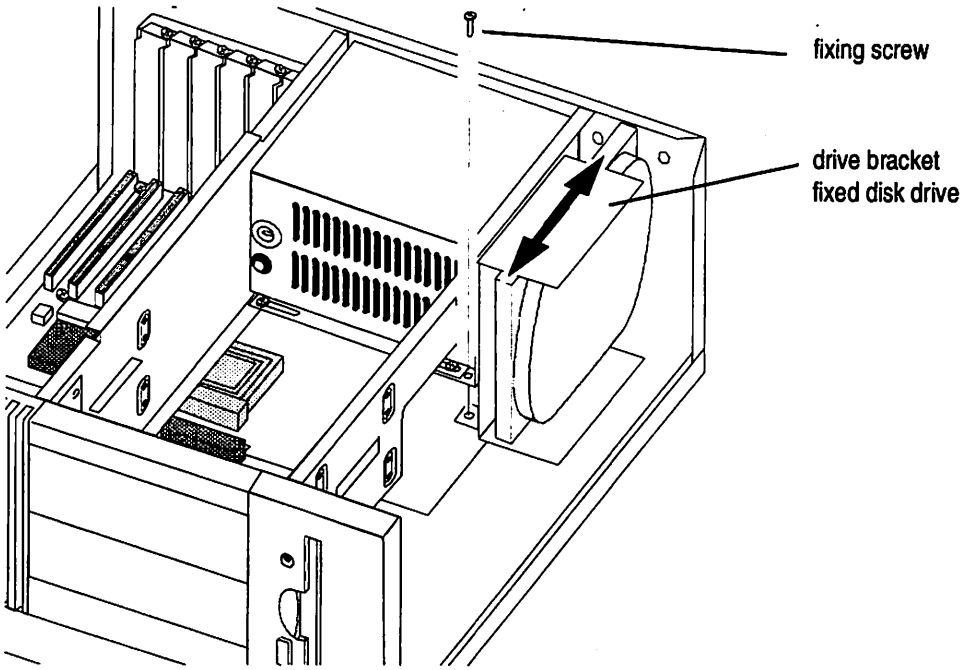
   b Remove the screw that fixes the drive bracket to the computer cabinet.

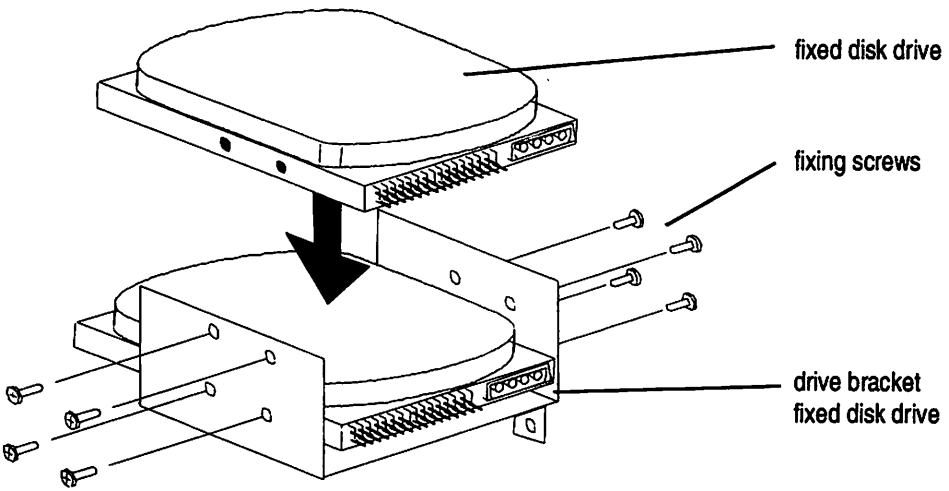
   c Slide the drive bracket to the front of the computer cabinet, lift it out and put it on the working surface.

3 Slide the new drive into the drive bracket and fix it with the screws that came with the kit.

4 If you are installing fixed disk drives with IDE interface,
   continue with **steps 5 through 8**.

   If you are installing SCSI fixed disk drives,
   continue with **steps 9 through 11**.


fixing screw
drive bracket
fixed disk drive


fixed disk drive
fixing screws
drive bracket
fixed disk drive

5 Connecting IDE/AT fixed disk drives to the computer.

Notes: Make sure that line 1 of the ribbon cable, marked with a colored tracer, connects to pin 1 on the data cable connectors.

Match the keys on mating connectors.

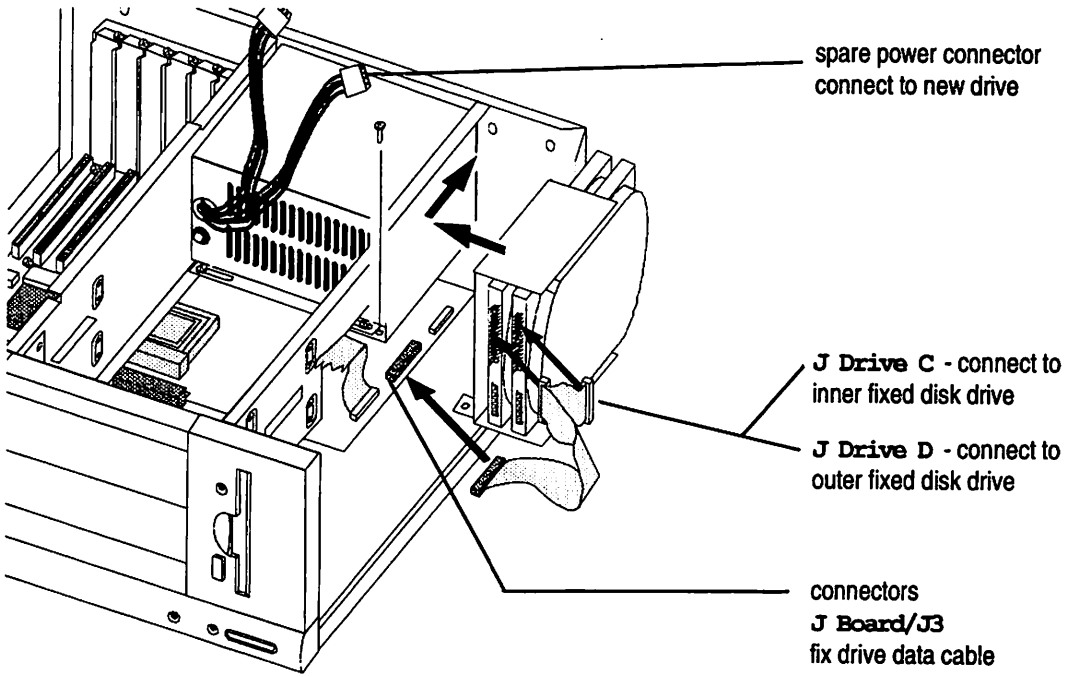
Refer to the *Kit Information* for the exact connector positions on the drive.

