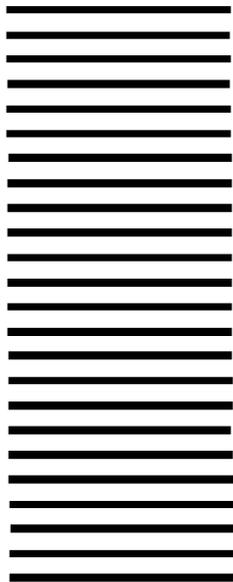


EQUITY™ II+

User's Guide



EPSON®



EPSON[®]
Equity[™] II+
User's Guide

Y16299110300

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- 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 the 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:

"Television Interference Handbook"

This booklet is available from the U.S. Government Printing Office, Washington DC **20402**. Stock No. 004-000-00450-7.

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.

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Introduction

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

The Equity II+ main unit is available in these models:

- One 1.2MB (megabyte) high-density floppy disk drive
- One 1.2MB floppy disk drive and one 40MB internal hard disk drive.

Both models include 640KB (kilobytes of memory. You can install additional) drives in your Equity II+ to increase its storage capacity: another floppy disk drive (360KB, 720KB, 1.2MB, or 1.44MB) or one hard disk.

The Equity II+ comes with both a serial interface and a parallel interface. These interfaces let you connect an Epson printer or plotter, or almost any peripheral device you choose.

You can further expand the capabilities of your Equity II+ by adding optional cards to which you connect external devices. The Equity II+ has six option slots in which you can install option cards. (One slot holds the parallel and serial interfaces.)

You **choose** the type of monitor you want to use with your Equity II+. A monitor requires a video card. Here are some monitors and video cards you can use with the Equity II+:

- Monochrome monitor (green or amber) and monochrome video card
- RGB (red, green, blue) color monitor and either a CGA (color graphics adapter) card or an EGA (enhanced graphics adapter) card
- RGB enhanced color monitor and a CGA or EGA card
- Composite monitor, either color or monochrome, and a CGA card
- Monochrome monitor and an EGA card
- EGA monitor and an EGA card.

You can add memory expansion option cards to increase the amount of internal memory in your Equity II+, and you can add an 80287 math coprocessor (which is not an option card but installs on the main circuit board).

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

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 on the Equity II+. Be sure to refer to your Equity MS-DOS manual, however, for descriptions of the special utility programs added by Epson.

You may have purchased other software; you can use most software products designed for the IBM PC, PC XT, and PC AT on your Equity II+. Refer to your software program documentation for information on using the software.

Additionally, the Equity II+ supports multiple users and multiple tasking with the appropriate operating system. Consult your Epson dealer for more information.

How to Use this Manual

This user's guide explains how to set up and care for your Equity II+. It also describes how to start using your system and install optional devices. You may not need to read everything in this book; some sections may describe a particular option or accessory you do not have.

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

Appendix A describes how to change jumper settings inside the main unit when you install certain optional devices, Appendix B presents the Equity II+ hardware specifications, and Appendix C is a glossary of computer terms used in this manual. Refer to the glossary whenever you come across an unfamiliar word.

The last section of this manual describes the diagnostics programs for your Equity II+. You run these diagnostics programs the first time you set up your system and any time you change the configuration of your Equity II+.

Setting Up Your System

Setting up your Epson Equity II+ personal computer is easy. Just follow the steps in this chapter- You'll find a quick guide to these steps on the inside back cover.

1 Unpacking

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

Once you have unpacked your Equity II+ computer components and documentation, you should have this manual and the following items:

- The main unit and power cord.
- The keyboard with detachable cable.
- A startup diskette that contains the MS-DOS operating system (version 3.3) and the commands used to identify your basic system configuration.
- Two operating diskettes both of which provide the MS-DOS commands used for daily operation. Operating diskette 1 contains the individual commands; Operating diskette 2 contains menus you can use to access many of the same commands. This diskette also provides the MS-DOS Help utility and the GW-BASIC programming language.
- A reference diskette that contains a special group of programs called diagnostics. You use these programs the first time you set up your system and any time you make changes to it. This diskette also contains several MS-DOS commands to provide system information or perform advanced MS-DOS operations.
- An MS-DOS manual and a GW-BASIC manual.

In addition to these items, you probably bought a compatible video monitor and video card.

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

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.

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 read/write heads. Be sure to remove it before you connect any cables. Turn up the latch that covers the disk slot until it is horizontal. Carefully pull out the sheet. (If you have an optional drive with a push button, press the disk drive button to release the protector 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, reinsert the protector sheet to help prevent dust from entering the disk drive.

2 *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 it 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 of space around the computer 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. because 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 auxiliary power outlet on the rear panel of the Equity II+ reduces the number of wall outlets you need.
- No electromagnetic interference. Locate your system away from any electrical device that generates an electromagnetic field. Even a telephone can cause trouble, especially if you keep diskettes right next to it.

3 *Arranging the Components*

First decide how you want to arrange the different parts of your system. Figure 1-1 shows a typical setup.

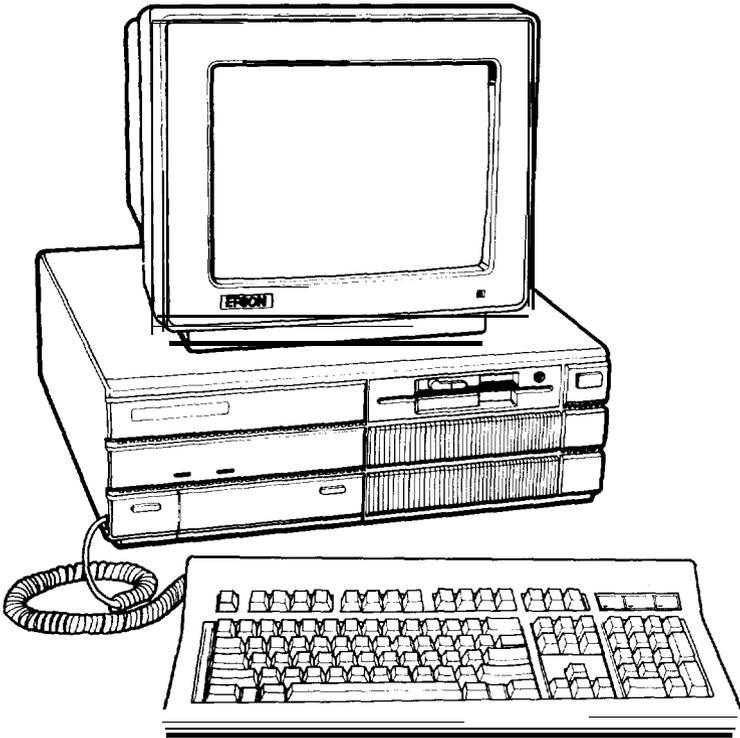


Figure 1-1. *System arrangement*

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

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

The front panel

Figure 1-2 identifies the various components on the front panel. To view the keyboard socket and control switches, gently press in each cover on the lower left side of the front panel. This releases the cover and you can gently pull it down to view the switches.

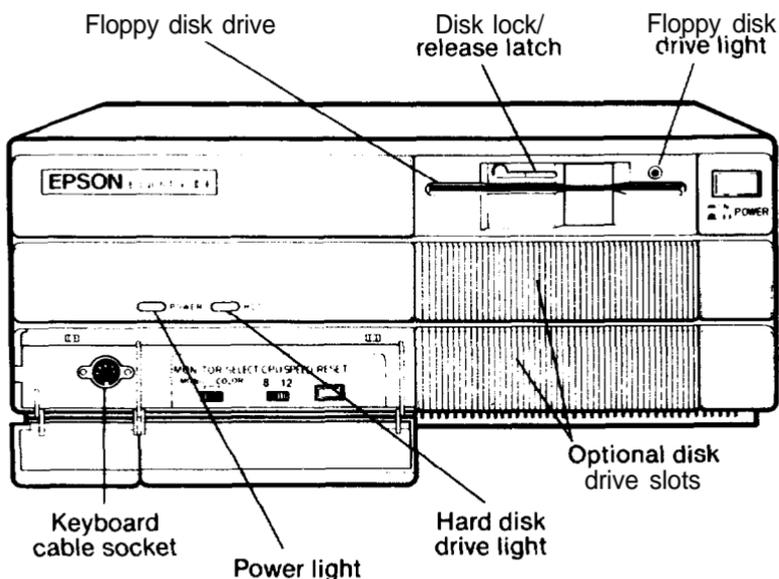


Figure 1-2. Front panel

- **POWER switch.** Use this switch to turn the Equity II+ on or off.
- **Floppy disk drive.** The top drive is a floppy disk drive that uses high-density (1.2MB) diskettes.
- **Disk lock/release latch.** To lock a diskette in place, turn this latch down until it is vertical. To release a diskette, turn it up until it is horizontal.
- **Floppy disk drive light.** A red light indicates that the drive is being accessed. To avoid losing data, never remove a diskette or turn off the computer's power when this light is on.

