

EPSON[®]
Equity[™] II
User's Guide

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

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

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

"How To Identify and Resolve Radio-TV Interference Problems"

This booklet is available from the U.S. Government Printing Office, Washington DC 20402. Stock No. 004-000-00345-4.

Note: If the interference stops, it was probably caused by the computer or its peripheral devices. To further isolate the problem:

Disconnect the peripheral devices and their input/output cables one at a time. If the interference stops, it is caused by either the peripheral device or its I/O cable. These devices usually require shielded I/O cables. For Epson peripheral devices, you can obtain the proper shielded cable from your dealer. For non-Epson peripheral devices, contact the manufacturer or dealer for assistance.

WARNING

This equipment has been certified to comply with the limits for a Class B computing device, pursuant to Subpart J of Part 15 of FCC Rules. Only peripherals (computer input/output devices, terminals, printers, etc.) certified to comply with the Class B limits may be attached to this computer. Operation with non-certified peripherals is likely to result in interference to radio and TV reception.

The connection of a non-shielded equipment interface cable to this equipment will invalidate the FCC Certification of this device and may cause interference levels which exceed the limits established by the FCC for this equipment.

System Upgrade Sheet

This sheet describes several changes to the Equity II/III documentation due to an upgrade in the system software.

Equity II User's Guide (Page 18)

The Equity II is now capable of supporting four logical disk drives: any combination of floppy-disk drives and RAM-card drives. Correct Table 1-1 to read:

DIP switch	7	8
Number of floppy disk drives:		
One	ON	ON
Two	OFF	ON
Three	ON	OFF
Four	OFF	OFF

A new DIP switch label has been provided to place over the one on the inside of the DIP switch cover. To attach the label, remove the protective backing and place it on top of the old label. You do not need to remove the old label.

The Equity II normally recognizes a hard disk as drive C. If you install a RAM disk card and set the number of drives to three, the hard disk becomes drive D. Setting it to four causes the hard disk to become drive E. See the manual that came with your RAM card for details on all the possible drive settings.

G W-BASIC for the Equity II/III (Pages 7-203 to 7-207)

GW-BASIC now supports Hercules™ monochrome graphics on the Equity III. If you have installed a Hercules Board in Equity III, all references in the SCREEN command section to "Equity II only" no longer apply. You can also RUN the sample program on page 7-206 on your Equity III.

MS-DOS for the Equity II/III (Page 10-16)

The last option in Table 10-2, under "Format Disk", shows that you can select the media type in a 1.2MB drive. If your system does not have a 1.2MB drive, this option does not appear.

Hercules™ is a trademark of Hercules Computer Technology.

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Introduction

Your Epson® Equity™ II personal computer is a versatile, high-performance system which offers you a wide variety of choices. First you choose between two models of the Equity II main unit. Then you select the peripherals you want to use with it to assemble the configuration that does the most for you.

The Equity II main unit can have up to two disk drives and comes in these models:

- One 360KB (double-density) floppy disk drive
- One 360KB floppy disk drive and one 20MB internal hard disk drive

Both models include 640KB of memory. Instead of the hard disk, you can choose to add either a 1.2MB (high-density) floppy disk drive or another 360KB floppy disk drive in the bottom slot. You may also replace the standard 360KB floppy disk drive in the top slot with a 1.2MB floppy disk drive.

You can also choose among many optional internal and external devices. The Equity II's built-in serial, parallel, and video interfaces allow you to connect almost any peripheral or combination of peripherals. Here are some optional Epson devices you can add to your system:

- A 12-inch monochrome monitor
- A 13-inch RGB color monitor
- An Epson printer or plotter
- A mouse and a mouse interface card

You can also use most cards for the IBM® Personal Computer on the Equity II. Check with your Epson dealer from time to time to find out which peripherals and option cards are available.

In addition, the Equity II runs most software products for the IBM PC. And you can choose between two execution speeds and several wait states to control how fast the Equity II operates.

How To Use This Manual

This user's guide explains how to set up and care for the Equity II. It also describes how to connect optional equipment and start using your system.

Follow the instructions in Chapter 1 to set up your system. Chapter 2 describes how to turn on the Equity II and gives general operational procedures. Chapter 3 explains how disks and disk drives work and shows you how to use them. Chapter 4 describes how to install and remove option cards. If you encounter a problem, refer to Chapter 5 on troubleshooting.

Appendix A presents the Equity II's hardware specifications and Appendix B is a glossary of important computer terms this manual uses. Refer to the glossary whenever you come across an unfamiliar word. You may even want to glance through it before you start reading this book.

Although illustrations in this manual show the Equity II model with the internal hard disk, the setup and operational procedures apply to all configurations. You do not need to read everything in this book; some sections may describe a particular option or accessory you do not have.

The Equity II comes with the MS[™]-DOS operating system and the GW[™]-BASIC programming language. If you have used MS-DOS before on another computer, you will find that it works the same way on the Equity II. However, be sure to refer to your Equity MS-DOS manual to learn about the new commands and special utility programs Epson has added.

You may have bought other software as well. This manual tells you how to load software diskettes. To learn how to use a program or an operating system, refer to the software manual that comes with it.

Chapter 1

Setting Up Your System

It won't take you long to get your Epson Equity II personal computer up and running. This chapter describes the Equity II main unit and shows you how to set up your system and make any necessary adjustments.

Unpacking

When you unpack your Equity II, you should find the following:

- The main unit and power cord
- The keyboard with cable
- An MS-DOS operating system diskette and a GW-BASIC programming language diskette with supplemental MS-DOS utilities
- An MS-DOS manual and a GW-BASIC manual
- This *Equity II User's Guide*

In addition to these items, you probably bought a compatible video monitor, such as the Epson monochrome monitor MBM-2095-E or the Epson RGB color monitor MCM-4035N-E.

As you remove your system components from their cartons, be sure to inspect each piece. If anything is missing, looks damaged, or seems wrong, consult your Epson dealer.

You'll also find a registration card with the main unit. Fill it out now and mail it to Epson. With your registration card on file, Epson can support your hardware and software and send you information on product updates.

Be sure to keep your packing materials. They provide the best protection possible for your computer if you need to move or ship it later.

Choosing a Location

Before you set up your new system, choose an appropriate place. Whether you use your computer at home or in the office, you need to find a comfortable, convenient location where the Equity II can run properly.

Choose a location that provides the following:

- A large, sturdy desk or table. Make sure it can easily support the weight of your system, including all its components.
- A flat, hard surface. Soft surfaces like beds and carpeted floors attract static electricity, which erases data on your disks and can damage the computer's circuitry. Soft surfaces also prevent proper ventilation.
- Good air circulation. Air must be able to move freely under the system as well as behind it. Leave several inches behind the computer clear to allow ventilation.
- Moderate environmental conditions. You need to protect your computer from extremes in temperature, humidity, dust, and smoke. Avoid direct sunlight or any other source of heat. High humidity also hinders operation, so select a cool, dry area. Since you can't risk losing data stored on disk, do not expose your computer to dust and smoke which can damage disks and disk drives.
- Appropriate power sources. To prevent static charges, connect all your equipment to 3-prong, 120-volt, **grounded** outlets. You need one outlet for the main unit, one for the monitor, and additional outlets for a printer and any other peripherals. The two auxiliary power outlets on the back panel of the Equity II reduce the number of wall outlets you need (see "The Back Panel" in this chapter).
- No electromagnetic interference. Locate your system away from any electrical device that generates an electromagnetic field. Surprisingly, even a telephone can cause trouble, especially if you keep diskettes right next to it.

When you find the ideal location for your Equity II, you can start to set up your system.

Arranging the Components

First decide how you want to arrange your system components. You can set up the Equity II main unit horizontally or vertically.

In the horizontal position, the main unit lies flat with the monitor on top of it and the keyboard directly in front. Figure 1-1 shows this arrangement.

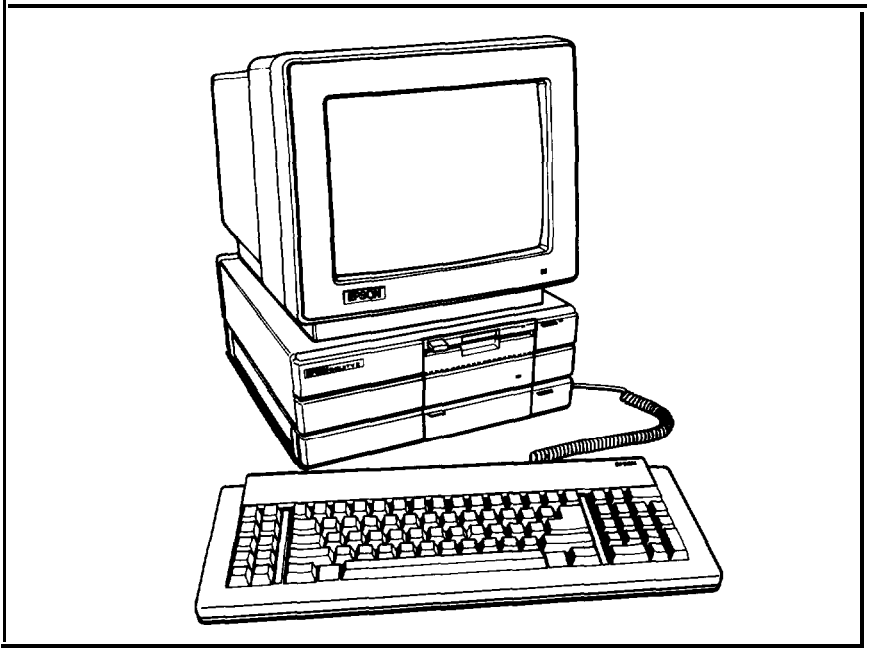


Figure 1-1. Standard system arrangement

In the vertical position shown in Figure 1-2, the main unit stands upright on its side with the keyboard and monitor beside it. The feet on the right side serve as the base when the main unit is vertical. If you choose the vertical position, contact your Epson dealer about a mounting kit to stabilize the computer.

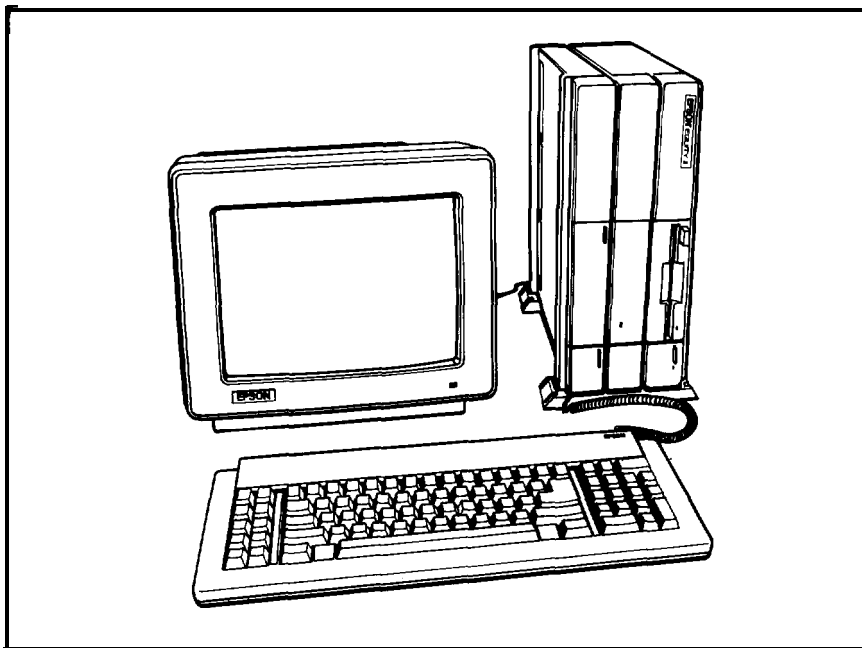


Figure 1-2. Alternate system arrangement

Of course, if you have special computer furniture or want to customize your setup, you can arrange your system components to suit your own particular needs.

Before you connect the system components, take a look at the front and back panels of the main unit.

The Front Panel

Figure 1-3 shows the front panel with the covers open to reveal the computer's DIP switches and the keyboard cable socket. To open the covers, press down gently on each of the small handles and pull out.