a One IDE fixed disk drive installed

- Use the data cable that was attached to the drive bracket (see step 2). You do not need the ribbon data cable that is supplied with the kit.
- Connect the connector **J-BOARD** at one end of the cable to connector **J3** on the main processor board.
- Re-install the drive bracket with the fixed disk drive.
  Connect a spare connector of the power harness to the newly installed drive.
- Connect the connector **J-Drive** at the other end of the cable to the newly installed drive.

b Two IDE fixed disk drives installed

- Remove the old data cable from connector **J3** on the main processor board. You may discard this cable.
- Take the data cable that came with the kit. Connect the connector **J-BOARD** at the end of the cable to connector **J3** on the main processor board.
- Re-install the drive bracket with the fixed disk drive.
  Connect a spare connector of the power harness to the newly installed drive.
- Connect the connectors **J-Drive** at the end of the data cable to the fixed disk drives in the drive bracket.



6 Reassemble the computer.

7 Run SETUP and set the correct drive type number for **Fixed disk C** and **Fixed disk D**. Refer to the *Kit Information* for the drive type number of your new fixed disk drive.

8 Format the drive media, if necessary. Refer to your operating system documentation for how to prepare fixed disks for your computer.

9 Connecting SCSI fixed disk drives to the computer.

Notes: Make sure that line 1 of the ribbon cable, marked with a colored tracer, connects to pin 1 on the data cable connectors.

Match the keys on mating connectors.

Refer to the *Kit Information* for the exact connector positions on the drive.

a Re-install the drive bracket with the fixed disk drive.
Connect a spare connector of the power harness to the newly installed drive.

b Connect the SCSI data cable.

- If you have added a SCSI drive to a system with SCSI drives already installed, connect a free connector of the SCSI data cable to the newly installed drive.
- If the newly installed drive is your only SCSI drive, take the SCSI data ribbon cable that came with the SCSI host adapter board. Connect the connector **J-BOARD** at one end of the cable to the SCSI host adapter board. Connect the connector **J-Drive 1** at the other end of the cable to the newly installed drive.

- If you are installing more than one SCSI drive, take the SCSI data ribbon cable that came with the SCSI host adapter board. Use the following table to correctly connect the SCSI data cable.

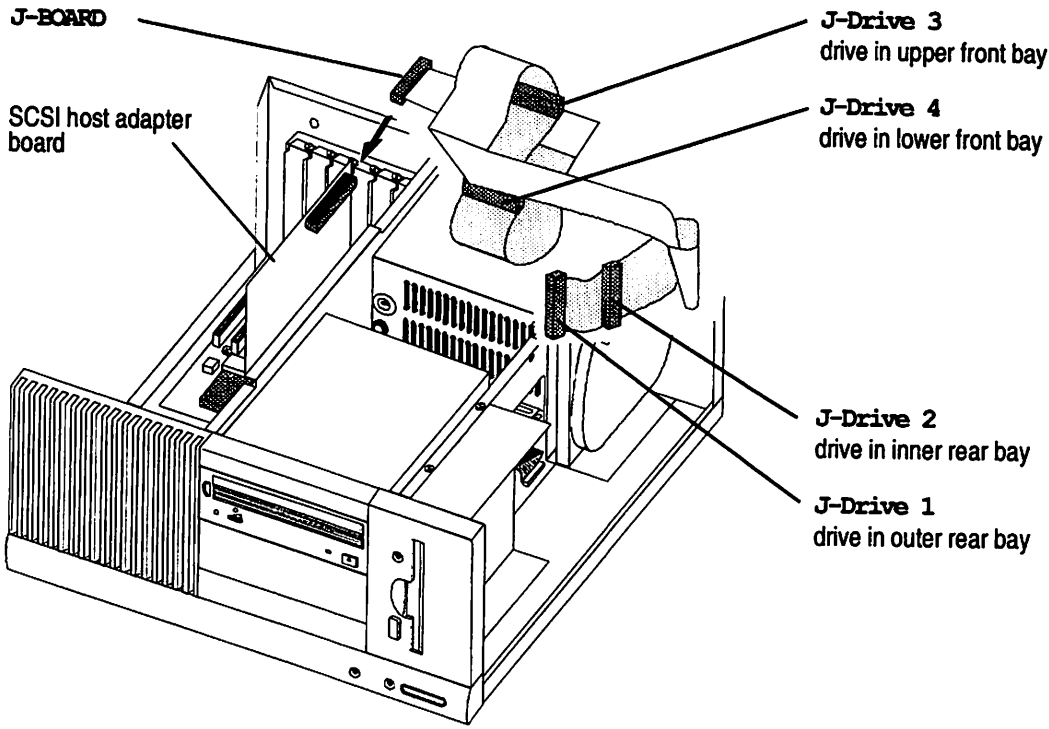
SCSI Cable Connector	Connect to
J-BOARD	SCSI host adapter board
J-Drive 1	SCSI drive in outer rear bay
J-Drive 2	SCSI drive in inner rear bay
J-Drive 3	SCSI drive in upper front bay
J-Drive 4	SCSI drive in lower front bay

Note: Connector J-Drive 1 at the end of the SCSI data cable must always be connected to a SCSI drive to ensure correct termination of the SCSI subsystem.

- From the SCSI host adapter board, run the data cable on top of the power supply to connect the drives in the front center bays. Then run the end of the cable above the stabilizing brace to connect the drives in the rear bays.

10 Reassemble the computer.

11 Format the drive media, if necessary. Refer to your operating system documentation for how to prepare fixed disks for your computer.