- Slots for optional disk drives. You can add another floppy disk drive (1.44MB, 1.2MB, 720KB, or 360KB) and/or hard disk drive in these slots. All Equity II+ units come with at least one 1.2MB floppy disk drive.
- Hard disk drive light. A green light indicates that the drive is being accessed. To avoid losing data, do not turn off the computer's power when this light is on.
- Power light. When the light is on, the power is on. The light is orange if the CPU (central processing unit) speed is 8 MHz and green for 12 MHz.
- RESET button. Press this button to reset the computer. When an operating system is running and the computer is unlocked, you can press the RESET button to reboot the system.
- CPU SPEED switch. Use this switch to select the CPU's execution speed: slide it to the left to run at 8 MHz and slide it to the right to run at 12 MHz.
- MONITOR SELECT switch. Slide this switch to the left if you are using a monochrome monitor or to the right if you are using a color monitor.
- Keyboard cable socket. Plug in the keyboard cable here.

The back panel

Now look at the back panel to identify the input/output ports. Figure 1-3 shows where you connect your peripherals.

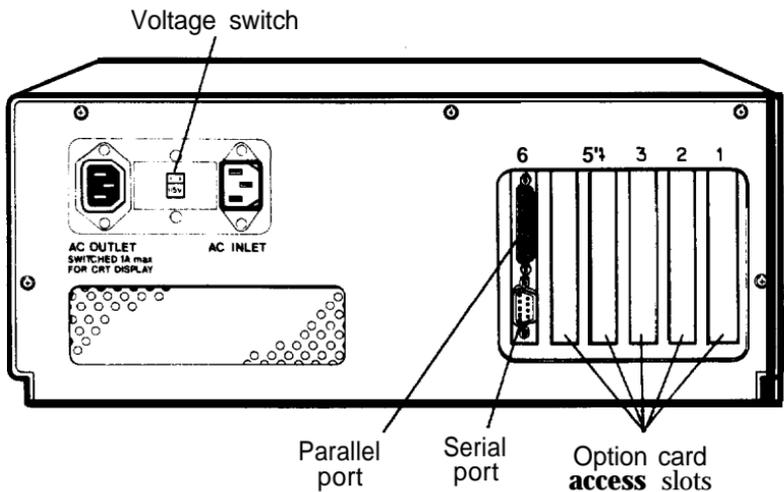


Figure 1-3. Back panel

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

- Voltage switch. Leave this switch at 115V for USA and Canadian use. Slide the switch to the right to select 230V for use in other countries (as necessary).
- AC OUTLET Auxiliary power outlet. You can plug some monitors (and other types of peripherals) into the main unit here, instead of a wall outlet. The main unit's power switch controls the monitor or peripheral connected to this outlet.
- AC INLET Plug the power cord into the main unit here. Be sure the power switch is off when you plug the power cord into an outlet.
- Parallel port. Lets you connect a peripheral with a parallel interface, such as a printer or a plotter.
- Serial port. Allows you to connect a peripheral with a serial interface, such as a modem, another computer, or a printer.
- Option card access slots. The Equity II+ has six slots to hold up to six option cards. Option cards allow your computer to control your peripherals or enhance your computer's performance. One option card slot holds the parallel and serial interfaces as well as the floppy disk controller. If your Equity II+ has a hard disk, a hard disk controller card occupies another option slot. You also need to use one or more slots for the video card(s) you purchased for your monitor. You can use the other slots to install additional options, such as a memory expansion card.

4 *Connecting the Power Cord*

Insert the power cord into the AC power inlet on the left side of the back panel, as shown in Figure 1-4. To avoid an electric shock, be sure to plug this end into the main unit before plugging the other end into the wall socket. For now, do not plug the power cord into an electrical outlet.

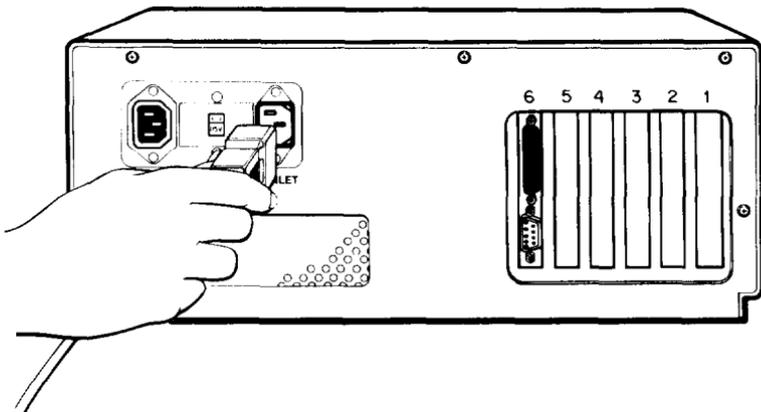


Figure 1-4. Connecting the power cord

5 *Connecting a Video Monitor*

The procedure you use to connect your monitor to the main unit depends on the type of monitor you have. Refer to your monitor manual for detailed instructions or follow the general guidelines below.

Note: Your dealer may have installed a video card in your main unit to control your monitor. If not, you need to install it before you can connect your monitor. See Chapter 4 for instructions on how to remove the main unit's cover and install an option card.

1. Place your monitor on top of or near the Equity II+ main unit. It is easiest to connect the monitor cable if the backs of the monitor and main unit face you.
2. If necessary, connect the monitor cable to the monitor. (Some monitors come with permanently attached cables.)
3. Connect the appropriate end of the monitor cable to your monochrome or color/graphics card connector at the back of the main unit, as shown in Figure 1-5. If the plug has retaining screws, tighten them with a screwdriver.

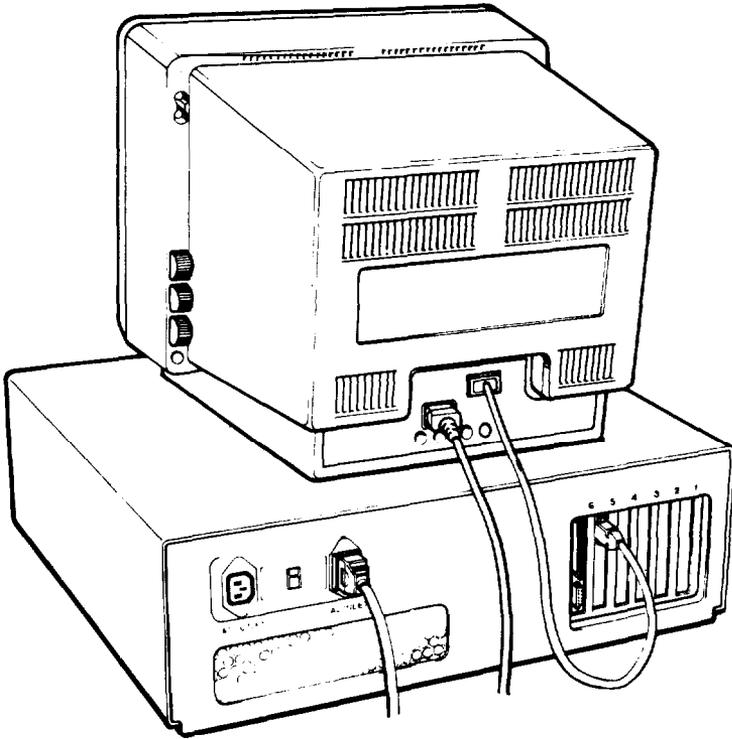


Figure 1-5. Connecting the *monitor*

The monitor type must match the video card in the main unit. If you have a color card, you can use one of two connectors: a nine-pin, female D-connector for RGB monitors or an RCA connector for composite video monitors. Consult Table 1-1 to make sure your card and monitor match.

Table 1-1. Monitor/video card compatibility

Monitor	Video card	output type
Monochrome	Monochrome or enhanced graphics	9-pin output (TTL compatible)
Color or enhanced color	Color graphics or enhanced graphics	9-pin RGB output
Composite-color or monochrome	Color graphics	RCA-type jack

Note: Be sure to set the switches on the video card to match your monitor.