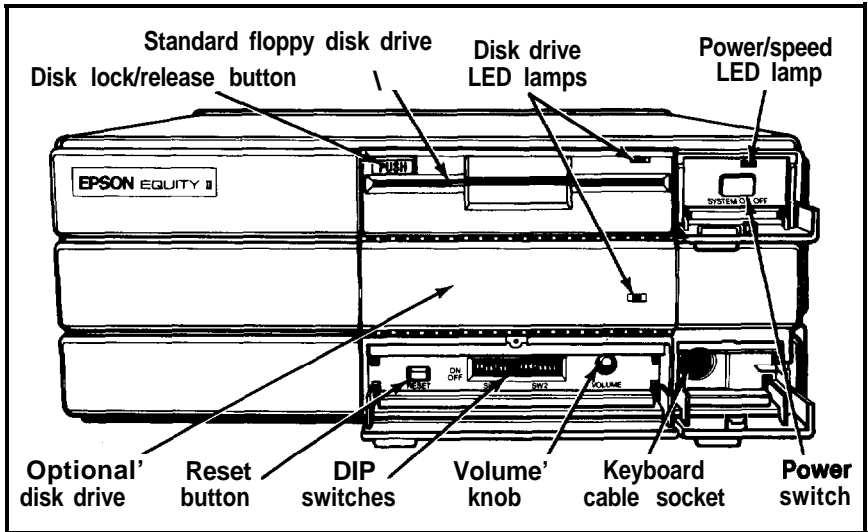


Figure 1-3. Front *panel*

The front panel components work as follows:

- Power switch. Use the power switch to turn the computer on and off.
- Power/speed LED lamp. A light indicates the power is on. When it is green, the computer is running at the faster execution speed. When it is red, the computer is running at the slower execution speed.
- Standard floppy disk drive. The top drive on the Equity II is a 360KB floppy disk drive that uses double-density, 360KB diskettes.
- Disk lock/release button. Press this button to lock a diskette in place. Press it again to eject a diskette.
- Optional disk drive. Your Equity II may have a second floppy disk drive (360KB or 1.2MB) or a 20MB hard disk drive (as shown in Figure 1-3) in this slot. If your Equity II has only one disk drive, a panel covers this empty slot.
- Disk drive LED lamps. A red light indicates that the drive is being accessed. To avoid losing data, never remove the diskette or turn off the computer when the drive's LED lamp is **on**.

- Keyboard cable socket. You plug the keyboard cable into the main unit here.
- Reset button. Press this button to reset the computer. When an operating system diskette is in the top drive or running on the hard disk, you can press the reset button to reboot it.
- DIP switches. You set these switches to match your system's characteristics, such as your monitor type, number of floppy disk drives, and interface types.
- Volume knob. Turn this knob to adjust the volume of the internal speaker the computer uses to generate sounds.

Removing the disk drive protector sheet

A cardboard sheet occupies the diskette slot in the floppy disk drive. This sheet is inserted at the factory to protect the drive's read/write heads.

Remove the sheet before you connect any cables. For a 360KB floppy disk drive, press the button labelled PUSH to eject it. If you have a 1.2MB floppy disk drive, turn the latch counterclockwise until it is horizontal and pull out the sheet.

Save the protector sheet and reinsert it whenever you move the computer, even if you just move it to another part of the room. If you don't plan to use your computer for a week or more, such as when you go on vacation, insert the protector sheet to help prevent dust from entering the disk drive.

The Back Panel

Now look at the back panel of the main unit to identify the electrical outlets and the input/output ports. Figure 1-4 shows where you connect your peripherals.

WARNING: Connect all your peripherals before you plug the power cable into an electrical outlet. After you plug in the power cable, always turn off the power switch before you connect or disconnect any peripheral.

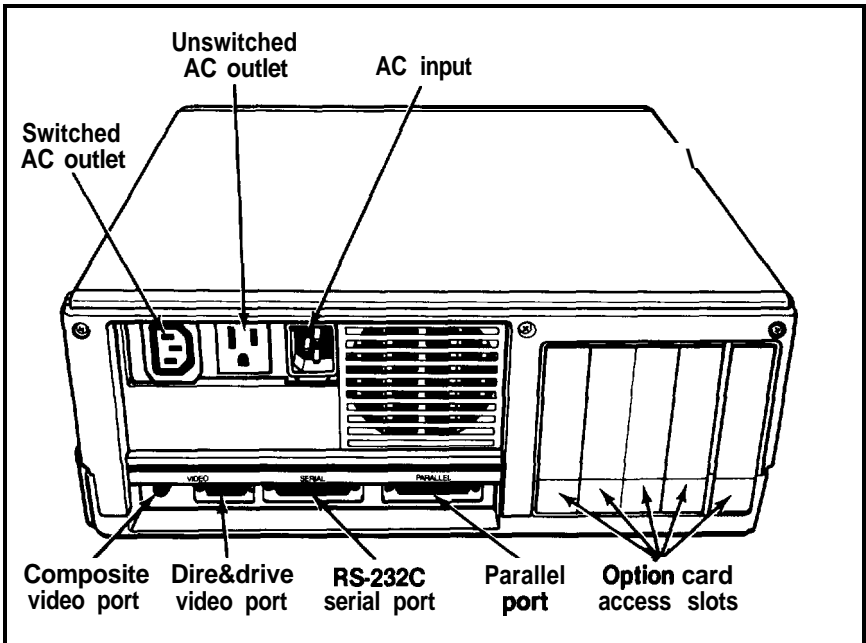


Figure 1-4. Back panel

The back panel components work as follows:

- Switched AC outlet. Auxiliary power outlet. You can plug the power cord of an IBM-compatible monochrome monitor into this outlet, if the monitor's power consumption does not exceed 1 amp. The main unit's power switch controls the monitor connected to this outlet.
- Unswitched AC outlet. Auxiliary power outlet. You can plug a peripheral such as a color monitor or a printer into this outlet, if the peripheral's power consumption does not exceed 1.5 amps. The main unit's power switch does not control the peripheral connected to this outlet.
- AC input. Plug the power cord into the main unit here to supply electrical power to the computer. Make sure the computer is off when you plug the power cord into a wall outlet.
- Composite video port. You can plug a composite monitor into this RCA-type phono jack. See "Setting the DIP Switches" in this chapter to find out how to set switches 1-5 and 1-6 to match your monitor type-

- Direct-drive video port. Internal video interface connector. You can plug a TTL monochrome or an RGB color monitor into this nine-pin female D-connector. See “Setting the DIP Switches” in this chapter to find out how to set switches 1-5 and 1-6 to match your monitor type.
- RS-232C serial port. Allows you to connect a peripheral with a serial interface, such as a modem, another computer, or a printer.
- Parallel port. Allows you to connect a peripheral with a parallel interface, such as a printer or a plotter.
- Option card access slots. The Equity II has five slots to hold up to five option cards. You can install option cards to add special features and peripherals, such as a hard disk, a mouse, or another monitor. If your Equity II has a hard disk, a hard disk controller card occupies one option slot.

Connecting the Power Cord

Plug the power cord into the AC input on the back panel of the main unit, as shown in Figure 1-5. To avoid an electric shock, be sure to plug this end into the main unit before you plug the other end into a wall outlet. For now, do not plug the other end of the power cord into an electrical outlet.

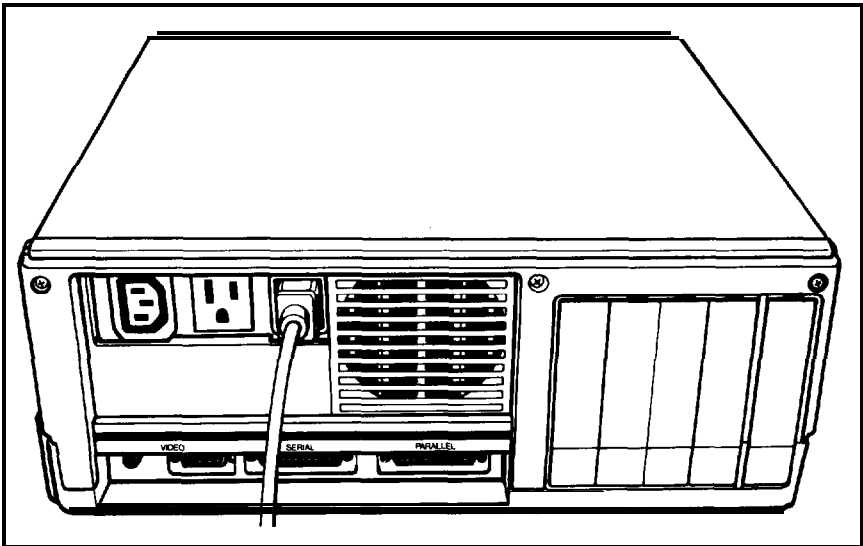


Figure 1-5. Connecting the power cord

Connecting a Video Monitor

The Equity II has a built-in video interface for connecting a monitor. The exact procedure you use to connect your monitor to the main unit depends on the type of monitor you have. See your monitor manual for detailed instructions or follow these general guidelines:

1. Place your monitor on top of or near the Equity II main unit. It is easiest to connect the monitor cable if the back of the monitor and the main unit face you.
2. If necessary, connect the monitor cable to the monitor. (Some monitors come with permanently attached cables.)
3. If you have a TTL monochrome or RGB color monitor, connect the appropriate end of the monitor cable to the direct-drive video port on the back panel, as shown in Figure 1-6. If the plug has retaining screws, tighten them with a screwdriver.

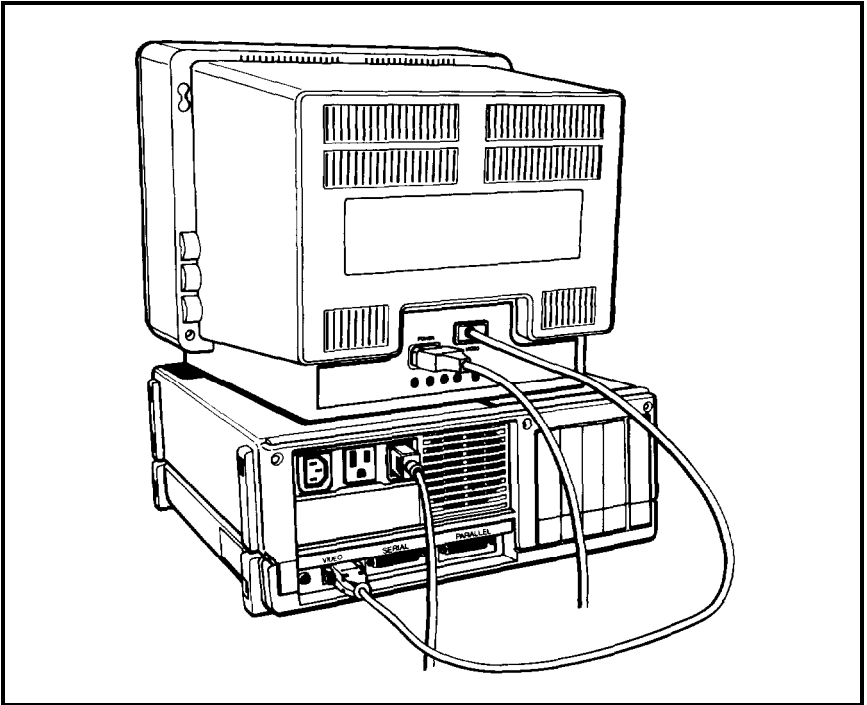


Figure 1-6. Connecting a monitor

If you have a composite video monitor, connect the appropriate end of the monitor cable to the composite video port on the back panel.

If you want to use a different monitor with a video interface card, install the option card as described in Chapter 4. Then connect the appropriate end of the monitor cable to the connector on the option card.

4. Plug the monitor's power cable first into the power inlet on the monitor and then into an electrical outlet.

Note: You can plug some monitors into one of the two auxiliary power outlets on the back panel. Make sure the monitor's power consumption does not exceed 1 amp if you plug it into the switched AC outlet or 1.5 amps if you plug it into the unswitched AC outlet.

5. When you read "Setting the DIP Switches" in this chapter, be sure to set DIP switches 1-5 and 1-6 on the front panel of the main unit to match your monitor type.

If you have a monochrome monitor and you set your DIP switches accordingly, you can run IBM-compatible text and Hercules graphics software. With a color monitor and the appropriate switch settings, you can run IBM-compatible color/graphics software.

Connecting the Keyboard

After you connect your monitor to the main unit, you can connect the keyboard. The keyboard cable is attached to the keyboard at one end. You connect the other end to the keyboard cable socket under the cover on the lower right corner of the front panel.

To connect the cable, open the front panel cover and insert the keyboard connector as shown in Figure 1-7. Do not force the connector, but be sure to insert it all the way. See that the cable exits to the right of the main unit. Gently push the cable into the retaining clip, and close the cover.