J-BOARD
SCSI host adapter board
J-Drive 3
drive in upper front bay
J-Drive 4
drive in lower front bay
J-Drive 2
drive in inner rear bay
J-Drive 1
drive in outer rear bay

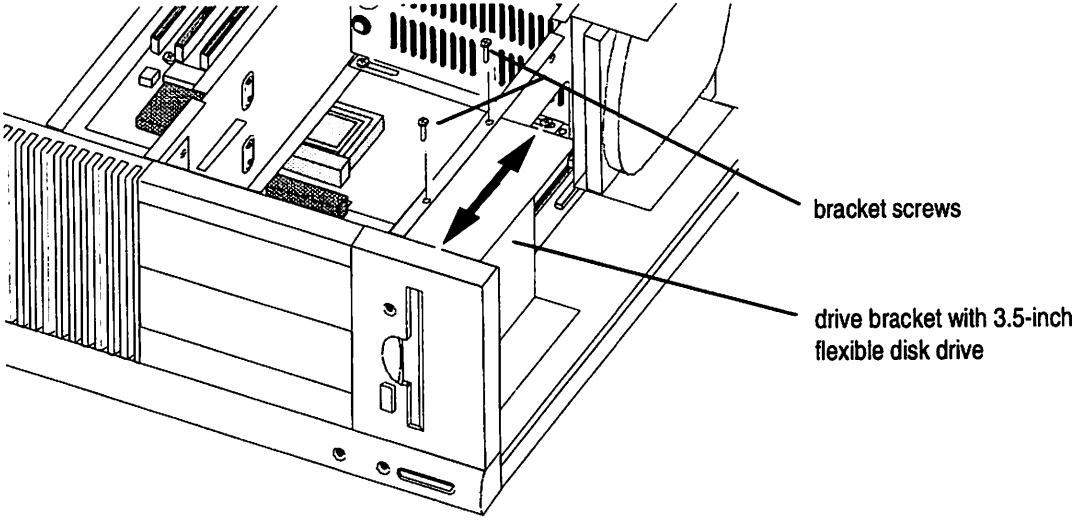
Removing Drives

Follow these steps to remove any type of drive.

1 Open the cabinet as described in "Opening the Cabinet."

2 Front 3.5-inch drive bay

- **a** Remove all harnesses from the installed drive.
- **b** Remove the two screws that secure the drive bracket, as shown in the illustration.
- **c** Slide the bracket to the back of the cabinet, and lift it with the drive from the cabinet.
- **d** The flex drive is secured to the bracket from the sides by four screws. These may now be removed, and the drive lifted out of the bay.



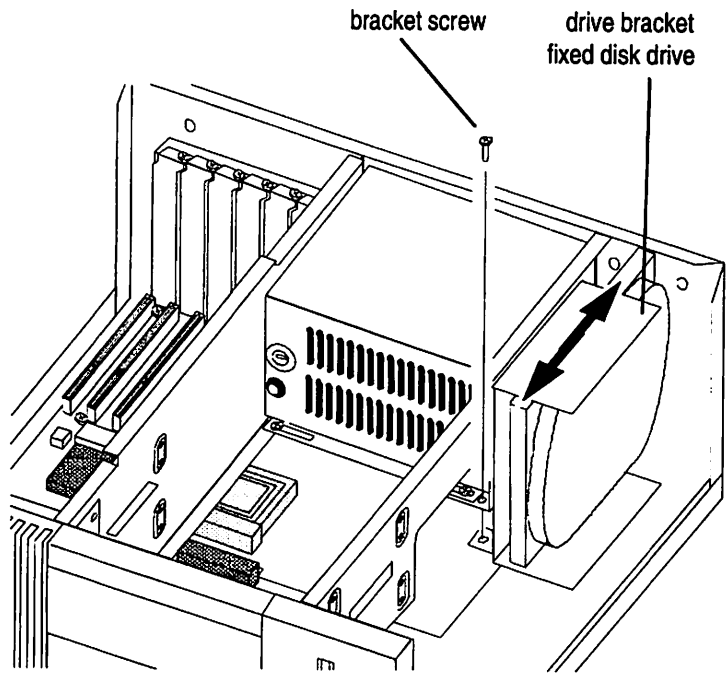
3 Rear drive bays

a Remove all harnesses from the installed drive.

b Remove the screw that secures the drive bay, as shown in the illustration.

c Slide the bay to the front of the cabinet, and lift it complete with drive from the cabinet.

d The drive is secured to the bracket from the sides by four screws. These may now be removed, and the drive lifted out of the bracket.



4 Front drive bays

   a First, the front 3.5" drive bracket must be removed as described in step 2.

   b Also, remove any full-length board from the expansion slots on the main processor board. Refer to "Replacing a Board."

   c Now you can access and remove the fixing screws from the sides of the drive bays. Four screws are provided for each drive.

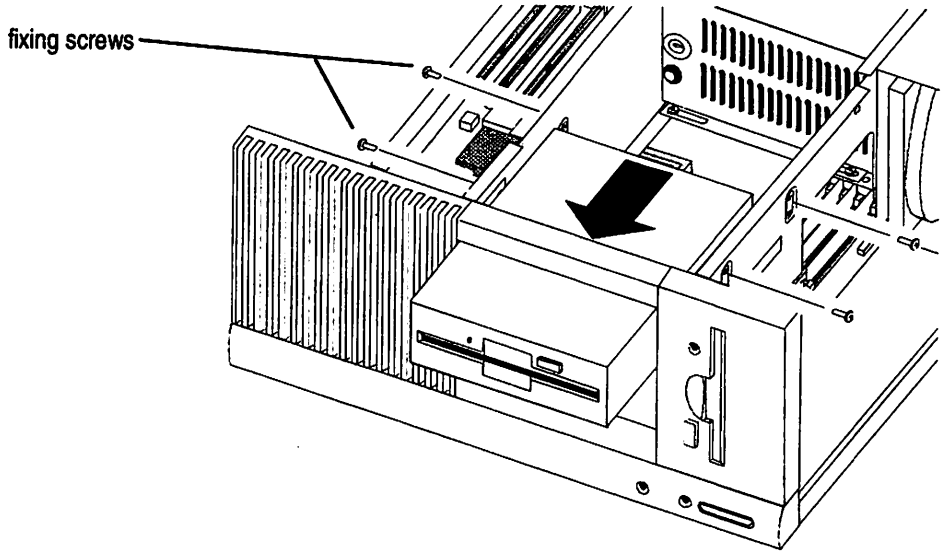
   d Disconnect the harnesses from the drive, and slide the drive out through the front of the cabinet.

   e If you are replacing a drive, refer to the corresponding sections about installing a drive.

   f If you remove a drive from this position permanently, cover the drive bay slot in the computer front panel. Use the drive bay covers that were removed when you installed the drive. These covers are designed to provide the proper air flow when there is no drive installed. They are also required for the system to conform to emission standards.