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

Note: If a monochrome monitor has the proper type of plug, you can plug it into the auxiliary outlet on the back of the Equity II+ main unit.

5. Set the monitor switch on the front panel of the main unit for the type of monitor you are using. (See Figure 1-2.) Slide the switch to the left for a monochrome monitor or to the right for a color monitor.

6 *Connecting the Keyboard*

Follow these steps to connect the keyboard:

1. Open the cover on the lower left corner on the front panel of the main unit. Press in to release the cover; then gently pull down the cover.
2. Plug the other end of the cable into the keyboard socket, as shown in Figure 1-6. Do not force the connector, but be sure to insert it all the way

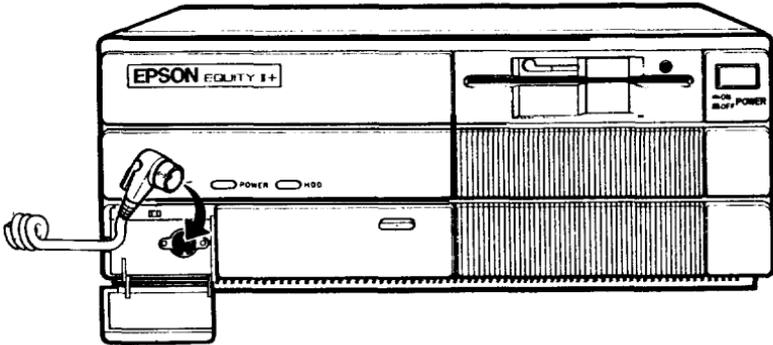


Figure 1-6. Plugging the keyboard cable into the *main* unit

You can tilt the angle of the keyboard by adjusting the legs on the bottom. To adjust the legs, turn the keyboard over and lift each leg upward until it locks into place, as shown in Figure 1-7. You can adjust the legs to two different positions, or leave them flat.

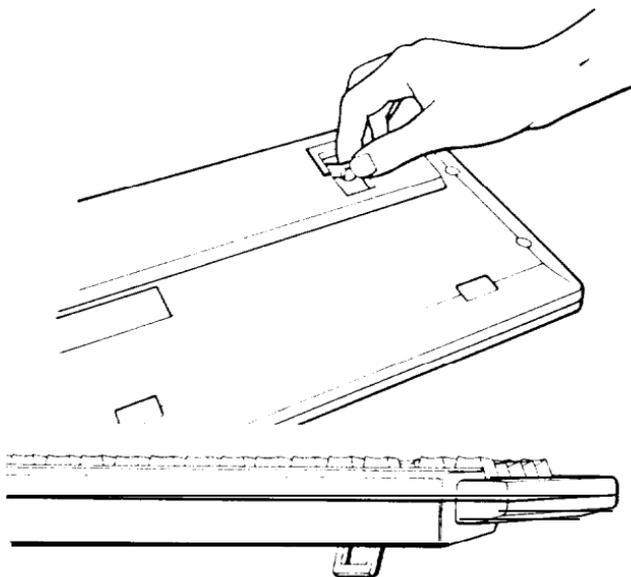


Figure 1-7. Adjusting the keyboard legs

7 *Connecting a Printer*

The Equity II+ has both parallel and serial interfaces. You can easily connect a printer or plotter that has either type of interface—just follow the instructions below. Epson offers a full range 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-compatible printer cable. If you are not sure which one 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.
2. Before you connect the printer, be sure the power switches on both the main unit and the monitor are off.
3. Connect the appropriate end of the printer cable to the parallel port on the back panel of the main unit, as shown in Figure 1-8. If the plug has retaining screws, tighten them with a small screwdriver.

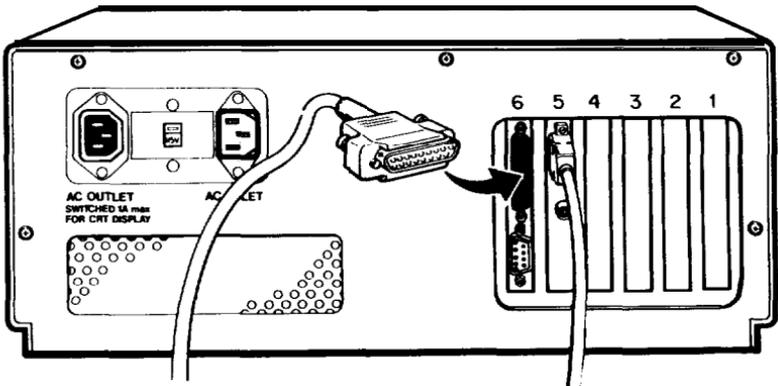


Figure 1-8. Connecting the printer cable to the *parallel port*

4. Connect the other end of the cable to the printer as shown in Figure 1-9. 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.

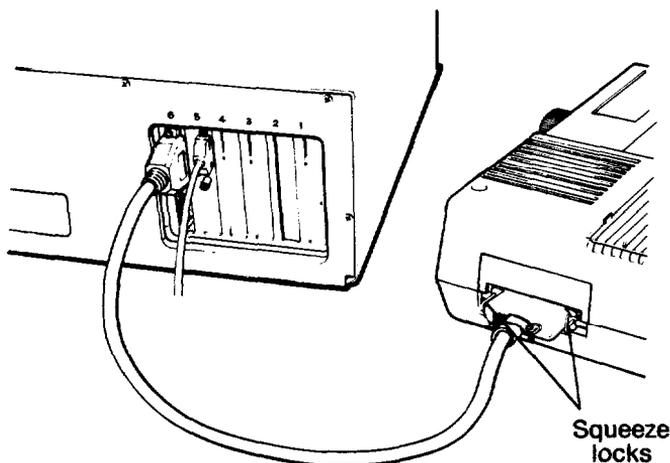


Figure 1-9. *Connecting the printer*

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

Serial interface

If you have a printer (or another peripheral such as a modem) with a serial interface, connect it to the serial (RS-232C) port at the back of the main unit. The Equity II+ uses a DB-9P connector, so be sure you have an AT-compatible cable (or an adapting cable that converts the 9-pin output to the standard 25-pin output). To connect a serial device, follow the same steps above for connecting a parallel device.

You need to ensure the serial port is set up so it functions properly. If you are using the port for a serial printer, you must also redirect printer output to the serial instead of the parallel port. Use the MS-DOS SETMODE program (or the MODE command) to make these changes. 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 of the 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 others can be adapted. In addition, some application programs can print the special graphic characters on a standard printer when you use a special printer driver program. Ask your Epson dealer for more information.

8 *Turning On the Computer*

After you set up your system, you're ready to turn on the power and start using your Equity II+ 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 protector sheet in the disk drive.
- Do not attempt to dismantle any part of the computer. Only remove the top cover to install and remove option cards. If there is a hardware problem you cannot solve after reading Chapter 5 on troubleshooting, or if you want to install an optional 80287 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 switch is on.
- Never turn off or reset your computer while a disk drive light is on. This can destroy data stored on disk or make a whole disk unusable.
- Always wait at least five seconds after you switch the power off 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 next to your system or any of its components. Spilled liquid can damage the circuitry of your components.

Turning on the power switch

Now you are ready to turn on your system. It is a good idea to turn on the monitor and any peripheral devices before you turn on the main unit.

First, make sure the power cord is plugged into the power inlet on the back panel of the main unit. Then plug the power cable into a 3-prong, 120-volt, grounded electrical outlet. Turn on the monitor so you can see the messages that appear as your computer starts up. If you have a printer or other peripheral device, turn it on next.

You can turn on your computer with or without a system diskette in the top disk drive. For now, leave the drive empty. To turn on the computer, press in the power switch on the front panel of the main unit, as shown in Figure 1-10. The power indicator on the front panel lights up and the cooling fan inside the main unit starts. After a few seconds, the computer begins to perform an internal self test.