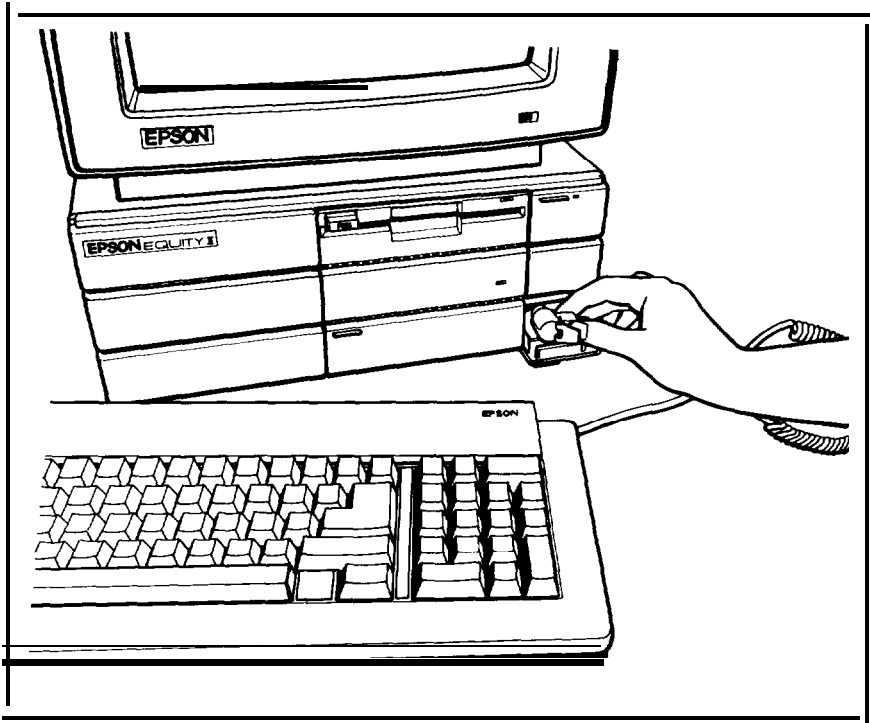


Figure 1-7. Connecting the keyboard

You can use the keyboard in different positions-including flat on a desk or on your lap. You can also adjust the keyboard's legs to tilt the keyboard up. Just turn the keyboard over and lift each leg upward until it locks into place, as Figure 1-8 shows.

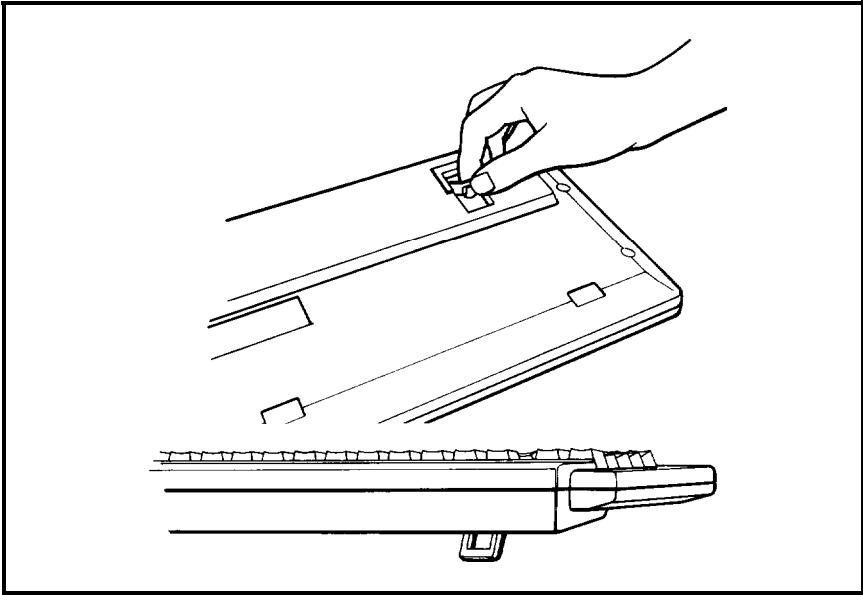


Figure 1-8. Adjusting the keyboard legs

To disconnect the keyboard, open the cover on the front panel and press down on the retaining clip to release the cable. Lift the tab on the keyboard connector and pull it straight out from the main unit.

Connecting a Printer

The Equity II has built-in parallel and serial interfaces so you can easily connect a printer or plotter that has either type of interface. Epson offers a wide selection of printer products-consult your dealer for more information.

Parallel interface

The Equity II parallel interface is Centronics-compatible and uses a DB-25S connector. Most Epson printers have parallel interfaces.

To connect a printer to the main unit, you need an IBM PC-compatible printer cable with a 25-pin male D-connector on one end. If you are not sure which cable you need, consult your Epson dealer. Once you have a printer cable, follow these steps to connect your printer to the parallel interface on the main unit:

1. Place the printer next to your system, as shown in Figure 1-9.

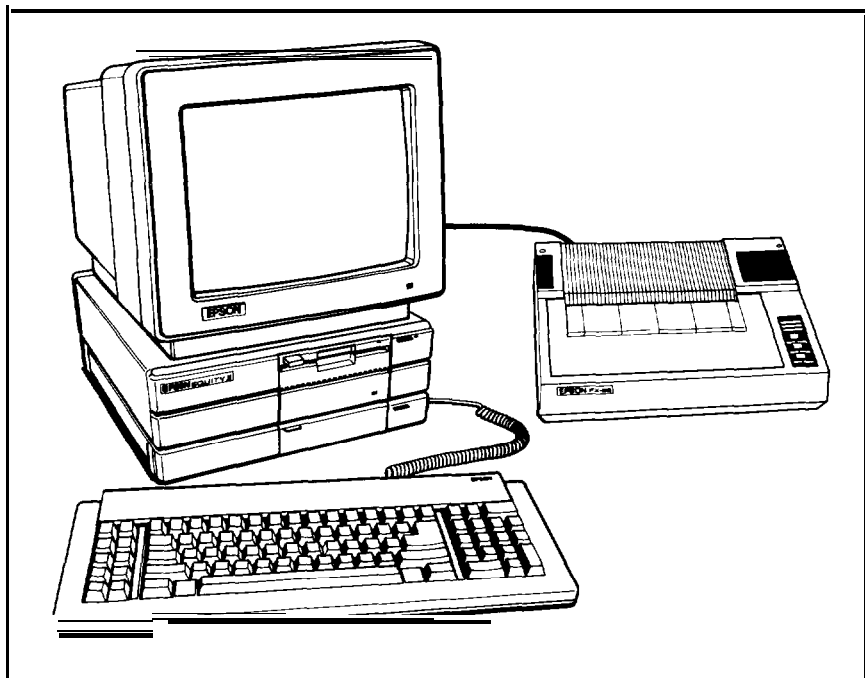


Figure 1-9. Printer placement

2. Before you connect the printer, be sure the power switches on both the main unit and the monitor are off.
3. One end of the printer cable has a 25-pin male D-connector. (Refer to your printer manual to determine which end this is.) Connect this end to the socket marked PARALLEL on the back panel of the main unit. If the plug has retaining screws, tighten them with a small screwdriver.
4. Connect the other end of the cable to the printer. To secure the cable, tighten the squeeze locks at each side of the printer port and push them into the connectors on each side of the cable. Figure 1-10 shows how to connect the cable to the printer.

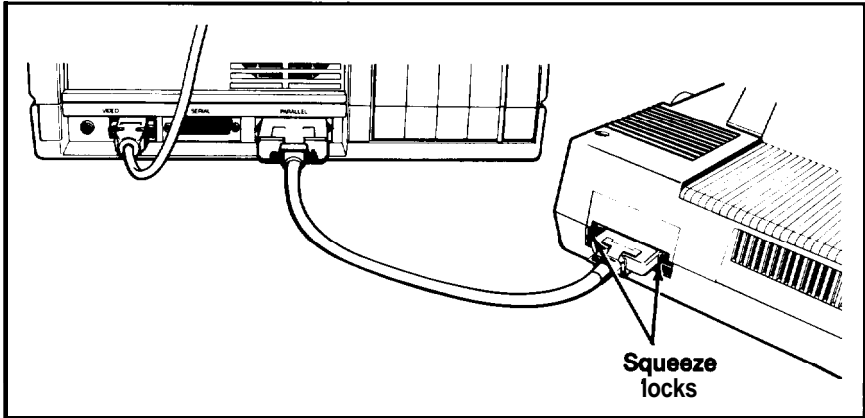


Figure 1-10. Connecting a printer

5. Plug the printer's power cable into an electrical outlet.

Note: You can plug some printers into the unswitched AC outlet on the back panel, if the printer's power consumption does not exceed 1.5 amps.

Serial interface

If you have a printer (or another peripheral such as a modem) with a serial interface, connect it to the port marked SERIAL on the back panel of the main unit. If your cable has a male D-connector at both ends, you need an adapter to connect it to the computer. To connect a serial device, follow the same steps above for connecting a parallel device.

To use a printer connected to the serial port, you need to use the MS-DOS SETMODE program (or the MODE command) to indicate the RS-232C serial port is in use and to direct printer output to the serial instead of the parallel port. See your MS-DOS manual for instructions.

The Equity II character set

The Equity II uses a special character set that assigns graphics and international characters to some ASCII codes. In most cases, if you try to print these characters on a standard printer, you get italic characters instead. Some Epson printers support the IBM character set (the character set the Equity II uses) as a standard feature, and you can adapt others. Also, some application programs can print the special graphics characters on a standard printer when you use a special printer driver program. Ask your Epson dealer for more information.

Setting the DIP Switches

You set the DIP switches on the Equity II to provide your system with information about itself. This information includes monitor type, number of floppy disk drives, and which built-in interfaces are in use. Some software programs do not operate properly if your DIP switch settings do not match your hardware.

Although your dealer probably set your DIP switches for you, read this section to be sure your settings match your system configuration. If you upgrade your system later (by adding a disk drive, for example), you may need to change the settings.

Note: Set the DIP switches while your computer is off. Software programs check the settings when you turn on the system, so do not change the settings while a program is running.

To set your computer's DIP switches, open the cover below the disk drives on the front panel of the main unit, as shown in Figure 1-11.

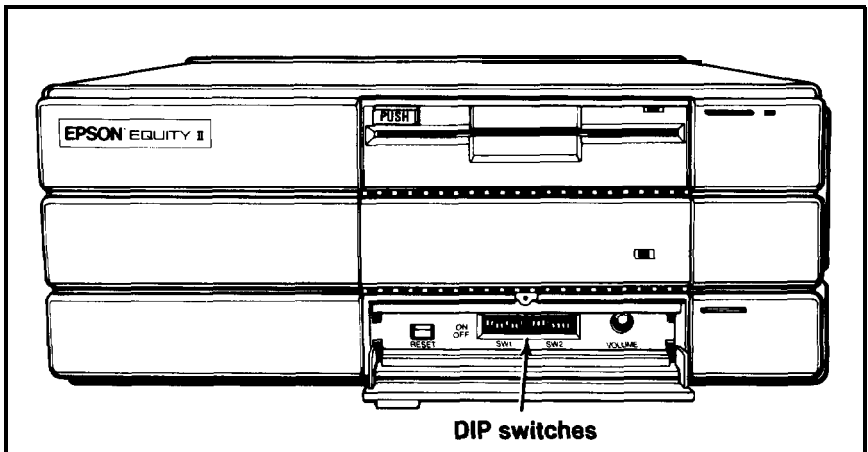


Figure 1-17. Location of DIP switches

The Equity II has two sets of DIP switches: 1 and 2. Each set contains eight numbered switches. When a switch is up, it is on. When a switch is down, it is off. Inside the DIP switch cover, a label shows the functions of the DIP switches on the Equity II. The next sections explain how to set your DIP switches. To change a setting, use a hard, thin object, such as a small screwdriver.

DIP switch set 1

Table 1-1 and the descriptions below explain how to set the DIP switches in set 1.

Note: Switch 1-3 is not used. Leave it off.

Table 1-1. Set 1 DIP switches

	1	2	4	5	6	7	8
Floppy drive A:							
360KB	ON						
1.2MB	OFF						
Coprocessor:							
Installed		OFF					
Not installed		ON					
Internal parallel interface:							
Primary			OFF				
Secondary			ON				
Monitor type:							
Disable internal video				ON	ON		
Color (40 X 25)				OFF	ON		
Color (80 X 25)				ON	OFF		
Monochrome				OFF	OFF		
Number of floppy disk drives:							
One						ON	ON
Two						OFF	ON

Switch 1 (floppy disk drive A)--This switch tells the computer what type of A drive it has. If your Equiity II has a 360KB floppy disk drive in the top slot, turn on switch 1-1. If the top slot contains a 1.2MB floppy disk drive, turn off this switch.