   The metal drive bay cover is secured by the two screws at the front of the drive bay; the plastic drive bay cover snaps into the cabinet front panel.

5 If you are replacing a drive, refer to the corresponding sections about installing a drive.


fixing screws

Reassembling the Computer

When you have finished installing options, reassemble the computer as listed below.

1 Replace the cabinet top.

   a Check that all cables are securely connected and routed properly, so that they cannot get trapped by the cabinet top.

   b If you have a SCSI data cable installed, make sure that it does not block the intake vents of the fan in the power supply front.

   c Place the cabinet top slightly behind and on top of the slides on each side of the cabinet almost at the back panel. Make sure both sides are sitting properly on the metal slide.

   d Push the top forward to meet the cabinet back panel.

2 Fasten the retaining screws that secure the cabinet top.

3 Lock the cabinet, if required.

4 Connect all previously removed cables to the computer.

Checking Options After Installation

Diagnostic Testing

Always use any available diagnostic routines (refer to Chapter 2 "Using the System") to check that the computer is in working order.

Some options may require special test routines that the standard diagnostic does not include. In such instances, a special diagnostic often comes with the option.

System Configuration Check

You may disturb the information in the battery-supported memory, which notes important characteristics of your system (for example, type and number of disk drives) when you are handling printed circuit boards, especially the main processor board.

To check for the correct system configuration and time setting, run the SETUP program after doing any work involving removal of the cabinet.

Appendix A

Switches and Technical Data

Setting Switches

You may change certain functions of the system by altering the setting of the switches on the main processor board. Also, installing some options may require you change the switch settings.

For most users the standard settings will suit their needs and no changes will be required.

To access the switches on the main processor board, remove the cabinet top as described in the Chapter "Installing Options."
A label inside the cabinet shows the factory default settings of the switches.

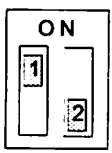
Selecting the Display Type

Switch 1 on switchblock SW1 has no function when a VGA controller board is installed to the system.

When a CGA or a MDA controller is installed to the system, set the switch as follows.

Color/Graphics - SW1-1 *on*

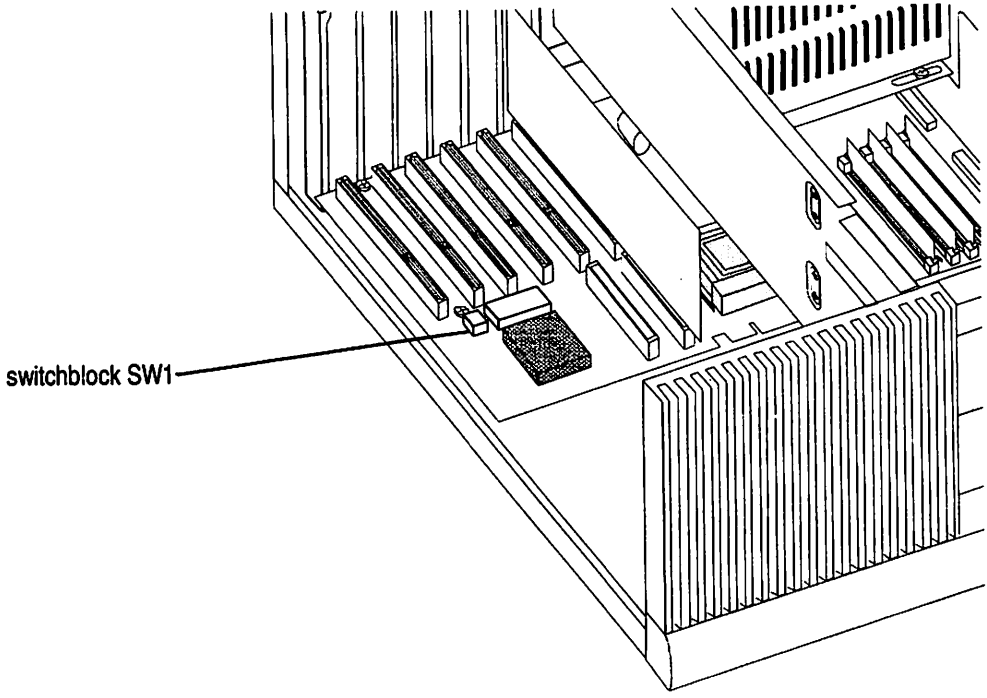
Alpha/Monochrome - SW1-1 *off*



SW1 - factory default settings

The second switch on the switchblock, SW1-2, is reserved for further enhancements. Set SW1-2 to *off*.

The following illustration shows the location of the switchblock SW1.


switchblock SW1

Technical Data

General Features

Main processor board with
i486 SX processor, 25 MHz or 33 MHz, or
i486 DX, 33 MHz processor or
i486 DX2 processor, 50 MHz or 66 MHz .

8 KB processor-internal cache memory

Industry Standard bus architecture (ISA/AT)

Up to 64 MB RAM memory

64 KB or 256 KB second level cache memory optional

Power supply, 160 W static, 240 W dynamic.
switchable between 115 Vac and 230 Vac,
integrated fan and power outlet for display.