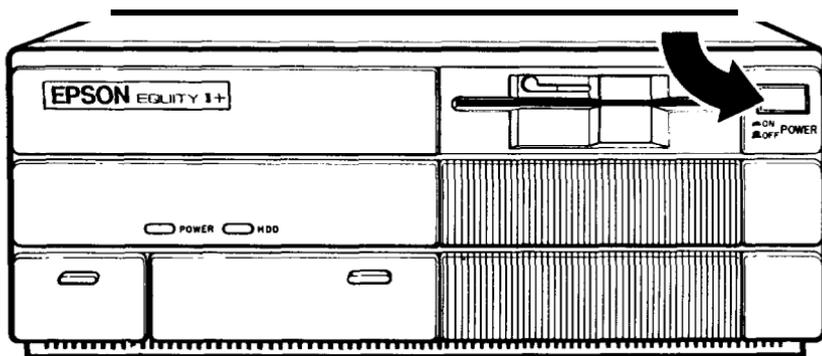


Figure 1-10. Turning on the power

If you cannot see the screen display clearly, use the controls on your 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.

Initial setup procedure

If this is the first time your Equity II+ has been used, you need to use the diagnostics programs on the reference diskette to perform an initial setup. This is a simple procedure that you must do at least once. You may need to

do it again if you change your system configuration-by adding a disk drive, for example-or to change the system date or time. See the Diagnostics section at the back of this manual for instructions.

Initial screen display

After the computer completes its self test, a message tells you how much RAM (random access memory) is available, for example:

640 KB 0K

Then the following message displays:

Non-System disk or diskerror
Replace 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 3.3. If you want to use another operating system, consult your dealer.

To load an operating system, insert the system diskette you want to use (see "Inserting and Removing Diskettes" in Chapter 2). Refer to your MS-DOS (or other operating system) manual for details on how to use the system.

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

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

If your hard disk has been properly prepared and set up to automatically boot MS-DOS, the message above does not appear. Instead, the operating system loads when you turn on the computer. The date and time prompts display and then the system prompt:

c>

This indicates the hard disk has been assigned as drive C.

Using the Equity II+

This chapter covers some basic procedures for using your Equity II+ computer and keyboard.

Inserting and Removing Diskettes

To insert a diskette into the 1.2MB floppy disk drive, hold it with the label face up and the write-protect notch to the left (so that the read/write slot is away from you). Then slide it into the disk drive as shown in Figure 2-1. When the diskette is all the way in, turn the latch down until it locks into the vertical position. This keeps the diskette in place and enables the read/write heads in the disk drive to access the diskette.

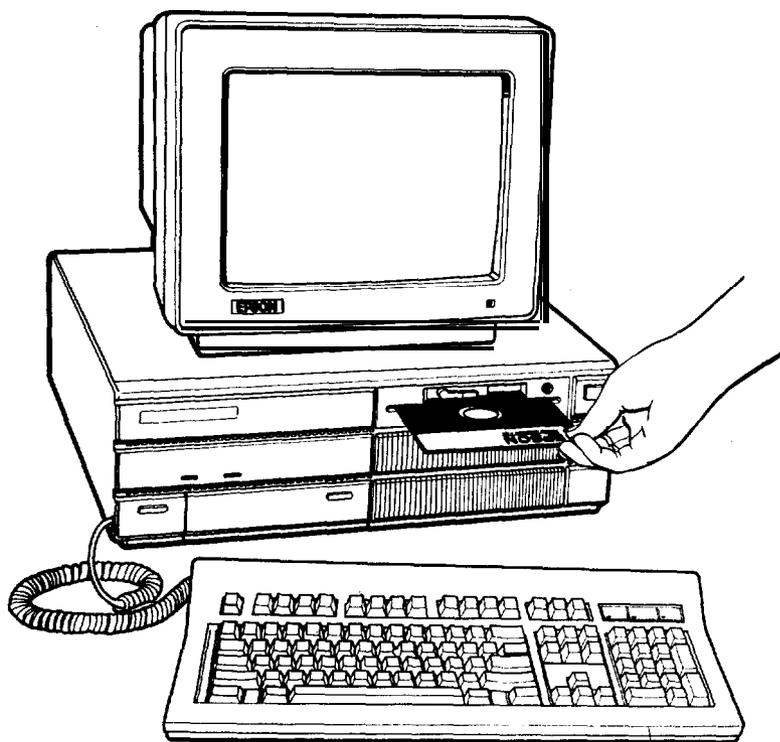


Figure 2-1. Inserting a diskette

To remove the diskette, turn the latch up until it is horizontal and 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.

If you have an optional floppy disk drive with a disk drive button, insert the diskette the same way as for a 1.2MB drive (with the label facing up). When it is all the way in, press the disk drive button to lock it in place. To remove the diskette, press the button to release it and pull it out of the drive.

WARNING: Never remove a diskette or turn off the computer while the drive indicator light is on. You could lose data. Also, be sure to remove all diskettes before you turn off the computer.

Special Keys on the Equity II+ Keyboard

Certain keys on your keyboard serve special functions when your computer is running application programs. Figure 2-2 shows the standard Equity II+ keyboard, and Table 2-1 describes the special keys.

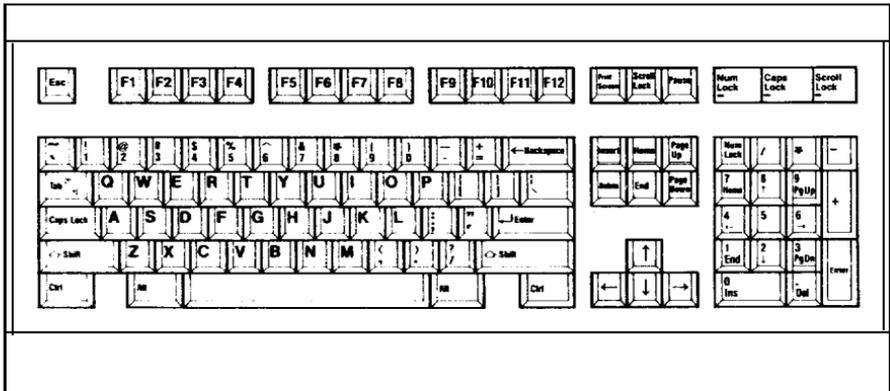


Figure 2-2. Standard keyboard

Table 2-1. Special keys

Key	Purpose
Tab ← →	Moves the cursor to the right in normal mode and to the left in shift mode.
Caps Lock	Changes the letter keys from lower- to uppercase; changes back to lowercase when pressed again.
Shift	Produces uppercase characters or symbols when used with the main character keys. Produces lowercase characters when Caps Lock is on.
Ctrl	Works with other keys to perform special (control) functions, such as editing operations in MS-DOS and GW-BASIC.
Alt	Works with other keys to enter alternate character codes.
← Backspace	Moves the cursor back one space, deleting the character to the left.
↵ Enter	Ends a line of keyboard input or executes a command.
Insert (Ins)	Turns insert function on and off.
Delete (Del)	Deletes characters to the right.
Home, End Page Up (Pg Up) Page Down (Pg Dn) ↑ ← ↓ →	Within application programs, control cursor location.
Num Lock	Changes the function of the numeric/cursor keys from numeric to cursor positioning; changes back when pressed again.
Esc	Cancels the current command line or operation.
F1 - F12	Perform special functions within application programs.
Print Screen	Prints the screen display on a line printer.
Sys Rq	Generates the System Request function.
Scroll Lock	In some applications, controls scrolling.
Pause	Suspends current operation.
Break	Terminates current operation.

The **Num Lock**, **Caps Lock**, and **Scroll Lock** keys work as toggles when you press them. When the function is enabled, the corresponding light on the upper-right corner of the keyboard is on; when the function is disabled, the light is off.

Selecting Execution Speed

The Equity II+ can operate at two different execution speeds: 8 MHz or 12 MHz. At the faster speed, the computer performs all tasks more rapidly. You can select the slower speed to run application programs that have specific timing requirements.

To change the speed, move the CPU SPEED switch on the front panel. See Figure 2-3.

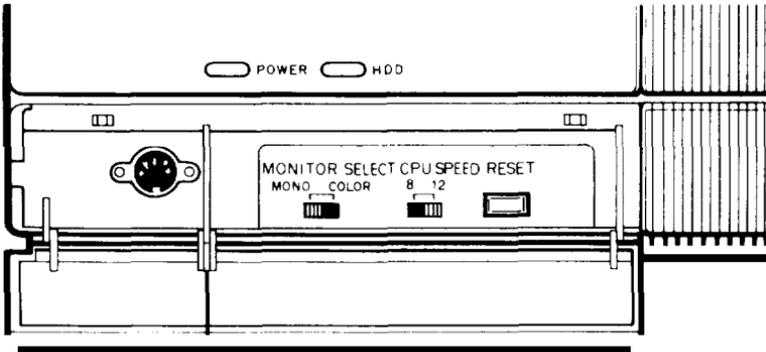


Figure 2-3. CPU speed switch

When the computer is running at 8 MHz, the power light is orange, and at 12 MHz, the light is green.