Switch 2 (coprocessor)--The optional 8087 math coprocessor speeds up programs that use math or arithmetic. If your computer has a coprocessor, turn off switch 1-2. If not, turn on this switch. (Contact your dealer if you want to add an 8087 math coprocessor.)

Switch 4 (**internal parallel** interface)-To use two or more parallel devices (usually printers), you need to designate the built-in parallel interface as either primary or secondary. In MS-DOS, you would then refer to it as LPT1 or LPT2 respectively. To use the built-in interface as the primary device, turn off switch 1-4. If you have not installed extra parallel interfaces, the built-in interface is the primary device regardless of how you set this switch. You cannot disable the built-in parallel interface. If you have installed optional parallel interfaces, you can use the built-in port as the secondary device if you turn on switch 1-4. You **can** then select any peripheral connected to an optional port as the primary device.

Most option cards which contain parallel interfaces have jumper connectors which you must set to tell MS-DOS whether you are using the port as LPT1, LPT2, or LPT3. If you use the built-in interface as the primary device, you must set the jumper on the optional interface to make it LPT2 or LPT3. If you accidentally set both to act as the primary device, you will not damage the computer, but you will get unpredictable results from both interfaces.

Switches 5 and 6 (monitor type)-Set switches 1-5 and 1-6 according to your monitor type as shown in Table 1-1. Be sure to set these switches properly or you may damage your monitor. If you do not want to use the built-in video port (for example, if your monitor connects to an option card), turn on switches 1-5 and 1-6 to disable internal video.

Switches 7 and 8 (number of floppy disk drives)-If your system has one floppy disk drive, turn on switches 1-7 and 1-8. If your system has two floppy disk drives, turn off switch 1-7 and turn on switch 1-8.

DIP switch set 2

Table 1-2 and the descriptions below explain how to set the DIP switches in set 2.

Note: Switches 2-1 through 2-4 and switch 2-6 are not used. Leave them off.

Table 1-2. Set 2 DIP switches

	5	7	8
Parity checking:			
Enable	OFF		
Disable	ON		
Internal serial interface:			
Primary		OFF	
Secondary		ON	
Internal serial interface:			
Enable			OFF
Disable			ON

Switch 5 (parity checking)—Parity checking is the method your computer uses to detect any errors in RAM. If you enable parity checking and the computer detects an error in memory, an error message displays. For maximum protection, turn off switch **2-5** to enable parity checking. To disable parity checking, turn on this switch.

Switch 7 (internal serial interface)—To use two serial devices (usually a serial printer or modem), you need to designate the built-in serial interface as either primary or secondary. In MS-DOS, you would then refer to it as COM1 or COM2 respectively. To use the built-in interface as the primary device, turn off switch **2-7**. If you have not installed an extra serial interface, the built-in interface is the primary device regardless of how you set this switch. If you have installed an optional serial interface, you can use the built-in port as the secondary device if you turn on switch **2-7**. You can then select any peripheral connected to the optional port as the primary device.

Most option cards which contain serial interfaces have jumper connectors which you must set to tell MS-DOS whether you are using the port as COM1 or COM2. If you use the built-in interface as the primary device, you must set the jumper on the optional interface to make it COM2. If you accidentally set both to act as the primary device, you will not damage the computer, but you will get unpredictable results from both interfaces.

Switch 8 (internal serial interface)—If you connected a peripheral to the built-in serial port on the back panel, turn off switch **2-8** to enable this port. If you do not want to use the built-in serial port, turn on switch **2-8** to disable it. For example, you need to disable the built-in port if you use an optional port as COM1 and a modem as COM2; MS-DOS can only recognize two serial devices.

Chapter 2

Using the Equity II

After you set up your system, you're ready to turn on the power and start using your computer. But before you turn it on, read the following safety rules.

Safety Rules

Follow these rules to avoid accidentally damaging your computer or injuring yourself:

- Never turn the computer on or off with a disk protector sheet in a disk drive.
- Do not attempt to dismantle any part of the computer. Only remove the top cover to install and remove option cards. If you cannot solve a hardware problem after you read Chapter 5 on troubleshooting, or if you want to install the optional 8087 math coprocessor, consult your Epson dealer.
- Always turn off the power, disconnect the computer's power cord, and wait a few minutes before you remove the computer's cover.
- Do not unplug cables from the computer when the power is on.
- Never turn off the computer while the red LED lamp on a disk drive is on. This can destroy data stored on disk or make a whole disk unusable.
- Always wait at least 5 seconds after you switch off the power before you switch it on again. Turning the power off and on rapidly can damage the computer's circuitry.
- Do not leave a beverage on top of or near your system or any of its components. Spilled liquid can damage the circuitry of your components.

Powering Up

Before you turn on your system, be sure you plugged the power cord into the AC input on the back panel of the main unit. Then plug the power cord into a 3-prong, 120-volt, grounded electrical outlet.

Turn on the monitor so you can see the messages that appear as the computer starts up. If you have a printer or any other peripheral, turn it on next.

You can turn on the computer with or without a system diskette in the top disk drive. For now, leave the drive empty. To turn on the computer, open the cover on the top right corner of the front panel and press the power switch. The power LED lamp next to the power switch lights up and the cooling fan inside the main unit starts. The computer turns on and begins to perform an internal self-test.

If you cannot see the screen display clearly, use the controls on the monitor to adjust the brightness and contrast until characters on the screen are clear and bright. If the display is not stable, check your monitor's horizontal and vertical hold controls. See your monitor manual for its instructions.

The initial screen display

After the system performs its self-test, a message tells you how much RAM is available:

```
640 KB RAM available
```

Unless your system has a hard disk which is set up to boot an operating system, this message appears next:

```
Non-System disk or disk error  
Insert system diskette in drive A:  
and strike any key when ready
```

This tells you the computer can now load an operating system from a diskette in the top drive. The Equity II needs a disk operating system (DOS) to function. It comes with MS-DOS version 3.1. If you want to use another operating system, consult your Epson dealer.

To boot an operating system, insert the system diskette you want to use (see "Inserting and Removing Diskettes" in this chapter). Your MS-DOS or other operating system manual explains how to use the system.

Note: Use only a backup copy of the system diskette and keep the original in a safe place. See your MS-DOS or other operating system manual to find out how to make backup copies.

You need to prepare your hard disk before you can run an operating system on it. Refer to “Using a Hard Disk Drive” in Chapter 3 and your MS-DOS (or other operating system) manual for instructions on how to prepare a hard disk for use.

When your hard disk is set up to automatically boot MS-DOS, the operating system loads when you turn on the computer. The date and time prompts display and you see the system prompt:

C>

Inserting and Removing Diskettes

Follow these steps to insert a diskette into a floppy disk drive:

1. Hold the diskette with the label face up and the write-protect notch to the left (so that the read/write slot is away from you).
2. Slide the diskette into the disk drive as shown in Figure 2-1.

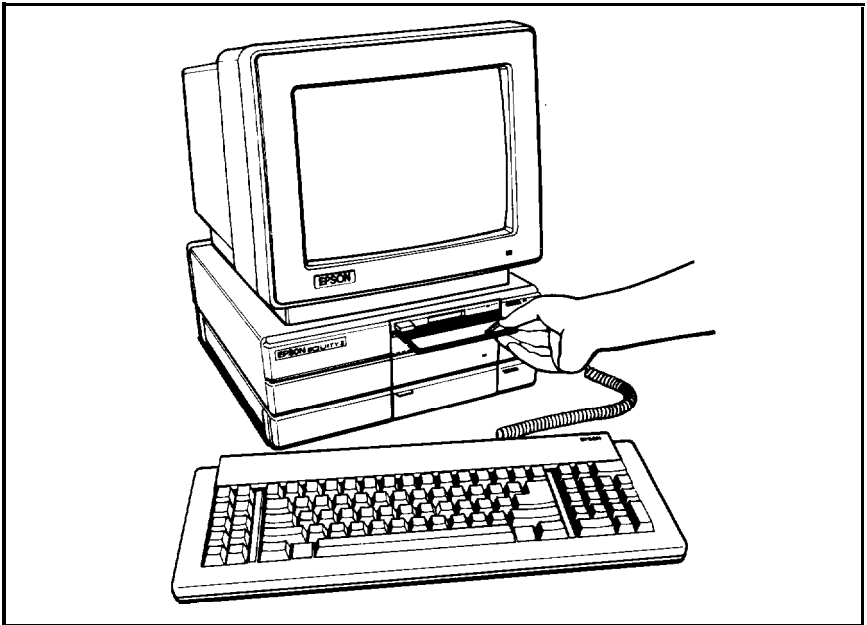


Figure 2-1. Inserting diskettes

3. Push the diskette into the slot until it clicks into place. Be careful not to force it.
4. When **the** diskette is in all the way, press the PUSH button on a 360KB floppy disk drive, or turn the latch **on** a 1.2MB floppy disk drive clockwise until it locks into **the** vertical position. This keeps the diskette in place while you use it, and enables the read/write heads in the disk drive to access the diskette.

To remove the diskette, press the PUSH button again or turn the latch counterclockwise until it is horizontal. As you release the PUSH button or turn **the** latch, the labelled edge of the diskette pops out. Carefully pull out the diskette, place it in its protective envelope, and store it properly, such as in a special diskette container.

WARNING: Never remove a diskette from a drive or turn off the computer while a drive's red LED lamp is on. This can destroy data stored on disk or make an entire disk unusable. When all drive LED lamps are off, remove all diskettes before you turn off the computer.

Special Keys on the Equity II Keyboard

The dark gray keys on the keyboard serve special functions when your computer is running application programs. Figure 2-2 shows some of the more important keys and Table 2-1 describes them.

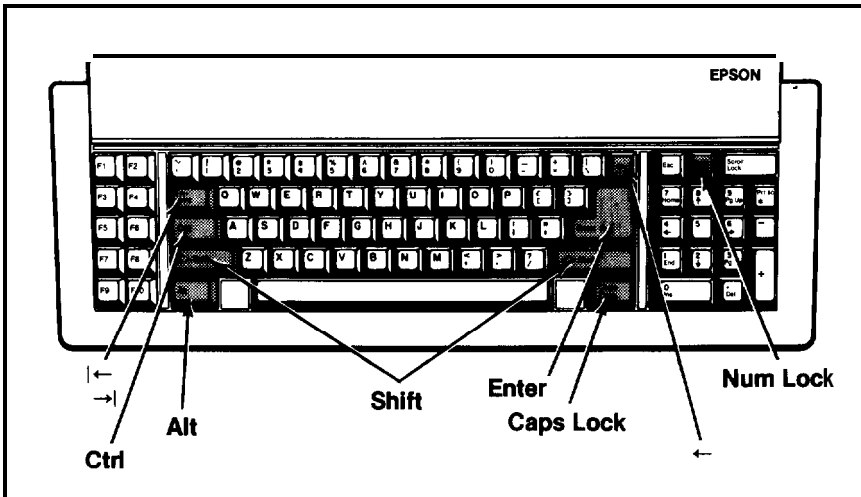


Figure 2-2. Special keys

Table 2-7. Special keys

Key	Purpose
← →	Moves the cursor to the right in normal mode and to the left in shift mode. Referred to as the tab key
Ctrl	Works with other keys to perform special (control) functions, such as editing operations in MS-DOS and GW-BASIC.
Shift	Produces uppercase characters or symbols when used with the main character keys. Produces lowercase characters when Caps Lock is on.
Alt	Works with other keys to enter alternate character codes not otherwise available.
Caps Lock	Changes the letter keys from lower- to uppercase; changes back to lowercase when pressed again.
Num Lock	Changes the function of the numeric/cursor keys from numeric to cursor; changes back when pressed again.
Enter	Ends a line of keyboard input.
←	Moves the cursor back one space, deleting the character to the left. Referred to as the backspace key

Using MS-DOS on the Equity II

After you boot MS-DOS, you need to run the SETUP program to provide MS-DOS with information about your system configuration. See your MS-DOS manual for instructions and be sure to select and set every SETUP option.