Video Adapter Boards

SVGA Graphics Adapter

512 KB video RAM, optional upgrade to 1 MB,
GD5422 graphic chip,
maximum resolution: 1024 x 768

Windows Graphics Adapter

1 MB video RAM, no upgrade possible
GD5426 graphic chip,
maximum resolution: 1024 x 768

Work Station Adapter

1 MB video RAM, optional upgrade to 2 MB
maximum resolution: 1280 x 1024

I/O Interfaces

6-Pin PS/2 type keyboard connector, bi-directional

6-Pin PS/2 type mouse connector, bi-directional

15-Pin VGA display connector

9-Pin Serial (RS-232C) connectors
Note: Data transfer speed via serial interfaces: 19200 baud maximum for cable length ≤ 15 m (50 ft)

25-Pin Parallel (Centronics) connector, bi-directional

Serial/Parallel Port Addresses

	Port	Address (Hex)	Interrupt Level
Serial	COM1	3F8 - 3FF	IRQ4
	COM2	2F8 - 2FF	IRQ3
Parallel	LPT1	378 - 37F	IRQ7
	LPT2	278 - 27F	IRQ7

I/O Port Address Map

Port (Hex)	System Use
00 - 1F	DMA Controller 1
20 - 3F	Programmable Interrupt Controller (Master)
40 - 5F	Programmable Interval Timer
60 - 6F	Parallel Input/Output Interface
70 - 7F	Real Time Clock and DMA Mask
80 - 9F	DMA Page Select Registers
A0 - BF	Programmable Interrupt Controller 2
C0 - DF	DMA Controller 2
F0	Clear Coprocessor Busy
F1, F2, F3	Reserved
F8 - FF	Coprocessor
170 - 177	Reserved
1F0 - 1F7	Fixed Disk Controller Primary
200 - 20F	Reserved
219	Reserved
278 - 27F	Parallel Interface Port 2 (Serial Port 4)
2F0 - 2F7	Reserved
2F8 - 2FF	Serial Port 2
300 - 31F	Reserved
330 - 333	SCSI Interface Default
338 - 33F	Reserved
360 - 36F	Reserved
370 - 377	Reserved
378 - 37F	Parallel Interface Port 1 (Serial Port 3)
380 - 38F	Reserved
3A0 - 3AF	Reserved
3B0 - 3BF	Character Display Controller
3C0 - 3CF	EGA/VGA Additional Reserved
3D0 - 3DF	Graphics Display Controller
3F0 - 3F7	Flexible Disk Controller Primary
3F8 - 3FF	Serial Port 1

Provisions for Optional Internal System Expansion

Socket for

- OverDrive™ processor upgrade ODP486SX or ODPR486DX
  or
- i486 DX or i486 DX-2 processor

4 Sockets for memory modules (SIMMs)

Connector for second level cache upgrade board - 64 KB or 256 KB

Connector for audio upgrade board

2 combination slots with VESA video extension for high resolution video boards or 16-bit AT compatible boards

4 Slots for 16-bit AT compatible boards

Dimensions

Height: 394 mm (15.5 in.)

Width: 157 mm (6.2 in.)

Depth: 417 mm (16.4 in.)

Weight

Approximately 15 kg (33 lb)

The above weight is the maximum weight for a computer with drives installed in all bays and boards installed in all slots. Weight of the computer varies according to the installed features.

Airflow Clearances

Sides : 76 mm (3 inches)

Top: 25 mm (1 inch)

Back: 76 mm (3 inches)

Bottom: 6 mm (0.25 inches)

Environment

Temperature

Operating: 15°C to 32°C (59°F to 90°F)

Storage: -10°C to 50°C (14°F to 122°F)

Transit: -40°C to 60°C (-40°F to 140°F)

Humidity

Relative Humidity: 20% to 80%

Humidity Change: 10% per hour

Altitude / Barometric Pressure

Operating/Transit/Storage)

Altitude: Up to 3002 m (9850 ft)

Barometric pressure: 10000 to 69000 Pascal

Acoustical Noise Information

Sound pressure level (LPA) in operator's ear position is less than 45 dB(A). Measurement, operating conditions and installation according to DIN 45635.

Review other installation environments with a site preparation specialist.

Power Requirements

Nominal Voltage 115 V
Input voltage: 100 to 125 Vac
Input current: maximum 5.0 A
Frequency: 60 Hz

Nominal Voltage 230 V
Input voltage: 220 to 240 Vac
Input current: maximum 3.0 A
Frequency: 50 Hz

Power consumption: 370 W or 1262 BTU/h maximum

Storage Media

Flexible Disk Drives
1.44 MB and 2.88 MB, 3.5-inch

1.2 MB, 5.25-inch

Fixed Disk Drives
80 MB, 120 MB, 160 MB, 240 MB, 340 MB, and 520 MB
IDE (Industry Disk Electronic) type, AT interface

240 MB, 535 MB, and 1 GB
SCSI interface (SCSI host adapter required)

Tape Drives
120 MB / 240 MB
Flexible disk drive interface

320 / 525 MB
SCSI interface (SCSI host adapter required)

CD-ROM Drive
600 MB
SCSI interface (SCSI host adapter required)

Password User Information Byte

Index 34h of the extended CMOS-RAM.

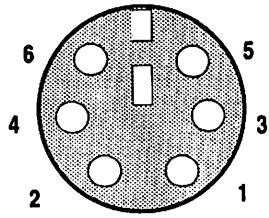
Bits			
1, 0	**User logged in**		
	00	=	Master
	01	=	User 1
	10	=	User 2
	11	=	User 3
3, 2	**Password Level**		
	00	=	Master
	01	=	Level 1
	10	=	Level 2
	11	=	Level 3
7	**Password Required at Start**		
	0	=	No
	1	=	Yes
4, 5, 6	**Reserved (0)**		

External Connectors Pin Assignments

All connectors are shown viewed from outside of the computer.