Resetting the Computer

You can reset the computer to load a different operating system or to 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. (MS-DOS must either be on the diskette or be autobootable from the hard disk.) If this does not correct the problem, try the second method.
2. Press the RESET button on the front panel. 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. Turn off the monitor and any peripheral devices and then turn off the Equity II+ using the power switch on the front panel of the main unit. Wait five seconds and then switch the power back on.

Turning Off the Computer

Before you turn off your computer, save your data, exit the program you are using, and then remove all diskettes from the disk drives. Turn off your monitor and peripherals first, then turn off the main unit using the switch on the front panel.

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. All Equity II+ systems have at least one floppy disk drive; you may also have a hard disk drive and/or a second floppy disk drive in your system. This chapter explains how disks work and tells you how to:

- Choose floppy disks
- 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 the 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 Diskette Drives for the Equity II+

Your computer has one or more of the following types of drives:

- 360KB drive-Uses 5¼-inch, double-sided, doubledensity, 360KB diskettes. (You can also use single-sided, 160KB or 180KB diskettes.) These diskettes contain 40 tracks per side, 8 or 9 sectors per track, and hold up to 360KB of information. (With 8 sectors per track, a diskette holds 320KB.) KB stands for kilobyte; each kilobyte equals 1024 bytes.
- 1.2MB drive-Uses 5¼-inch, double-sided, high-density, 1.2MB diskettes. These diskettes contain 80 tracks per side, 15 sectors per track, and hold up to 1.2MB of information. MB stands for megabyte; each megabyte equals 1,048,576 bytes.
- 720KB drive-Uses 3½-inch, double-sided, double-density, 720KB diskettes. These diskettes contain 80 tracks per side, 9 sectors per track, and hold up to 720KB of information.
- 1.44MB drive-Uses 3 ½-inch, double-sided, high-density, 1.44MB diskettes. These diskettes contain 80 tracks per side, 18 sectors per track, and hold up to 1.44MB of information.

If your computer has more than one of these drive types, you need to be aware of certain incompatibilities between the drives and the diskettes they use. These incompatibilities also apply to the same type of diskette drives on other compatible computers.

Drive and diskette incompatibilities

Because of the difference in size, you cannot use 3½-inch diskettes in a 5¼-inch drive or vice versa. Additionally, there are certain limitations on using diskettes that are the same size as the drive but have different capacities. Tables 3-1 and 3-2 summarize the possibilities and limitations.

Table 3-1. 5¼-inch drive/diskette compatibility

Drive type	Diskette types it can read from and write to
360KB	160KB, 180KB, 320KB, or 360KB
1.2MB	160KB, 180KB, 320KB, or 360KB, and 1.2MB

WARNING: If you write to a 360KB (or 160KB, 180KB, or 320KB) diskette while it is in a 1.2MB drive, you may not be able to read it or write to it in a 360KB drive later.

Table 3-2. 3½-inch drive/diskette compatibility

Drive type	Diskette types it can read from and write to
720KB	720KB
1.44MB	720KB, 1.44MB

If you have any combination of the above drives (360KB, 1.2MB, 720KB, and 1.44MB), you can copy files from one drive to another (using the COPY command) as long as the correct diskette type is in each drive. You can also copy files between a hard disk and any type of diskette. You cannot use the DISKCOPY command to copy from one drive to another if the two drives are not the same type.

If you have two drives of different types and want to copy from one diskette to another of the same type, you need to use MS-DOS to change your system's drive configuration. You do this by inserting the MS-DOS command DRIVER.SYS in a configuration file. See your MS-DOS manual for instructions.

You can 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 your 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:

- Keep disks away from dust and dirt. Small particles of dust or dirt scratch the magnetic surface and can destroy data. Dust can also ruin the read/write heads in a disk drive.
- 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 loudspeakers.
- Keep disks in a moderate environment. They work best at room-temperature and in normal humidity. Never leave diskettes sitting in the sun, or in extreme cold or heat. The temperature in a car in the middle of summer or winter can cause severe damage.

- Never touch a diskette's magnetic surface. The oils on your fingertips can damage it. Always hold a diskette by its protective jacket. On a 3½-inch diskette, do not expose the diskette's surface by sliding the metal plate.
- 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 the drive if damaged.
- Never wipe, brush, or try to clean diskettes in any way.
- Be careful when you label 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.
- Do not remove a diskette or turn off the computer while the drive light is on. This light indicates that the computer is copying data to or from a disk. If you interrupt this process, you can destroy data.
- Remove all diskettes before you turn off the computer.

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

- Never turn off the power to the computer when the hard disk drive light is on. This light indicates that the computer is currently 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 diagnostics program on your reference diskette called Prepare Hard Disk for Moving to move the read/write heads away from the recording area. See the Diagnostics section of this manual for instructions.

Protecting your Data

There are two ways to avoid losing data you store on disk: you can make backup copies and you can write-protect your diskettes.

You need to format new diskettes before you can use them with an operating system. Formatting erases all the data 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. Refer to your MS-DOS (or other operating system) manual for instructions on how to format diskettes.

Making backup copies

It is a good idea to make copies of all your data and system diskettes. Copy all diskettes that contain programs, such as the master system diskettes that come with the Equity II+, and use only the copies. Store your original system 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.

Your MS-DOS manual describes how to make a backup copy of your MS-DOS startup and operating diskettes. To make backups of other MS-DOS diskettes, use the DISKCOPY command or the DU (Disk Utility) program.

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 as well. For more information on backing up a hard disk, see "Using a Hard Disk" in this chapter and your MS-DOS manual.

Write-protecting diskettes

You can write-protect a diskette to prevent its data from being altered. When a diskette is write-protected, you can copy data from it, but you cannot store new data on the diskette or delete any files it contains. If you try to change data stored on a write-protected diskette, an error message displays.

To write-protect a 5¼-inch diskette, cover the small, rectangular notch shown in Figure 3-1 with an adhesive write-protect tab. Write-protect tabs usually come with new 5¼-inch diskettes when you buy them. To write to a 5¼-inch diskette, remove the write-protect tab.

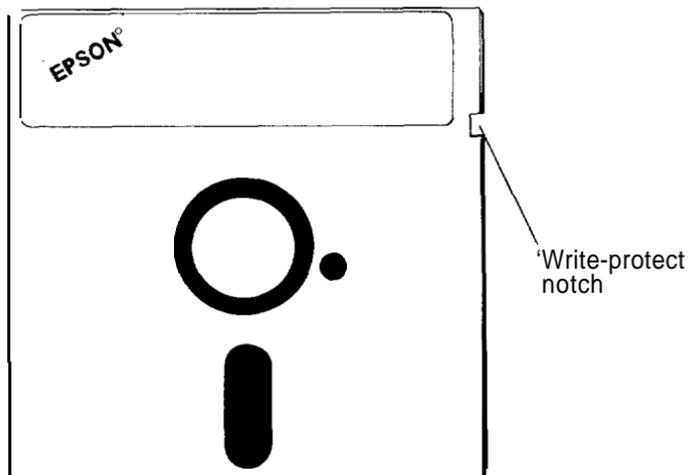


Figure 3-1. Write-protect notch

On a 3 1/2-inch diskette, the write-protect device is a small switch on the lower-right corner on the back, shown in Figure 3-2. To write-protect this diskette, slide the switch down toward the edge of the diskette so there is a hole where the switch used to be. To write to a 3 1/2-inch diskette, move the switch up toward the center of the diskette so the hole is covered.

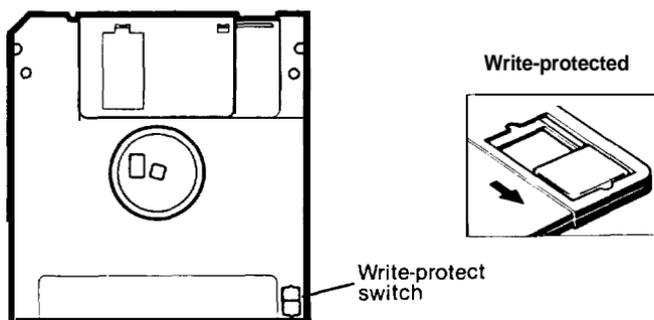


Figure 3-2. Write-protect switch

Using Two Diskette Drives

Operating systems usually expect the computer to have at least two physical disk drives. Normally, MS-DOS recognizes drives A and B for two diskette drives, and C for the hard disk drive.