You can use two special commands to change the appearance of characters your monitor displays. If you have a monochrome monitor, you can change the background color of your screen. Characters normally display in white on a black background, and you can use the MS-DOS REVERSE command or hold down Ctrl and **Alt** and press / to display black characters on a white background instead. See the MS-DOS manual for more information.

If you have a color monitor, you can change the size of the characters on your screen. A color monitor normally displays characters in single-width, and you can hold down **Ctrl** and **Alt** and press] to display double-width characters instead.

Selecting an Execution Speed

The Equity II can operate at two different execution speeds. You choose between a **4.77** or a **7.16** MHz clockrate. At the faster speed, the Equity II performs all tasks more rapidly. You can select the slower execution speed to run application programs that have specific timing requirements.

To select the execution speed you want the computer to start up in, use the MS-DOS SETUP program. To change between the two speeds while the computer is running, you can use the MS-DOS SPEED command or you can hold down **Ctrl** and **Alt** and press 1. See your MS-DOS manual for more information,

When the computer is running at the faster speed, the power LED lamp in the top right corner of the front panel is green. At the slower speed, it is red.

You can change the wait state when the computer is running at the slower rate to further control the speed. The wait state can be any number from 0 through 7. The smaller the number you select, the faster the Equity II runs. To set the wait state, you can use the MS-DOS SETUP program or hold down **Ctrl** and **Alt** and press a number key from 0 through 7 on the main keyboard. For example, hold down **Ctrl** and **Alt** and press 3 to set the wait state at 3.

Resetting the Computer

You can reset your computer to load a different operating system or reload the current operating system. For example, if an error occurs and the computer does not respond to your keyboard commands, you can reset the computer and try the same operation again. However, resetting erases all data in the computer's temporary memory (RAM), so reset your computer only as a last resort.

In MS-DOS, you can hold down **Ctrl** and press C to stop a program's operation and return to the MS-DOS command prompt. If an error occurs, try this method before you reset the computer.

WARNING: Do not reset the computer to exit a program unless you have to. Some application programs classify and store new data whenever you exit the program properly. If you reset the computer while such a program is running, you may lose data.

There are three ways to reset. Because each is more powerful than the last, try them in the order listed here:

1. If you are using MS-DOS, hold down **Ctrl** and **Alt** and press the **Del** key on the numeric keypad at the right of the keyboard. The screen goes blank for a moment and then MS-DOS reloads. (The operating system must be on either the diskette in the top drive or the hard disk.) If this does not correct the problem, try the second method.
2. Press the reset button under the cover below the disk drives. This method works even when the keyboard does not respond to your commands. If this does not correct the problem, try the third method.
3. Remove any diskettes from the floppy disk drives. Use the power switch under the cover at the top right of the front panel to turn off the Equity II. Wait 5 seconds and then turn on the power again.

Turning Off the Equity II

Before you turn off your system, exit the program you are using and then remove all diskettes from the disk drives. If you have a hard disk, it is best to run the MS-DOS HDSIT program to move the read/write heads away from the recording area before you turn off the computer (see your MS-DOS manual for instructions).

Turn off the main unit first—open the cover at the top right of the front panel and press the power switch. The power LED lamp above the power switch goes out. Then turn off the monitor, the printer, and any other peripherals you have.

Note: In addition to the power switch, you can use software to turn the Equity II on and off. The MS-DOS SETUP program allows you to set a time when you want the computer to turn on automatically. You can also turn off the Equity II using a program that turns off the computer. See your MS-DOS manual for more information.

Chapter 3

Using Disks and Disk Drives

The disk drives in your computer allow you to store data on disk, and retrieve and use stored data when you like. The Equity II can have up to two disk drives. The top disk drive on the Equity II is a floppy disk drive and you can have a hard disk drive or one of two types of floppy disk drives below it. (The introduction in this book describes the available Equity II disk drive configurations.)

This chapter explains how disks work and tells you how to:

- Choose diskettes
- Care for your disks and disk drives
- Protect your data
- Use a single floppy disk drive
- Use a hard disk drive

How Disks Work

The floppy disks (diskettes) you insert in your system's floppy disk drives are round pieces of flexible plastic coated with magnetic material and enclosed in protective jackets. Like a record, a diskette has circular tracks on both sides. The computer stores data you enter as magnetic patterns on these circular tracks.

A small read/write head in the disk drive interprets the magnetic patterns. When a diskette is in a drive, the read/write head is right over the large oval hole in the diskette jacket. This hole allows the read/write head to access the diskette when you store, retrieve, and delete data.

Unlike a floppy disk, a hard disk is rigid and fixed in place. It is sealed in a protective environment free of dust and dirt, so you cannot see it. A hard disk stores data the same way as a floppy disk, only it works faster and has a much larger storage capacity.

Because data is stored magnetically, you can retrieve it, record over it, and erase it—just as you play, record, and erase music on cassette tapes.

Choosing Diskettes for the Equity II

When you buy diskettes, be sure to choose high-quality diskettes with reinforced hub rings—the added reliability is well worth the extra cost. You also need to make sure you buy the correct format type for the drive(s) in your Equity II.

The top floppy disk drive on the Equity II has a storage capacity of 360KB (kilobytes) and uses 5 ¼-inch, double-sided, double-density, soft-sectored, 48 TPI (tracks per inch) diskettes. Each double-density disk can hold up to 360KB of data, or about 150 pages of text. (One kilobyte equals 1024 bytes.) These diskettes are compatible with those the IBM PC uses, so you can use diskettes prepared by one computer on the other. On the Equity II, a 360KB floppy disk drive has a PUSH button which you press to hold a diskette in place.

If you have a second 360KB floppy disk drive, your bottom drive uses the same double-density diskettes described above.

If your Equity II has a 1.2MB (megabyte) floppy disk drive, choose 5 ¼-inch, double-sided, highdensity, soft-sectored, 96 TPI diskettes for this drive. Each highdensity diskette can hold 1.2MB of data, or about 450 pages of text. (One megabyte equals 1,048,576 bytes.) These diskettes are compatible with those the IBM PC AT™ uses, so you can use diskettes prepared by one computer on the other. On the Equity II, a 1.2MB floppy disk drive has a latch which you turn to hold a diskette in place.

Before you can use new diskettes, you need to format them. Formatting erases any data stored on a diskette and prepares it to receive new data, so be sure to format only new blank diskettes or diskettes that contain data you want to erase. See your MS-DOS (or other operating system) manual for instructions on how to format diskettes.

Drive and diskette incompatibilities

You need to be aware of some incompatibilities between 360KB and 1.2MB floppy disk drives and the diskettes they use. These incompatibilities apply to diskettes from other compatible computers as well.

Although you cannot use high-density diskettes in a 360KB drive, you can use double-density diskettes in a 1.2MB drive under the circumstances described below.

You can use a double-density diskette in a 1.2MB drive if you format it as a 360KB (or 320KB) diskette in the 1.2MB drive first. (Your MS-DOS or other operating system manual explains how to format a diskette in the density you choose.) After you do this, you can read data from it in both drive types, but write to it only when it is in a 1.2MB drive. If you write to it in a 360KB drive, it may become unusable in both drives.

You can use a 1.2MB drive to read data from a double-density diskette that was formatted in a 360KB drive (for example, if you want to copy files from it). But do not write to this diskette while it is in a 1.2MB drive. If you do, the diskette may become unusable in both drives.

In general, do not write to a diskette in a drive unless it was formatted in that drive (or the same type of drive on another computer). To avoid accidentally storing data on a diskette while it is in the wrong drive, you can place a write-protect tab on it before you insert it in the drive (see “Write-protecting diskettes” in this chapter). Because of these incompatibilities, always be sure to indicate density and drive type when you label your diskettes.

Table 3-1 shows what types of diskettes to use in the two types of drives.

Table 3-1. Drive/diskette compatibility

Drive type	Diskette types it can read from	Diskette types it can write to
360KB	double-density	double-density
1.2MB	high-density double-density	high-density double-density*

*Do not write to a double-density diskette in a 1.2MB drive unless it was formatted in a 1.2MB drive as a 360KB (or 320KB) diskette.

Note: Both types of floppy disk drives on the Equity II can read and write to single-sided, double-density diskettes. But do not write to a single-sided diskette while it is in a 1.2MB drive unless it was formatted in a 1.2MB drive as a single-sided, double-density diskette.

If you have both drive types (one 360KB and one 1.2MB), you can copy files from one drive to another as long as the right diskette type is in each drive. You can also copy files between a hard disk and any type of diskette. See your MS-DOS or other software manual for instructions on how to copy files.

Caring for Disks and Disk Drives

To avoid damaging floppy and hard disks, you need to care for them properly. Take these precautions to avoid losing data:

- Never remove a diskette from a drive or turn off **the** computer while a disk drive's LED lamp is on. The red light indicates the computer is copying data to or from a disk. If you interrupt this process, you **can** lose data.
- Remove all inserted diskettes before you turn off the computer.
- Never touch a diskette's magnetic surface. The oil on your fingertips can damage **the** diskette. Always hold a diskette by its protective jacket.
- Store diskettes properly. When they are **not** in use, keep diskettes in their protective envelopes and store them in a diskette container.
- Do not place anything on top of your diskettes and be sure **they** do not bend or sag. They do not rotate properly in a drive if damaged.
- Be careful when you label your diskettes. Attach labels firmly but gently, and only along **the** top of a diskette (next to the manufacturer's label). Do not place several labels on top of one another—too many labels can prevent a diskette from spinning freely in a disk drive.
- It is best to write **on** a label before **you attach** it to a diskette. Use only soft-tip pens (not ballpoint pens or pencils) to write on a label that is already on a diskette.
- Keep disks away from dust and dirt. Small particles of dust and dirt can scratch the magnetic surface and destroy data. Dust can also ruin the read/write heads in a disk drive.
- Never wipe, brush, or try to clean your disks in any way.
- Keep disks away from magnetic fields. (Remember that disks store data magnetically.) There are many sources of magnetism in your home or office, such **as** electrical appliances, telephones, and especially loudspeakers.
- Keep disks in a moderate environment. They work best at room-temperature and in normal humidity. Never leave disks sitting in the sun or in extreme cold or heat. The temperature in a car in the middle of summer or in **the** dead of winter can cause severe damage.

If you have a hard disk drive, take these additional precautions:

- Never turn off the computer's power when the hard disk LED lamp is on. The red light indicates the computer is copying data to or from the hard disk. If you interrupt this process, you can lose data.
- Never attempt to open the hard disk unit. The disk itself is enclosed in an air-tight container to protect it from dust.
- If you are going to move your computer (even to another part of the room), run the MS-DOS HDSIT program to move the read/write heads away from the recording area. See your MS-DOS (or other operating system) manual for instructions.

Protecting your Data

To avoid losing data you store, you can copy and write-protect your diskettes.

Making backup copies

It is a good idea to make backup copies of all your data and system diskettes. Copy all diskettes that contain programs, such as the MS-DOS and GW-BASIC diskettes that come with the Equity II, and use only the copies. Store your original software diskettes in a safe place away from your working diskettes. Copy your data diskettes regularly (preferably every day) to keep them up-to-date, and store them away from your originals.

The MS-DOS manual describes how to make a backup copy of your MS-DOS system diskette. To copy your other MS-DOS diskettes, use the DU (Disk Utility) program or the DISKCOPY command.

If you have a hard disk, keep backup copies of all your program files on floppy disks and regularly copy important data files to floppy disks also. For more information on backing up a hard disk, see 'Using a Hard Disk' in this chapter.

Write-protecting diskettes

As shown in Figure 3-1, the right edge of a diskette has a small, rectangular notch. If this notch is visible, you can copy new data to the diskette. If you cover the notch with an adhesive write-protect tab, you can retrieve and copy data from the diskette, but you cannot store new data on it or delete any files it contains. If you try to change data stored on a write-protected diskette, an error message tells you the diskette is write-protected. Write-protect tabs usually come with new diskettes when you buy them.