Keyboard and Mouse Connectors

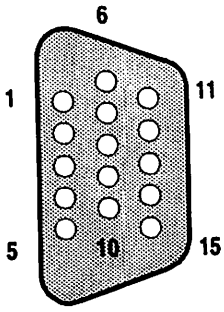
6-pin, female



Pin	Signal
1	Data
2	Not Used
3	Ground
4	+5 Vdc
5	Clock
6	Not Used
Shell	Shielding

Display Connector (VGA)

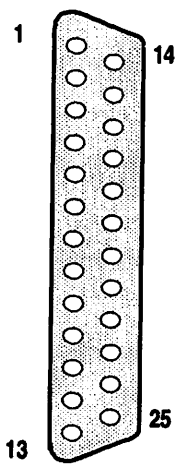
15 pin, female



Pin	Signal	Pin	Signal
1	Red Video	9	Not Connected
2	Green Video	10	Digital Ground
3	Blue Video	11	Not Connected
4	Not Connected	12	Not Connected
5	Digital Ground	13	H-Sync
6	Red Ground	14	V-Sync
7	Green Ground	15	Not Connected
8	Blue Ground		

Parallel (Centronics) Connector

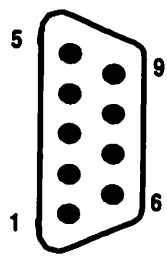
25-pin, female



Pin	Signal	Pin	Signal
1	Strobe/	14	Auto/
2	Data Line 0	15	Error/
3	Data Line 1	16	Init/
4	Data Line 2	17	Select In/
5	Data Line 3	18	Ground
6	Data Line 4	19	Ground
7	Data Line 5	20	Ground
8	Data Line 6	21	Ground
9	Data Line 7	22	Ground
10	Acknowledge/	23	Ground
11	Busy	24	Ground
12	PE	25	Ground
13	Select		

Serial (RS-232C) Connectors

9-pin, male



Pin	Signal	Pin	Signal
1	Receive Line Signal Data	6	Data Set Ready
2	Receive Data	7	Request To Send
3	Transmit Data	8	Clear To Send
4	Data Terminal Ready	9	Ring Indicator
5	Signal Ground		

Memory Map

Address (hex)	Function	Notes
00000000 - 0009FFFF	640 KB System	system board RAM
000A0000 - 000BFFFF	128 KB Video RAM Display Buffer	reserved for video
000C0000 - 000C7FFF	VGA BIOS	video adapter
000C8000 - 000EFFFF	128 KB I/O Expansion ROM	reserved for ROM or RAM on I/O adapters
000F0000 - 000FFFFF	64 KB System ROM BIOS	duplicated system BIOS at address FFFF0000
01000000 - 03FFFFFF	Maximum Memory	memory
FFFF0000 - FFFFFFFF	128 KB Reserved on System Board	duplicated ROM BIOS

Interrupt Levels

Interrupt Level		Function
NMI		Parity or I/O Channel Check
8259A No.1	8259A No. 2	
IRQ0		Timer Output 0
IRQ1		Keyboard Output 0
IRQ2		Interrupt from 8259A No. 2
	IRQ8	Real Time Clock Interrupt
	IRQ9	Software Redirected to Int 0AH
	IRQ10	Reserved
	IRQ11	SCSI Host Adapter
	IRQ12	Mouse/Auxiliary Port
	IRQ13	Math. Coprocessor
	IRQ14	Fixed Disk Controller
	IRQ15	Reserved
IRQ3		Serial Port 2
IRQ4		Serial Port 1
IRQ5		Reserved
IRQ6		Flexible Disk Controller
IRQ7		Parallel Port 1, Parallel Port 2

Glossary

List of Abbreviations

A	Amperes
BIOS	Basic Input/Output System
CGA	Color Graphics Array
CMOS	Complementary Metal Oxide Semiconductor
CPU	Central Processing Unit
DMA	Direct Memory Access
DOS	Disk Operating System
EGA	Enhanced Graphics Array
HMA	High Memory Area
IC	Integrated Circuit
IDE	Industry Disk Electronic
ISA	Industry Standard Architecture
I/O	Input/Output
IRQ	Interrupt Request
LED	Light Emitting Diode
MB	Megabyte
MHz	Megahertz
MIPS	Million Instructions Per Second
NMI	Non-maskable Interrupt
POST	Power-on Self-test
RAM	Random Access Memory
ROM	Read Only Memory
RTC	Real Time Clock
SCSI	Small Computer System Interface
SIMM	Single In-line Memory Module
Vac	Volts of Alternating Current
Vdc	Volts of Direct Current
VESA	Video Electronic Standards Association
VGA	Video Graphics Array
ZIF	Zero Insertion Force

A

ac Abbreviation for alternating current. It is usually measured in Hertz (Hz). The standard ac value in the U.S. is 120 volts at 60 Hz. The standard international ac value is 240 volts at 50 Hz.

Acronym A word formed from the first letter or letters of the words in a name, term, or phrase.

Adapter The interface between the computer main processor board and peripheral devices. The term also can be used to indicate a board which acts as an interface. It is also called a plug-in board, controller board, circuit board.

Address Each accessible location within a device is assigned a number, which is known as an address. In internal memory, the address is a specific byte number. In external memory, the address is a unit number (for example, drive A) and, for disk or diskette drives, the address may include a track number and a sector number. Your computer is able to locate data using these addresses.

Alpha-numeric A character set that contains letters, numbers, and punctuation.

Ampere One ampere (amp) is the basic unit for measuring electrical current.

Application program A software program that performs a specific job; these programs include spreadsheets, data bases and word processors.

Autoexec.bat An MS-DOS batch file that automatically executes a set of commands when you turn on the computer.

Automatic head parking A feature of some fixed disk drives. It automatically moves the drive read/write heads to an unused track when the computer is turned off. This is especially important when you are moving the computer since it reduces the chance of the head contacting the data area on the disk and damaging it.

B

Back up The process of copying data from one storage medium to another (i.e., diskette to diskette, or fixed disk to diskette) to prevent total information loss should the original record be lost or damaged.

Bad sector A disk sector that does not reliably hold data because of a problem with the disk or incorrect format parameters.

Bad track table Record of which tracks on the fixed disk are damaged and cannot hold data.

Batch file An MS-DOS file that contains a series of commands which execute automatically when the file is called up. The file must have a .BAT extension.

Bay A space in the computer's cabinet designed to hold a disk drive or similar device.

Binary code A system of numbering which uses only two values, zero and one. For example, the ASCII letter D is represented as 01000100.

BIOS Acronym for the Basic Input-Output System. It controls the interaction of the main processor board and peripheral devices such as the disk drives, keyboard, and display.

Bit (binary digit) One unit of computer data represented by the characters 0 or 1. Bits are grouped to form bytes.

Block A physical unit of data that can be conveniently stored by a computer on an input or output device. The term is synonymous with physical record of information.

Boot To load an operating system program into the computer memory. You can cold-boot the computer by turning it on or warm- boot the computer by pressing the Ctrl-Alt-Del keys at the same time.

Bootable A disk that has been formatted and contains an operating system.