A typical way to use a two-drive system is to load MS-DOS from drive A, run your application software from the same drive, and use drive B to store your data files.

Note: You can load MS-DOS from an application software diskette if that diskette contains the operating system files including COMMAND.COM.

Using a Single Diskette Drive

If your system has only one diskette drive, MS-DOS treats the single drive as two logical drives. This helps you perform operations that normally require two diskette 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.

Because 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 in your right. You can also write-protect your source diskette. For more information on using one floppy disk drive with MS-DOS, see your MS-DOS manual.

Using a Hard Disk Drive

The optional hard disk for the Equity II+ has a capacity of 40 megabytes-about 40 million characters. This is equivalent to approximately 110 double-density 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 of your work on the hard disk and copy your files to floppy disks as needed (to make backups, for example).

While the hard disk is very reliable, it is essential to back up all your hard disk files on floppy disks in case you lose some data accidentally. Use the MS-DOS BACKUP program to back up your hard disk files.

Although it has a lot of storage space, keep only files you use regularly on the hard disk, to ensure you always have plenty of space available. Store your other files on floppy disks.

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

- Use the Setup program on your reference diskette to prepare your system for using a hard disk, and then use the Format Hard Disk program to format the hard disk.
- Partition the hard disk to run the MS-DOS operating system using the MS-DOS program FDISK.
- Format the MS-DOS partition with the MS-DOS program SELECT.
- Copy the MS-DOS utility programs to the hard disk using SELECT

For instructions on running the diagnostics program, see the Diagnostics section of this manual. For instructions on how to use the MS-DOS programs, refer to your MS-DOS manual.

Note: 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.

Installing Option Cards

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

The Equity II+ has six option card slots, so it can hold up to six cards. The parallel and serial interface and floppy disk controller card occupies one slot. If your Equity II+ has a hard disk, a hard disk controller card occupies another slot. The video card that controls your monitor occupies the fifth slot.

You can buy option cards from Epson as well as other vendors. Multi-function cards, which allow you to add features without using multiple option card slots, are also available. Consult your dealer for more information.

This chapter describes how to remove and replace the main unit's cover, and install and remove an option card.

Removing the Cover

To install an option card, you need to remove the cover from your 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, lift it off and set it to one side. Turn the main unit around so the back panel faces you.
2. As shown in Figure 4-1, the top cover is secured by five screws on the back panel and four screws on the side panels (two on each side). Remove the screws and put them all safely to one side. They are small so be careful when you take them out.

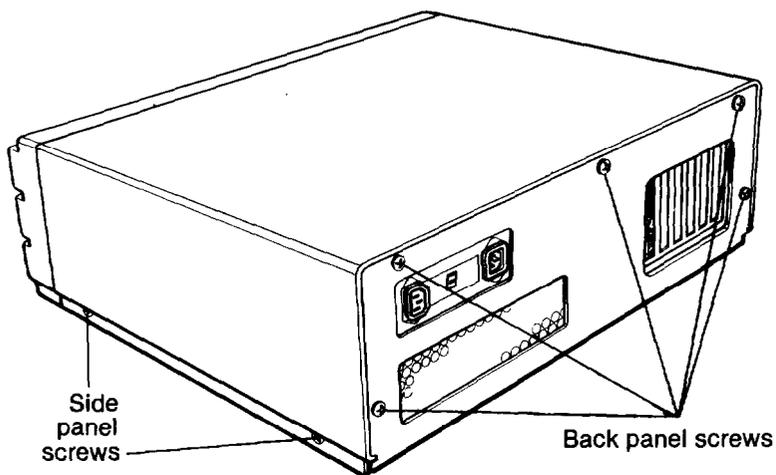


Figure 4-1. Back and side *panel screws*

3. Turn the main unit around so the front panel faces you. Hold on to the two sides of the cover and carefully pull it straight toward you, away from the back of the computer, as shown in Figure 4-2. The cover fits tightly, so if you have trouble moving it at first, keep pulling it firmly.

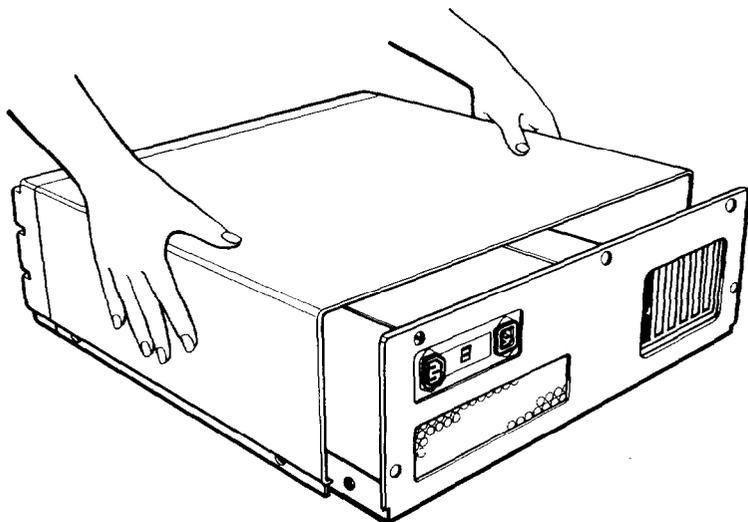


Figure 4-2. *Sliding back the cover*

4. You can separate the sides of the cover from the bottom ledge of the computer by pulling them outward slightly, as shown in Figure 4-3.

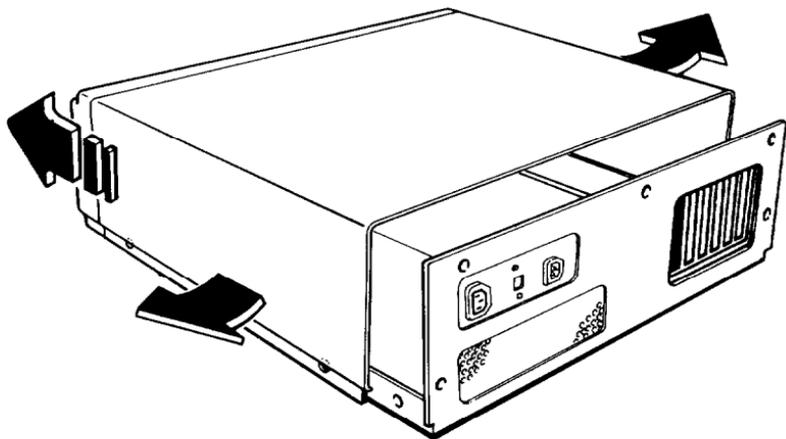


Figure 4-3. Remodeling the cover

5. When the back edge of the cover is a few inches away from the back panel, you can lift the cover off. Set the cover aside.

Installing an Option Card

Figure 4-4 shows the six option slots in the Equity II+. Slot 6 contains the parallel and serial interface and floppy disk controller card. Be sure to install the video card in slot 5.

Slots 1,5, and 6 are designed for 8-bit option cards and the other three-slots 2 through 4—are designed for 16-bit option cards. Figure 4-5 shows both types of cards. As you can see, the 16-bit card has a second connector.

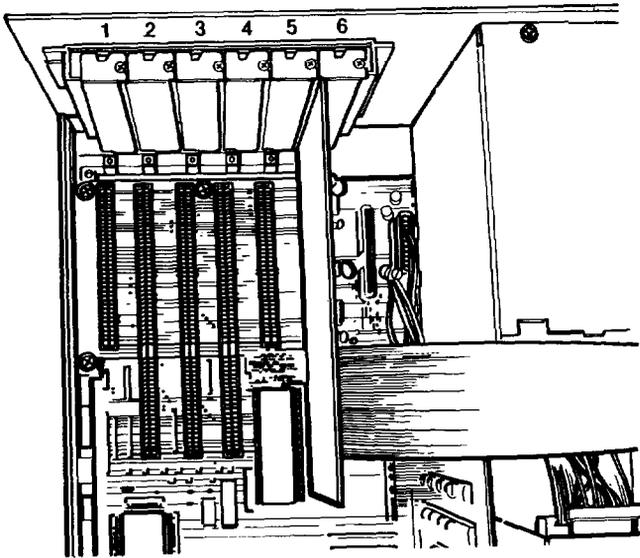
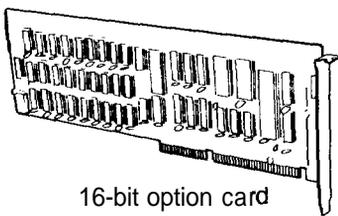
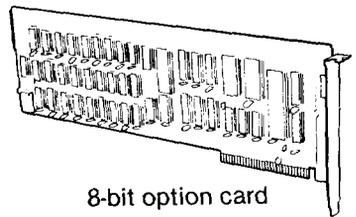


Figure 4-4. Option slots



16-bit option card



8-bit option card

Figure 4-5. 16-bit and 8-bit option cards

Except for the video card, it does not matter which slot an option card occupies, as long as the card fits in the slot. For example, you can place some 8-bit cards in a 16-bit slot. But if an 8-bit card has an additional skirt along the bottom (which looks like an extra long connector), it must go in an 8-bit slot.