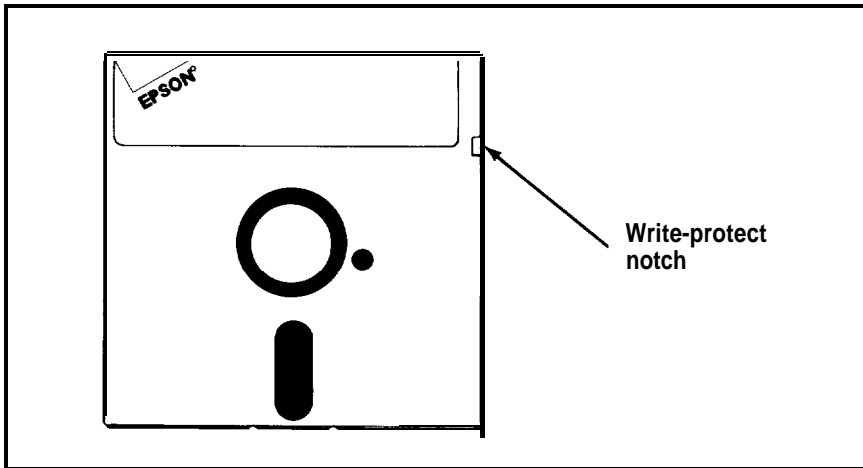


Figure 3-1. Write-protect notch

Using a Single Floppy Disk Drive

Usually, operating systems expect the computer to have at least two physical disk drives and display prompts and messages accordingly

If your Equity II has only one floppy disk drive, turn on (up) DIP switches 1-7 and 1-8 under the cover beneath the disk drives. When these switches are on, the operating system treats your single drive like two logical drives. This helps you perform operations that normally require two floppy disk drives.

For example, if you give a command to copy from one drive to another, MS-DOS copies from the first diskette you place in the drive to the computer's memory. Then MS-DOS prompts you to insert another diskette and copies from memory to the diskette you place in the drive. When copying is complete, you see a prompt to insert the original diskette.

Since you may swap diskettes this way often, it is easy to forget which diskette is which. One way to avoid accidentally losing data is to hold the diskette for one drive in your left hand and the diskette for the other drive in your right. You can also place a write-protect tab on your source diskette. For more information on using a single floppy disk drive with MS-DOS, see your MS-DOS manual.

Using a Hard Disk Drive

The internal hard disk for the Equity II has a capacity of 20MB, or about 20 million characters. This is equivalent to approximately 60 doubledensity floppy disks. Using a hard disk reduces the number of floppy disks you need and eliminates much of the disk-swapping you do when you use floppy disks. You can do almost all your work on the hard disk and copy files to floppy disks as needed (to make backups, for example).

Although the hard disk is very reliable, be sure to back up all your hard disk files on floppy disks in case you lose some data accidentally. You use the MS-DOS ARCHIVE program to back up your hard disk files.

To ensure you always have plenty of storage space available, keep only files you use regularly on the hard disk and store your other files on floppy disks.

Before you can use the Epson internal hard disk, you must do the following to prepare it:

- Use the MS-DOS SETUP program to tell your system it has a 20MB hard disk.
- Use the MS-DOS HDPART program to partition the hard disk to run MS-DOS.
- Format the MS-DOS partition with the MS-DOS HDFORMAT program and use the /S option to copy MS-DOS to the hard disk.
- Use XTREE® or the COPY command to copy the MS-DOS utility programs to the hard disk.

The MS-DOS system diskette contains all these programs and the MS-DOS manual describes how to use them. If you plan to use an operating system other than MS-DOS, you need to use that operating system to partition the hard disk and copy the system files to it.

The Epson hard disk is formatted at the factory. Therefore, you need not format it before you partition it to run an operating system. If you have serious read/write problems when you use the hard disk, you may need to format the entire hard disk with the MS-DOS HDFMTALL program as a last resort. See your MS-DOS manual for instructions and be sure to read the precautions carefully.

Chapter 4

Installing Option Cards

Option cards are accessories you can install in your Equity II to provide extra capabilities. For example, you can add a hard disk, another monitor, an auto-dial modem, or a mouse.

The Equity II has five slots for 8-bit option cards so it can hold up to five cards. If your Equity II has a hard disk, a hard disk controller card occupies one option slot.

You can buy option cards from Epson as well as other vendors. Multifunction cards that allow you to add features without using multiple option card slots are also available. **Consult** your Epson dealer for more information.

This chapter describes how to:

- Remove and replace the main unit's cover
- Install and remove an option card
- Use a mouse
- Use a modem

Removing the Main Unit Cover

To install an option card, you need to remove the cover of the Equity II.

WARNING: Never open the cover of the Equity II while it is plugged into an electrical outlet. Before you open the cover, turn off the power switches on the main unit and each peripheral, let the computer stand for a few minutes, and then unplug the power cable.

1. If the monitor is on top of the computer, move it to one side. Turn the main unit around so the back panel faces you.

2. As shown in Figure 4-1, the back panel is secured with three screws. Remove the screws with a Phillips screwdriver and put them safely to one side. Then remove the back panel from the main unit and set it aside.

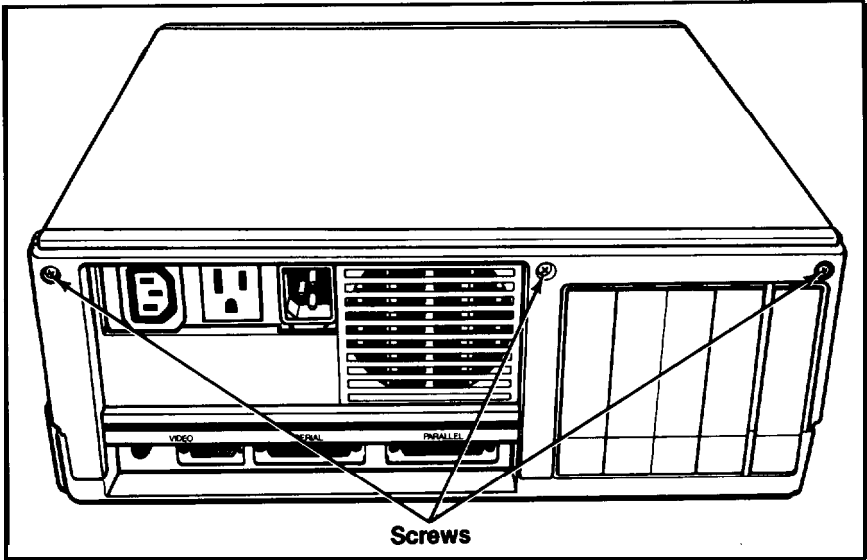


Figure 4-1. Back panel screws

3. The top cover is secured by four screws, two on each side of the computer. Locate the small plastic inserts that cover the two screws on the left side, as shown in Figure 4-2. Remove the plastic inserts with a small screwdriver and set them aside. Then remove the screws on both sides of the computer. Put all the screws safely to one side.

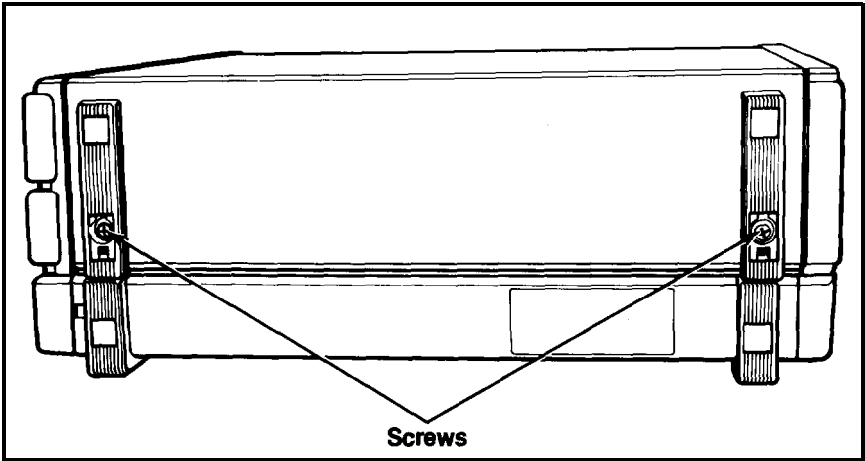


Figure 4-2. Side screws under plastic inserts

4. Figure 4-3 shows how to tilt the cover up and remove it from the computer. Set the cover aside for now.

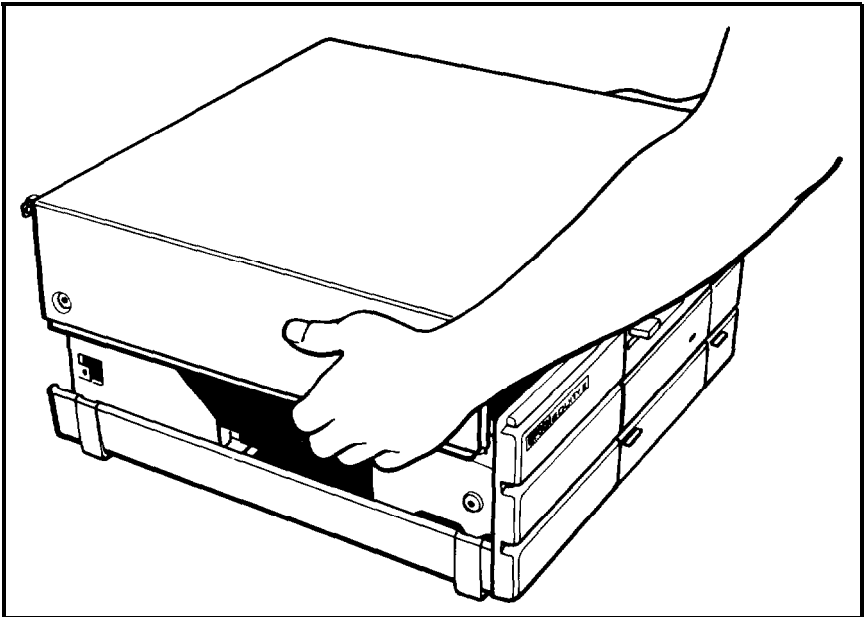


Figure 4-3. Removing the main unit cover

Installing an Option Card

You can install most option cards in any available slot. However, some cards work only in a specific slot. If you have such a card, your option card manual tells you which slot you need to use. Since the hard disk controller card must be connected to the hard disk, this card occupies slot 5, which is closest to the hard disk.

To install an option card inside the Equity II, follow these steps:

1. Decide which option slot you want to use and then remove the retaining screw from the top of the metal plate at the back of the slot. Keep the retaining screw to secure the option card to the frame of the computer. Lift out the metal plate and keep it in a safe place in case you remove the option card later.
2. Unpack the option card. When you handle the card, be careful not to touch any of the contacts on the circuit board, especially the gold-edge connector. If necessary, adjust any DIP switches or jumper connections on the option card (see the option card instructions). If you need to put the option card down before you install it, place it on top of its anti-static packing material with the component side facing down.

Note: Pay attention to the warnings in your option card manual. Most cards have delicate static-sensitive components that you must not touch.

3. Grip the card firmly by the top corners and position it above the slot so that the contact pins point down and the components face the metal boxes inside the main unit.
4. Slide the card into the slot, guiding the tab at the bottom of the metal retaining bracket into the corresponding notch at the back of the computer.

5. Once the connector pins are sitting in the connector slot, push the card downward firmly (but carefully) to fully insert it as shown in Figure 4-4. If the card does not go in smoothly, do not force it—pull it all the way out and try again, being sure to keep it straight.

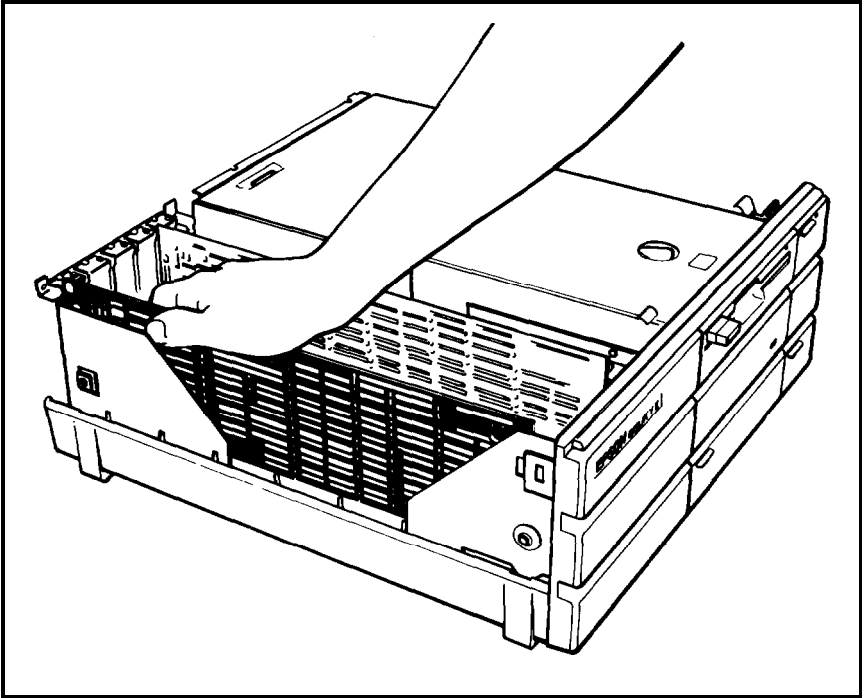


Figure 4-d. Inserting an option card

6. Secure the card's metal retaining bracket to the back of the computer with the retaining screw. The piece of foam in the main unit's cover holds long option cards in place at the free end.
7. Keep the card's packing materials in case you need to remove the card later.