Buffer A part of memory which holds information until the computer or peripheral device is ready to process it.

Bus A set of signal lines used for transmitting addresses or data between or within devices.

Byte A group of bits which form a computer-readable unit which usually represents one character. In your computer, each byte consists of eight bits.

C

Card The term used to indicate a board which acts as an interface. Also called adapter, plug-in board, controller board, circuit board.

Central processing unit (CPU) The computer's CPU contains the memory, the arithmetic logic (ALU), and the input/output (I/O) control for the system.

CGA Color Graphics Adapter™ is a type of display adapter and a display. CGA supports monochrome, color, text, and graphic applications.

Chip An integrated circuit etched into the surface of a wafer, or chip, of silicon. Chips are usually placed in a plastic or ceramic carrier which has pins to make electrical connections with controller board circuits.

Circuit A complete electronic path.

Circuit Board A card or board which contains printed circuits. The board is made of an insulating material and components are mounted and interconnected by the circuit conductors.

CMOS Complementary Metal Oxide Semiconductor. A type of chip that requires little power. In computers, this chip is often battery-powered and stores configuration data.

Coding The writing of a list of instructions which causes a computer to perform specified operations.

Command An instruction which tells the operating system what you want to do.

Computer system The equipment and instructions used as a unit to process data. It includes the central processing unit (CPU), operating system, and peripheral equipment and programs.

Config.sys A file that tells MS-DOS what parameters are required to run the system and loads programs called device drivers into memory. It operates as soon as the computer is turned on.

Controller A group of circuits etched into a board to send signals from the main processor board to a peripheral. The term also can be used to indicate a board which acts as an interface. Also called adapter, plug-in board, controller board, circuit board.

CPU See central processing unit.

Cursor A moving, sliding, or blinking symbol on a display screen which indicates where the next character will appear.

Crash A malfunction that brings work to a halt.

D

Daisy chain An adapter interface where the data passes from one peripheral device to another. Most disk drives are connected in daisy chain fashion.

Data Any information (letters, numbers, symbols) input to, or output from, the computer for storage or manipulation.

Debug To detect, trace, and eliminate mistakes in computer programs or in other software.

Default A value or option automatically selected by the computer program when none has been specified.

Device driver A program loaded into memory by the system configuration file, config.sys, so a particular device can work with the system.

Diagnostics Procedures used to identify and isolate problems within the computer or its peripherals.

Directory Names of files or groups of files stored on a fixed disk, flexible diskette, or tape cartridge.

Disk See diskette and fixed disk.

Diskette A thin, flat, round piece of flexible plastic which is coated with magnetic material and placed in a paper or plastic casing. Data is recorded and stored on diskette. Flexible disk, floppy disk, disk, flexible diskette, floppy diskette, floppy, mini disk are all common names used to refer to a removable diskette.

DMA Abbreviation for Direct Memory Access. A circuit which provides high-speed transfer of data between a device and system memory.

DOS (MS-DOS) Microsoft's Disk Operating System which allows the computer to store data and work with information in memory.

E

Edit To rearrange, add, and delete data or programmer's code or change formats.

EGA Enhanced Graphic Adapter™ is both a type of display adapter and a display. EGA supports text, color, and graphic applications in varied resolutions. It can emulate previous graphics modes including CGA.

Electronics Pertaining to the application of that branch of science which deals with the motion, emission and behavior of currents of free electrons, especially in vacuum, gas or photo tubes and special

conductors or semiconductors. Electronics is contrasted with electric which pertains to the flow of large currents in wires only.

EPROM An acronym for Erasable Programmable Read Only Memory. Data etched on an EPROM chip can be erased with ultraviolet light and re-programmed with special equipment.

Erase To remove data from a medium, leaving the medium available for recording new data.

Error message A message which tells the user what type of error occurred.

Extension A one-, two-, or three-letter addition to an MS-DOS file name generally used to identify what type of data file it is.

F

File A set of related records; the records in a file may be sequenced according to a key contained in each record.

File name The name applied to a data file to identify it so that the computer can locate and recall it from a storage device. It can have up to 8 letters and a 3 letter extension.

Fixed disk A thin, flat, circular piece of rigid plastic or aluminum coated with a magnetic material for data storage. Fixed disks store more data than flexible diskettes and cannot be removed like flexible diskettes.

Flash ROM Read only memory that can be erased and re-written many times. Used to store the BIOS, allowing easy upgrades as new versions become available.

Flexible diskette A thin, flat, circular piece of flexible plastic coated with a magnetic material for data storage. Flexible diskettes can be removed from the drive.

Formatted disk(ette) A disk(ette) on which track and sector control information has been written by an operating system like MS-DOS.

Function keys Keys on the keyboard that can be programmed to perform specific functions.

H

Hard disk See fixed disk.

Hardware Physical equipment used in data processing. Used with software, it creates a complete computer system.

Head A device that reads, records, or erases data on a storage medium, e.g., a small electromagnet used to read, write, or erase data on a magnetic disk.

Head parking A procedure where the fixed disk drive read/write heads are moved to an unused track when the computer is turned off. This is especially important when you are moving the computer since it reduces the chance of the head contacting the data area on the disk and damaging it. Disks with automatic head parking do this automatically.

Hexadecimal number A whole number in the hexadecimal numeral system (using base 16 notation). A hexadecimal digit can be expressed as any one of sixteen different characters.
0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F

High Memory Area The first 64 KB of extended memory, ranging from 1024 KB to 1088 KB.

I

Icon A graphic symbol for a given device, function, or instruction.

Illegal character A character or combination of bits which is not accepted as a valid or known representation by the computer.

Indicator A device which registers a condition in the computer such as an LED which indicates that the power is on.

Initialize To set counters, switches, and addresses to zero or other starting values in a computer routine. Also, initialize refers to a method of preparing a fixed disk. See low-level format.

Interface A common link between two or more electronic devices or software programs which enables them to transfer information.

Interleave To arrange a sequence of memory addresses or disk sectors to reduce access time. This allows the system to work efficiently.

Interrupt A mechanism in the computer for reporting changes in the states of hardware and software resources. These changes cause current processes to be interrupted so the system can give new assignments to meet work-load demands.

I/O Abbreviation for input and output. Input is the data received by the CPU from devices connected to it. Output is data sent from the CPU to other devices.