The video card must be installed in slot 5. See Figure 4-4 to see how the slots are numbered. Also, some other cards must be installed in a specific slot. If you have such a card, the instructions that come with it specify which slot you need to use.

Option cards fit in the slots only one way, but be sure to examine the card first and follow the instructions closely.

1. Decide which option slot you want to use. If the card has an external connector (such as a monitor card), you need to remove the option slot cover at the back of that slot. See Figure 4-6. Remove the retaining screw from the top of the metal option slot cover and keep it to secure the option card to the computer. Lift out the slot cover and keep it in a safe place in case you remove the option card later.

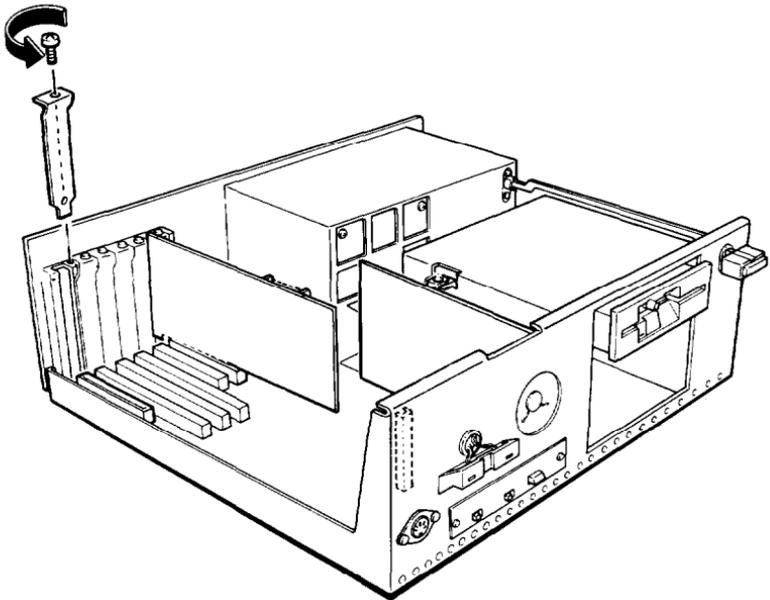


Figure 4-6. Removing an option slot cover

2. Unpack the option card and adjust any switches or jumper connections on it if necessary. (For example, a memory expansion card usually contains DIP switches that you need to set. See the option card instructions.)

Note: If the option card you are installing requires you to change any of the jumper connections on the Equity II+ main circuit board, memory card, or multi-function card, see Appendix A, "Jumper Settings."

When you handle the card, be careful not to touch any of the contacts on the circuit board, especially the gold-edged connections. If you need to set it down before you install it, place it on top of its original packing material with the component side facing down.

Keep the card's packing materials in case you remove the card later.

3. Grip the card firmly by the top corners and position it at the top of the slot. Make sure the contact pins point down and the components face the inside of the main unit.
4. Insert the card in the slot as shown in Figure 4-7. When the card is almost all the way in, make sure the tab at the bottom of the metal adapter plate on the end of the card goes into the corresponding notch at the back of the computer.

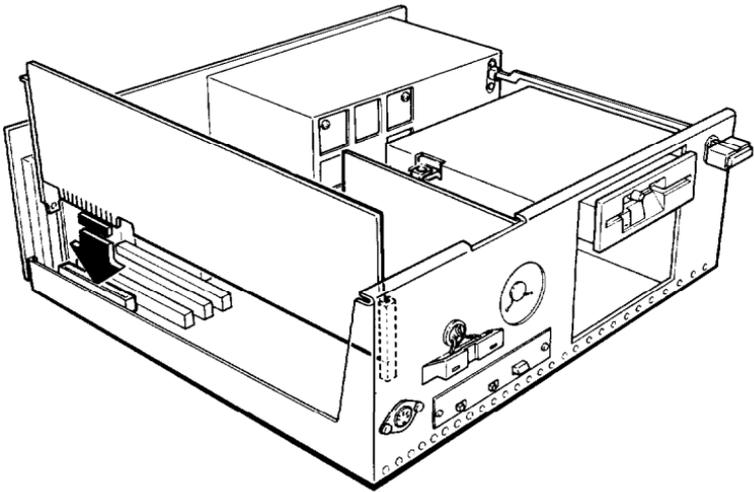


Figure 4-7. Inserting an option card

5. Once the connector pins are sitting in the connector slot, push the card downward firmly (but carefully) to fully insert it. If the card does not go in smoothly, do not force it-pull it all the way out and try again, keeping it straight.
6. Secure the adapter plate on the end of the card to the back of the computer with the retaining screw.

Removing an Option Card

To remove an option card, follow the same basic procedure you used to install it. Remove the screw holding the adapter 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. Cover the end of the empty option slot with the original metal cover and retaining screw. If you modified anything in the post-installation setup (see below), be sure to change it back.

Replacing the Cover

After you install (or remove) an option card, follow these steps to replace the main unit's cover:

1. With the front of the computer facing you, position the cover on the computer.
2. Pull the sides outward slightly and lower the cover over the computer. Guide the curved edge on the bottom of the cover along the bottom of the computer.
3. Slide the cover straight back until the front panel is flush with the diskette drive. Make sure the power switch fits properly through the opening on the front panel.
4. To secure the cover, replace the screws on the back and side panels.
5. Return the main unit to its original position and place the monitor on top, if that is where you keep it. Then reconnect the main unit to the monitor, the keyboard, and any other peripherals you have.
6. Check to be sure the power switch on the main unit is off. Then reconnect the power cable to the back of the main unit and to an electrical outlet.

Post-installation Setup

After you install an option card (and replace the main unit's cover and reconnect the power cord and peripherals), you may need to run the Setup program on the reference diskette to update the configuration information. For example, if you add a hard disk, you need to tell the computer that it has the additional drive. See the Diagnostics section of this manual for instructions.

You may also need to add some commands in the configuration file on your system disk. See your MS-DOS manual for instructions.

When you finish installing an option and reconfiguring the system, you should test the option if possible. Some options come with their own test programs, and you can test others using the diagnostics programs on the reference diskette that came with the Equity II+. These include:

- Expansion memory
- 80287 numeric coprocessor
- Serial and parallel ports
- Monitors and display adapters
- Disk drives.

See the Diagnostics section of this manual for instructions.

Troubleshooting

You should not encounter any serious difficulties as you set up and use your 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 five 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 find a solution:

1. Check to see if the power light on the front panel is on. If it is not, remove any diskettes and then turn off the power. Wait five seconds, then turn the power back on.
2. If the power light still does not come on, turn off the power switch. Check to see that the power cable is securely connected to both the AC inlet on the back panel and the electrical outlet. Then turn the power back on.
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 to see that the power indicator on the video monitor is on. If it is not, turn off the monitor's power, wait five seconds, then turn the power back on. Wait to see if the display screen image appears.

2. Use the controls on the monitor to turn up the brightness and contrast.
3. Remove any diskettes, 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 both power switches back on.
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.

The Computer Does Not Respond

If the computer does not respond to something you enter from 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 have a lot of calculations to perform 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 repeat the operation that caused the problem using the copy. (If you have trouble copying the entire diskette, some of the sectors may be bad. Try to copy single files with the COPY command.) 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. 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 (5¼-inch) or the write-protect switch may be set (on a 3½-inch diskette). Before you remove the tab or move the switch, 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 describes how to display a directory.) Although you should normally write-protect all program diskettes, some programs store temporary files on the diskette. These programs do not work if you write-protect the diskette.