Removing an access slot cover

Some option cards come with outlets for external devices (like a mouse or a monitor), while others work with devices inside the Equity II. If the option card you installed has a connector for an external device, you need to remove the appropriate access slot cover on the back panel.

Notice that **each** access slot cover on the back panel is secured by a tab at the bottom and a clip at the top. Locate the access slot cover that corresponds to the position of the option card you installed. Then hold the back panel of the computer with the inside facing you. As shown in Figure 4-5, push down on the clip at the top and push out to remove the cover.

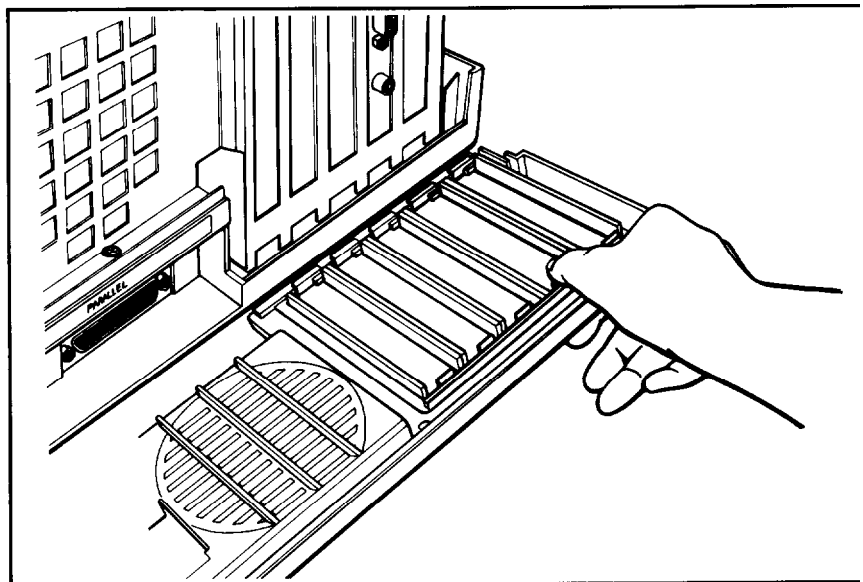


Figure 4-5. Removing an access slot cover

Replacing the Main Unit Cover

After you install the option card, follow these steps to replace the main unit's cover:

1. With the back of the computer facing you, hold the cover over the computer with the side feet on the left. Tip the cover slightly downward near the front panel.
2. Lower the cover onto the main unit. Slide the front edge of the cover beneath the top edge of the computer's front panel. Make sure that the bottom edges of the cover fit inside the main unit. Then lower the back of the cover so it is in position.
3. To secure the cover, replace the two screws on either side of the main unit. Then replace the plastic inserts over the side feet.

4. Replace the back panel and the three screws across the top edge.
5. Reconnect the main unit to the monitor, the keyboard, the printer, and any other peripherals you have.
6. Turn the main unit so the front faces you and place the monitor back on top of the main unit, if that is where you keep it.
7. Check to be sure the power switch on the main unit is off. Then reconnect the power cable to the AC input on the back panel and to an electrical outlet.

Post-Installation Adjustments

After you install an option card, you may need to change some DIP switch settings to match your new system configuration. See “Setting the DIP Switches” in Chapter 1 to find out which DIP switches (if any) you need to reset.

Then use the MS-DOS SETUP program to update your system’s configuration information. For example, if you add a hard disk, you need to tell the operating system that the additional drive is available. See your MS-DOS (or other operating system) manual for instructions.

Also complete any additional instructions in the option card manual.

Removing an Option Card

Before you remove an option card, turn off, unplug, and disconnect your system components. Be sure to detach any cable connected to the card. Then remove the main unit’s back panel and cover.

To take out the card, remove the screw on the metal retaining bracket and pull the card straight up and out of the connector. Then carefully wrap the card, preferably with the original packing materials, and place it inside its box for safe storage.

Replace the metal plate and retaining screw at the back of the empty option slot. Then replace the main unit’s cover. Snap the plastic access slot cover onto the back panel and then attach the back panel to the computer.

If necessary, reset the DIP switches on the main unit. Also, if you used the MS-DOS SETUP program to change some operating system settings for the option card, you need to change these settings back to their original values.

Using a Mouse

You can use a mouse with special software to enter data and direct a pointer on the screen. For example, you can point to an instruction on the screen and press a button on the mouse to perform the command. See the software manual that comes with the mouse, or the application program, for instructions on how to use it.

If you need to install an option card to use the mouse, follow the instructions in this chapter to install it. Then connect the mouse's cable to the connector on the card. If your mouse does not require a card, connect the cable to the serial port on the back panel.

To use the mouse, remove the velcro strip that covers the roller. When you are not using it, replace the velcro strip to keep out dust and dirt. Use the mouse only on a hard, flat surface, never on carpet-like material or on a wet surface.

When you use the mouse frequently, clean its roller about every two weeks. First remove the roller cover. If you have an Epson mouse, turn it over, push the roller cover to the side, and lift the cover out. (If you have another type of mouse, turn the cover counterclockwise to remove it.) Then remove the roller, wipe it with a clean, dry cloth, and replace the roller and cover. There are no other user-serviceable parts inside the mouse.

Using a Modem

To use the Equity II for telecommunications, you need to connect a modem to the computer so it can send and receive messages over telephone lines. A modem translates (modulates) signals from a computer to allow them to travel over telephone lines, and translates (demodulates) signals from telephone lines to allow a computer to use them. The name modem stands for MODulator/DEModulator.

You can choose an external or an internal modem. An internal modem is contained on an option card which you install in an option slot as described in this chapter. You plug your phone line into the connector on the option card. An external modem connects to your phone line and to the built-in serial port on the back panel. Install your modem according to the instructions in the manual that comes with it.

Chapter 5

Troubleshooting

You should not encounter any serious difficulties as you set up and use the Equity II. But if anything out of the ordinary happens, refer to this chapter. Usually such a situation requires nothing more than adjusting a cable connection, repeating a software procedure, or resetting the computer.

You can use the suggestions here to solve most problems you may encounter. If the recommended solution does not work, consult an Epson dealer about servicing the computer.

WARNING: If you need to turn off the computer for any reason, always wait at least 5 seconds before you turn it back on. You can damage the Equity II if you turn it off and on rapidly.

The Computer Fails To Start Up

If the computer does not start up when you turn on the power switch, follow these steps to solve the problem:

1. Check to see if the power LED lamp on the front panel is lit. If it is not, remove any diskettes and then turn off the power. Wait 5 seconds and then turn on the power again.
2. If the power LED lamp still does not light up, turn off the power again. Check to see that the power cable is securely connected to both the AC input on the back panel and the electrical outlet. Then turn on the power.
3. If the computer still does not start up, check the electrical outlet. Plug a portable lamp into the outlet you are using for the computer and turn it on to see if the outlet supplies power.

The Video Display Does Not Appear

If the computer starts up but no image appears on the screen, follow these steps to solve the problem:

1. Check if the power indicator on the video monitor is lit. If it is not, turn off the monitor's power, wait 5 seconds, then turn **on** the power again. Wait to see if a screen image appears.

2. Use the controls on the monitor to turn up the brightness and contrast.
3. Remove any diskettes and then turn off the power switches on the monitor and the main unit. Check that the monitor's power cable is securely connected to the electrical outlet and that the monitor cable is properly connected to both the monitor and the main unit. Turn on both power switches again.
4. Turn off the power switches on both the main unit and the monitor. Then check the electrical outlet for power. Plug a portable lamp into the outlet you are using for the monitor and turn it on to see if the outlet supplies power.
5. Check DIP switches 1-5 and 1-6 on the front panel of the main unit to see if they match your monitor type. See "Setting the DIP Switches" in Chapter 1 for the correct settings.

The Computer Hangs Up or Freezes

If the computer locks up and does not respond to the keyboard, try the following:

1. Wait a few seconds. Some operations take longer to perform than others. For example, a spreadsheet program takes longer to recalculate an entire spreadsheet than to record one figure. Also, BASIC programs that perform many calculations can take several minutes, or even hours. Be aware of the task the computer is performing and judge the time accordingly.
2. If the computer remains locked up, follow the steps in Chapter 2 under "Resetting the Computer."

Floppy Disk Problems

If you have trouble with a diskette, check the following questions:

1. Is the diskette damaged? Copy the diskette and then repeat the operation that caused the problem using the copy. (If you have trouble copying the entire diskette, try to copy single files.) If the operation works using the copy, the original diskette is probably damaged. Make another copy to use as a backup.

2. Have you inserted the right type of diskette? The diskette type is normally shown on the manufacturer's label. In the top drive, which has a storage capacity of 360KB, use **5¼-inch**, double-sided, doubledensity, **48 TPI**, soft-sector diskettes. If you have a second 360KB floppy disk drive, use the same type of diskettes in this drive.

If you have a second floppy disk drive that has a storage capacity of 1.2MB, use **5¼-inch**, double-sided, high-density, **96 TPI**, soft-sector diskettes in this drive.

The two diskette types are not interchangeable between the two types of drives. You cannot read or write to a high-density diskette in a 360KB drive. You can read a double-density diskette in a 1.2MB drive, but do not write to it unless you format it in a 1.2MB drive as a 360KB (or 320KB) diskette first. See "Choosing Diskettes for the Equity II" and "Drive and diskette incompatibilities" in Chapter 3.

3. Is the diskette write-protected? There may be a write-protect tab over the notch on the side of the diskette. Before you remove the tab, check the directory to see what files the diskette contains-it may contain information you do not want to change or lose. (Your operating system manual tells you what command displays a directory.) Although you should normally write-protect all software diskettes, some programs store temporary files on the diskette. These programs do not work if you write-protect the diskette.
4. Have you told your system what types of floppy disk drives it has? First see "Setting the DIP Switches" in Chapter 1 to make sure you set switches 1-1, 1-7, and 1-8 correctly. Then use the MS-DOS SETUP program to check that your drive type settings match your system configuration. See the MS-DOS manual for instructions.

Hard Disk Problems

If you have problems with your hard disk when you first start to use it, check to see if it is set up properly. See "Using a Hard Disk Drive" in Chapter 3 and refer to your MS-DOS manual.

If you cannot access data stored on your hard disk, you may have accidentally repartitioned or reformatted part or all of the hard disk. If you have not done so and your hard disk does not function properly, have an authorized Epson service center check your hard disk. Never open the air-tight container that encloses the recording disk.

Software Problems

If you have trouble with a software program, check the following list of problems and solutions:

1. The software program does not start. Check **that** you are following the correct procedure for your operating **system**. Make sure you insert the system diskette in drive A (the top drive).
2. An application routine does **not** work. Refer to the software manual and complete the routine according to the instructions. If this does not work, reset **the** computer as described in Chapter 2 under "Resetting the Computer." Reload the program and try the routine again.

To operate properly, some programs require certain DIP switch settings. Be sure **the** DIP switches on the main unit match your monitor type, number of floppy disk drives, and other system characteristics (see "Setting the DIP Switches" in Chapter 1). Before you change **the** current settings, turn off the computer. When you turn on the computer again, the new settings take effect.

Printer Problems

Your printer manual describes methods to solve most printer problems. If your printer does not work correctly right after you install it, make sure the printer has power and connects to the computer properly. The printer manual tells you how to connect your printer.

If you **have a** printer connected to the parallel port on the back panel, be sure to set DIP switch 1-4 **on** the main unit. If you have a printer connected to **the** built-in serial port, turn off switch 2-8 to enable this port and set switch 2-7 properly. See "Setting the DIP Switches" in Chapter 1.

If you have a serial printer, or if you **have** problems with paper feeding, check the printer manual for **the** printer's DIP switch settings. The DIP **switches on a** printer help it communicate properly with the computer.