J

Jumper A small mechanical device used to connect/disconnect pairs of pins on a printed circuit board. Jumper settings control specific circuit board operations.

K

Kilobyte (KB) A kilobyte is 1024 bytes. It is commonly abbreviated as K, and used as a suffix when describing memory size in computers. Thus, 24K really means a 24 x 1024 = 24,576 byte memory system.

L

Language A set of characters, conventions, and rules used to convey information. COBOL, BASIC, and FORTRAN are some common computer languages

Light-emitting diode (LED) An electronic device that can emit visible light. LEDs are often used as indicator lamps.

Load To enter data or programs into storage or working registers of the computer.

Local bus A set of data, address, and status lines for direct CPU access.

Low-level format A program that divides the tracks on the fixed disk into sectors. Low-level format sets the disk interleave factor and identifies tracks and sectors that are damaged and should not have data stored on them.

M

Main processor board A printed circuit board that contains the central processing unit and other key elements that form the basis of the computer.

Medium The material on which data is recorded for input into memory. This includes paper tape, diskettes, disks and magnetic tape. The plural is media.

Megabyte (MB) A unit of information storage. One megabyte equals 1,048,576 bytes.

Memory Any device which stores data until needed. In a digital computer, this can include Random Access Memory (RAM) chips or magnetic storage media (disks and tapes).

Memory caching A method of copying the most recently used information into fast memory chips for quick access by the CPU.

Menu-driven software Software that contains a list of possible options to choose by using the arrow keys, a mouse, or another pointing device.

MHz Megahertz. A measurement of cycles per second.

Micro-processor A computer central processing unit (CPU) placed on a single chip.

Modem Acronym for MOdulator-DEModulator. A communications device used to exchange data between computers over telephone lines.

Module A self-contained unit and can be integrated into a system.

Multitasking The ability to run several programs at once.

O

Operating system A software program which controls the overall operation of a computer. It is available to the computer at all times from a fixed or flexible disk drive.

Operation An action specified by a computer instruction or high level language statement.

OS/2 (MS-OS/2) An operating system developed by Microsoft that supports simultaneous use of multiple programs.

Output Data transferred from a computer's internal storage unit to some storage or output device.

P

Parallel bus A communications channel which handles data transfers between system memory and I/O devices like the SCSI controller, allowing the devices to read or write to memory without going through the host processor.

Parallel port A connector for the data cable of an external device using parallel data transmission. Typically, a printer or plotter uses the parallel port.

Park A program that sets the read/write head on the fixed disk drive to an unused cylinder so it won't damage data when the computer is moved.

Partition A portion of a fixed disk devoted to a particular operating system. A fixed disk normally has only one partition, but can have up to four.

Password A unique string of characters that a program, computer operator, or user must supply to meet security requirements before gaining access to data.

Peripheral A device which is separate from the computer but works with it, such as a printer, keyboard, or disk drive.

Pixel The smallest unit of video display that is accessible by computer software.

Power-On Self-Test (POST) A series of diagnostic tests the computer runs to check that basic components are working properly.

Power Supply An electrical device which converts alternating current (ac) to direct current (dc) and supplies the required voltage and current to the computer.

Processor A device or system capable of manipulating data; for example, CPU (hardware) or compiler (software). A compiler is sometimes referred to as a language processor.

Processor frequency The speed at which the processor runs. Normally, the higher the frequency, the faster the computer processes data.

Program A set of sequenced instructions that direct a computer to perform particular operations.

R

RAM Random Access Memory. The type of internal memory of a computer in which data can be written to, read from, erased, or stored in any order. RAM is maintained by electrical current and makes up much of the internal memory.

Register A storage area in memory which holds data of a specified size and intended for a special purpose.

Restore Procedure used to recover data from a storage device such as a tape cartridge and transfer it back to the disk from which it was originally copied.

ROM An acronym for Read Only Memory. Non-erasable, permanently programmed memory used to store I/O drivers, interpreters, or special application functions. It is not possible to write into ROM memory.

Root directory The main directory of a fixed disk or flexible diskette. It is created by formatting the disk(ette).

Routine A set of machine instructions for carrying out a specific processing operation. Sometimes used as a synonym for program.

S

Scroll To roll lines up or down a display screen to review text or information. Most screens display 25 lines at a time; scrolling is useful in viewing large files of information.

Sector A section of one track on a disk surface.

Serial port A connector for the data cable of an external device using serial data transmission. Typically, a printer or modem uses the serial port.

Shadow Transferring the contents of a slower ROM (main system or adapter board) to the faster system RAM. Used to increase the processing speed.

Small computer system interface A high efficiency interface which allows the computer to make more effective use of peripheral devices.

Software Programs that control the operation of the computer. Software programs are read into the computer memory from diskette.

Source diskette A diskette that holds information to be copied to another (target) diskette.

Storage capacity The amount of data a storage device can hold. Frequently defined in terms of computer words, bytes, or characters.

Strapping Setting switches or jumpers to enable or disable certain system features.

Streaming tape drive A tape drive which backs up information as quickly as the fixed disk can transmit it. It is also called a streamer tape drive.

Subdirectory A directory for programs stored inside another directory.

System See also computer system.

System prompt The symbol that appears on the display screen to show that the computer is waiting for an action from the user.

T

Target diskette A diskette that receives data copied from the source diskette.

Tracks A series of concentric magnetic rings on a disk or diskette. Data can be written to or read from the tracks by the read-write head.

U

Update To incorporate new data into a file.

Utility routines Software used to perform some frequently required process in the operation of a computer system.

V

Variable A quantity that can assume any of a given set of values.

Verify To determine whether an operation has been accomplished accurately or to check if data is valid.

VESA local bus A connector for the video adapter that is directly linked to the CPU for optimum video performance.

VGA Video Graphics Array™ is both a type of display adapter and a display. It is an analog display which supports text, color, and graphic applications in a variety of resolutions. It can also emulate previous types of display adapters including CGA and EGA.

W

Write The process of copying data from the computer to a storage or output device.

Write-inhibit tab Tape or tab which covers the write-enable notch on a diskette to prevent changing the data already on the diskette.

Write-protect A form of memory protection where a computer program can read data from any area in memory but cannot record data on a protected area.

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