Option Card Problems

If you install an option card and get unexpected results, check the following questions:

1. Is the option card installed correctly?
2. Did you follow the setup and operation instructions in the option card manual?
3. Did you set any necessary jumpers or DIP switches on the option card? See your option card instructions.
4. If you added an external device, do you have the proper cable to connect the peripheral to the option card connector on the back panel?
5. Did you reset the DIP switches on the main unit to match your new system configuration? See "Setting the DIP Switches" in Chapter 1.
6. Did you perform any necessary post-installation setup procedures? See "Post-Installation Adjustments" in Chapter 4.

Memory Problems

If the computer does not save your system configuration settings and the correct date and time when it is off, the CMOS RAM backup battery may be disabled.

To enable the battery, follow the instructions in Chapter 4 to remove the main unit's cover. Locate the battery just behind the front panel on the side with the Epson Equity II logo and find switch 4 near the battery connector on the main system board. Turn on this switch to enable the battery.

If the computer still does not save your settings while it is off, the battery may be low. To replace it, see the next section.

The Battery Is Low

The Equity II's CMOS RAM backup battery lasts at least 1^{1/2} years. When MS-DOS loads, it checks the battery. If the battery is getting low, this message displays:

```
CMOS battery needs replacing
```

Contact your Epson dealer to obtain a new lithium battery and follow these steps to install it:

1. Follow the instructions in Chapter 4 to remove the main unit's cover. Locate the battery just behind the front panel on the side with the Epson Equity II logo.
2. To disconnect the battery, grip the brown battery connector on the main system board and pull it straight up.
3. Remove the screw on the plate that secures the battery and set the screw and the plate aside.
4. Lift out the battery.
5. Insert the new battery and replace the cover plate and screw.
6. To connect the new battery, insert the new battery's connector into the main system board.
7. Replace the main unit's cover as described in Chapter 4 .

After you install a new battery, you need to run the MS-DOS SETUP program to re-enter information about your system configuration and reset the correct date and time.

Appendix A

Equity II Specifications

CPU and Memory

16-Bit CPU	NEC V30 microprocessor (8086-compatible), 4.77 or 7.16 MHz clockrate, operator-selectable execution speed and wait states 20-bit address and 16-bit data bus
Math coprocessor	8087 support (optional with 8086 CPU), operates at 4.77 MHz clockrate only
Main memory	640KB RAM standard
ROM	16KB

Controllers

Clock/Calendar/ RAM	Real-time clock, calendar, and 50-byte CMOS RAM for configuration with battery backup
Display	Combination video display modes: IBM PC-compatible monochrome text/Hercules graphics (720 X 348); IBM PC-compatible RGB color/graphics (640 X 200) or composite video; controller on main system board
Floppy disk	Supports up to two drives, drives available in one of two formats (double-density 360KB or high-density 1.2MB), controller on main system board
Power	Power-on by switch or timer, power-off by switch or software
DMA	Programmable DMA controller with 3 channels: one for floppy disk controller; two available for user peripherals
Interrupt	Programmable interrupt controllers, 8 interrupt levels

Control/Timer	One programmable interrupt timer
Printer I/O	Programmable parallel interface
Serial I/O	Multi-protocol serial controller

Interfaces

Serial	RS-232C, programmable, asynchronous, DB-25P male connector
Printer	IBM-compatible, 8-bit, parallel, DB-25S female connector
Option slots	Five full-size, IBM PC-compatible, 8-bit input/output expansion slots in base configuration
Speaker	Internal with adjustable volume

Power Supply

Switching type, fancooled, 120 VAC, 100 W	
+ 5 VDC	@ 7.5 A
+12 VDC	@ 4.7 A
- 5 VDC	@ .3 A
-12 VDC	@ .3 A

Mass Storage

	Two drives maximum
Standard	5¼-inch, half-height floppy disk drive; double-sided, double-density, 360KB storage capacity
Optional	5¼-inch, half-height floppy disk drive; double-sided, double-density, 360KB storage capacity
Optional	5¼-inch, half-height floppy disk drive; double-sided, high-density, 1.2MB storage capacity
Optional	5¼-inch, half-height internal hard disk drive; 20MB storage capacity with controller

Keyboard

	Detachable, two positions, 83 sculpted keys
Layout	56-key QWERTY main keyboard, 17-key numeric/cursor pad, 10 function keys
Function keys	Three levels (normal, shift, and alternate), user-definable

Environmental Requirements

Temperature	Operating range: 41° to 104°F (5° to 35°C)
	Storage range: 22" to 158°F (-30" to 65°C)
Humidity	Operating range: 20% to 80% non-condensing
	Storage range: 5 % to 95 % non-condensing

Physical Characteristics (CPU Only)

Width, inches (mm)	14.50 (365)
Depth, inches (mm)	15.00 (389.5)
Height, inches (mm)	5.75 (145)
Weight, pounds (kg) for 20MB hard disk configuration	24.30 (10.9)

Power Requirements

120 VAC + 20%, 60 Hz, 4.8 A

Options

Monochrome video card

Supports Epson- or IBM PC-compatible monochrome monitor, 82-character X 25-line display, 9 X 14 character block, installs in option slot

TTL monochrome monitor (12-inch diagonal)

High-persistence, green, P-39 phosphor screen; etched surface to reduce glare; 22 MHz video bandwidth; 35 W

Color/graphics video card

Supports Epson- or IBM PC-compatible RGB color or composite video monitors, 40-character X 25-line display (low-resolution text), 80-character X 25-line display (high-resolution text), 640 X 200 (high-resolution graphics), 8 X 8 character block, installs in option slot

RGB color monitor (13-inch diagonal)

High-contrast screen, 16 colors, etched surface to reduce glare, 18 MHz video bandwidth

Epson mouse/interface card

Two-button mouse with option card, installs in option slot

Appendix B

Glossary

Application program

Software designed to perform a specific task, such as word processing or accounting.

ASCII

American Standard Code for Information Interchange. A standardized coding system for representing characters, such as numbers, letters, and graphic symbols. An ASCII character occupies one byte of storage. Many different computers, printers, and programs can use files transmitted in ASCII code.

Asynchronous

A method of data transmission in which a computer sends data one character at a time to another computer, without either machine preparing for the transmission.

Backup

An extra copy of a program, data file, or disk, kept in case your working copy is **damaged** or lost.

Bit

A binary digit (0 or 1). The smallest unit of computer storage. The value of a bit represents the presence (1) or absence (0) of an electric charge.

Boot

To load a program or an operating system.

Byte

A sequence or group of eight bits that represents one character.

Character

Anything that can print in a single space on the page or the screen. Includes numbers, letters, punctuation marks, and graphic symbols.

CMOS

Complementary Metal-Oxide Semiconductor. A method for making silicon chips.

Code

A system of symbols for representing data or instructions. Also any software program or part of a program.

Command

An instruction you enter on the keyboard to direct the computer to perform a specific function.

Configuration

The particular setup of a group of components. For example, a CPU with two floppy disk drives, connected to a monochrome monitor and a printer is a typical system configuration.

Control code

A command (generated when you hold down **Ctrl** and press another key on the keyboard) that instructs the computer to perform a specific function.

CPU

Central Processing Unit. The piece of hardware which interprets instructions, performs the tasks you indicate, keeps track of stored data, and controls all input and output operations.

Cursor

The highlighted marker which shows your position on the screen and moves as you enter and delete data.

Data

Information stored or processed by a computer.

Data diskette

A formatted diskette used to store files.

DIP switches

Small switches on a piece of hardware such as a CPU, a printer, or an option card. DIP switch settings control various functions and provide a system with information about itself. DIP stands for Dual In-Line Package.

Directory

A list of the files stored on a disk or a part of a disk.

Disk

The collective term for both hard disks and floppy disks (diskettes).

Disk drive

The physical device which allows the computer to read from and write to a disk. A floppy disk drive **has a** disk slot on the front panel of the main unit into which you insert diskettes. A hard disk is permanently fixed inside the main unit and hidden behind the front panel.

Diskette

A flat piece of flexible plastic coated with magnetic material and used to store data permanently. Also called floppy disk.

DOS

The Disk Operating System that controls the computer's input and output functions. See Operating system.

Double-density

A type of diskette format that allows you to store twice as much data as the single-density format. A double-sided, double-density diskette for the Equity II has a storage capacity of 360KB.

File

A group of related pieces of information called records, or entries, stored together **on** disk. Text files consist of words and sentences. Program files consist of code and are used by computers to interpret and carry out instructions.

Floppy disk

See Diskette.

Format

To prepare a new disk (or erase an old one) so that it can receive information. Formatting a disk divides it into tracks and sectors and creates addressable locations on it.

GW-BASIC

Microsoft's extended version of the Beginner's All-purpose Symbolic Instruction Code. A programming language designed to be easy to use and understand.

Hard disk

The enclosed unit used to store data permanently. Unlike a floppy disk, it is fixed in place. It can process data more rapidly and store many more files than a floppy disk.

Hardware

Any **physical** component of a computer system, such as a monitor, printer, keyboard, or CPU.

Highdensity

A type of diskette format that allows you to store up to 1.2MB of **data**.

Input/output port

See Port.

Interface

A physical or software connection used to transmit data between equipment or programs.

Kilobyte (KB)

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

LED

Light Emitting Diode. A substance that illuminates when electricity passes through it, like the power and disk drive indicator lights on the front panel of the Equity II.

Main unit

The Equity II computer.

Megabyte (MB)

A unit used to measure storage space (in a computer's memory or on a disk). One megabyte equals 1,048,576 bytes.

Memory

The area where your computer stores data. Memory contents can be permanent and inalterable (ROM) or temporary (RAM).

Microprocessor

A small version of a CPU contained on one semiconductor chip.

Modem

A device which allows a computer to transmit signals over telephone lines so it can send and receive data. Modem stands for Modulator/DEModulator.

Monitor

The piece of hardware that contains the screen and displays information.

Monochrome monitor

A monitor that displays in only one color, such as green or amber, as opposed to a color monitor which can display in several colors.

Mouse

A device used (as an alternative to a keyboard) to control a pointer on the screen and operate a program.

MS-DOS

An operating system from Microsoft. See DOS, Operating system.

Operating system

A collection of programs that allow a computer to control its operations. The operating system determines how programs run on the computer and supervises all input and output. Examples: MS-DOS, CP/M®.

Option card

A card you install inside the Equity II main unit to provide additional capabilities, such as a hard disk, a mouse, a modem, or another monitor.

Parallel

The type of interface which transmits data in groups of bits. See Interface and Serial.

Parity

A bit that indicates whether the number of 1s in a word is even or odd. When your computer uses parity checking, it adds an extra bit to each word. This parity bit is 1 when the parity is odd and 0 when it is **even**, or vice-versa, depending on the system. ASCII uses 7 bits for data and 1 bit for parity. Parity checking is a method of error detection.

Partition

To divide a hard disk drive into separate sections for use by different operating systems.

Peripheral

A device (such as a printer or a modem) connected to a computer that depends on the computer for its operation.

Port

A physical input/output socket on a computer where you can connect a peripheral.

Program

A disk file that contains coded instructions and tells a computer what to do and how to do it.

RAM

Random Access Memory. The part of memory that a computer can both read and write to. The programs you use are temporarily stored in RAM. All data stored in RAM is erased when you turn off the power.

Read

To copy data from one area to another. For example, when you open a text file stored on disk, the computer reads the data from the disk and displays it on the screen.

Read/write head

The physical device inside a disk drive that reads and records data on the magnetic surface of a disk.

Reset

To reload a computer's operating system so that you can retry a task or begin using a different operating system. Resetting clears RAM.

RGB

Red Green Blue. An RGB monitor displays in high-resolution color.

ROM

Read Only Memory. A portion of memory that can only be read and cannot be used for temporary storage. ROM retains its contents even when you turn off the power.

RS-232C

A widely-used, standard type of serial interface. You can easily connect RS-232C-compatible devices to the Equity II.

Sector

A contiguous section of a disk track that provides an address at which the computer can access data.

Self-test

The procedure a computer performs to check its hardware when you turn it on.

serial

The type of interface which transmits data one bit at a time. See Interface and Parallel.

Software

The programs that enable your computer to perform the tasks and functions you indicate.

System diskette

A diskette that contains the operating system.

Tracks

Addressable concentric circles on a diskette that resemble the grooves on a record and help to divide the diskette into separate accessible areas. There are 40 tracks on each side of a double-sided, double-density diskette and 80 tracks on each side of a double-sided, high-density diskette.

Write

To store data on a disk.

Write-protect

To prevent a diskette from being overwritten by placing a write-protect **tab** over the notch on the side of the diskette. When a diskette is write-protected, you cannot erase, change, or record over its contents.

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