Hard Disk Problems

If you have problems with your hard disk when you first start to use it, check to see if it has been 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 possible problems and solutions:

1. The software program does not start. Check that you are following the correct procedure for your operating system. Be 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 the computer to run at 8 MHz. Try changing the CPU speed with the switch on the front panel. See "Selecting Execution Speed" in Chapter 2.

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 is properly connected to the computer. The printer manual tells you how to connect your printer.

If you have printing problems, check the printer manual for the printer's DIP switch settings. The DIP switches on a printer help it communicate properly with the computer.

Be sure your software is set up for your printer.

Option Card Problems

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

1. Is the option card installed correctly?
2. Did you follow the setup and operation procedures in the option card instructions?
3. Did you set any necessary DIP switches or jumpers on the option card? See your option card instructions.
4. Did you change any necessary jumper settings in the main unit? See Appendix A, "Jumper Settings."
5. If you added an external device, did you use the proper cable to connect the peripheral to the port or option card connector on the back panel?
6. Did you perform any necessary post-installation setup procedures for the operating system? Refer to the Diagnostics section in this manual, your MS-DOS manual, or other software manual for instructions.

Appendix A

Jumper Settings

This appendix describes how to set the jumpers inside the Equity II+ if you install optional devices that require different jumper settings in the main unit. It is best if your dealer installs the option and makes all the necessary adjustments when you buy it. If you decide to do it yourself, be very careful when you follow the procedures in this appendix. There are many system components that can be damaged accidentally

The Equity II+ jumpers you may need to change are on the:

- Main circuit board
- Memory card
- Multifunction card (parallel port, serial port, and floppy disk controller).

Figure A-1 shows where each of these cards is located in the computer.

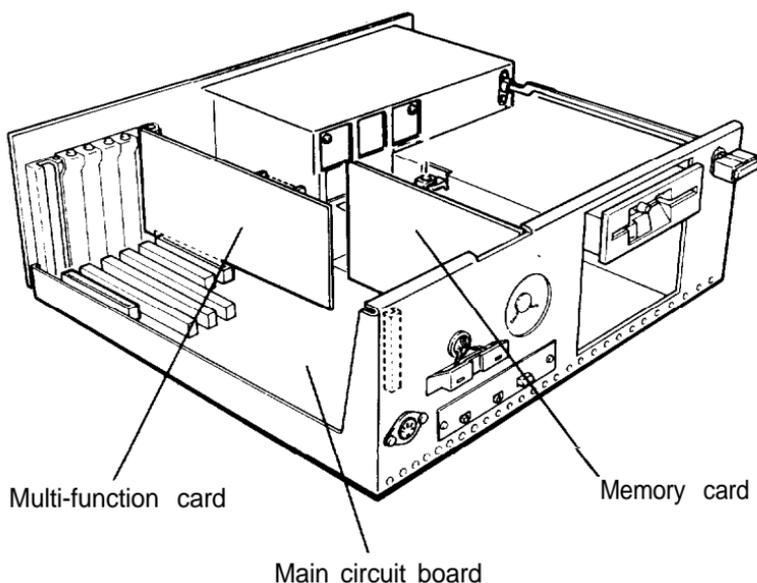


Figure A-1. Location of cards

WARNING: The jumpers on these cards are preset at the factory in default positions. Do not change any of them unless you are sure the option card you are installing requires different settings. If you have any doubts, ask your Epson dealer.

The procedure for changing a jumper setting is given first, then the jumper functions and locations for each card are described separately. All the instructions assume you have already removed the cover from the main unit. For instructions on removing the cover, replacing the cover, and installing and removing option cards, see Chapter 4.

Changing a Jumper Setting

A jumper's setting is determined by where the jumper is placed: either between pin A and the middle pin (position A) or between pin B and the middle pin (position B). Figure A-2 shows both positions.

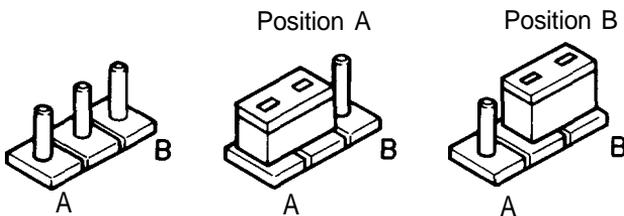


Figure A-2. Jumper positions

To move a jumper from one position to the other, use needle-nose pliers or tweezers to lift it off the board and gently move it to the other position. Be careful not to lose the jumper or leave it out of the computer.

Memory Card Jumpers

The jumpers on the memory card control the following functions:

- Amount of RAM (main memory). If you install a memory card that needs to use part of the main memory, you may need to change the jumper settings to disable some of the main memory on the memory card. Be sure to check your memory card instructions to see if this is necessary

- EPROM size. You can change the EPROM size jumper if you install a different size of EPROM.

In all cases, make sure you need to alter the jumper settings for the option you are installing before you change anything.

Table A-1 shows the functions for the jumpers on the memory card.

Table A-1. Memory card jumper settings

Jumper number			Function
1	2	3	
A	A		640KB *
B	A		512KB (disable upper 128KB)
B	B		256KB (disable upper 384KB)
		A	Select EPROM size 27128*
		B	Select EPROM size 27256

- Default setting

To access the memory card jumpers, you need to remove the card from the main unit first:

1. Remove the retaining screw from the bracket on the memory card, as shown in Figure A-3.

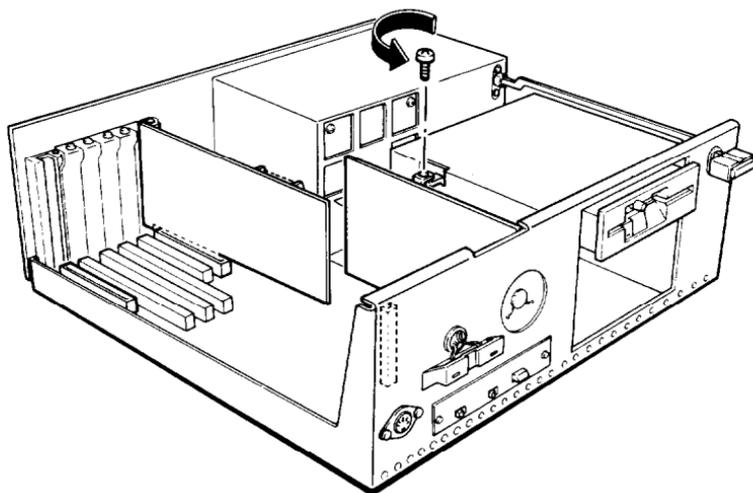


Figure A-3. Removing memory card retaining screw

- Lift the card gently out of the computer, taking care not to catch it on any cables inside the computer. Set it on a soft surface, such as a towel, with the component side facing up.

Figure A-4 shows the locations of the three jumpers. Refer to Table A-1 above to set them as needed.

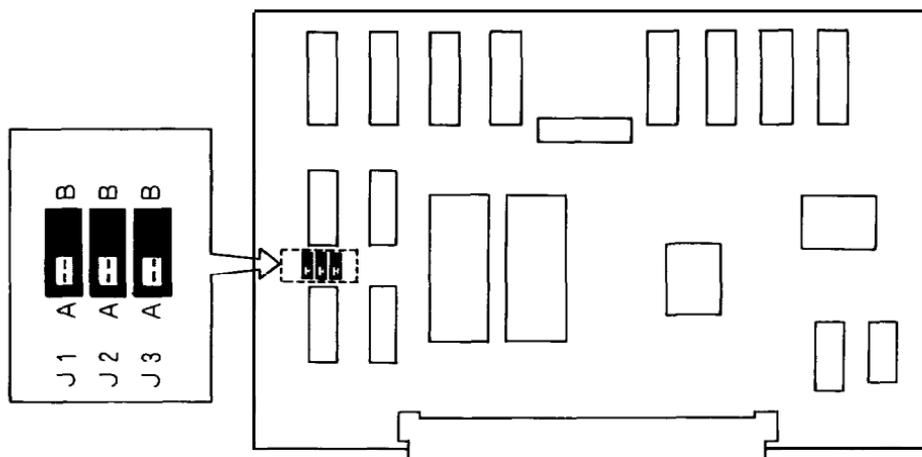


Figure A-4. Memory card jumpers

When you finish setting the jumpers, replace the memory card in the computer and secure it with the retaining screw.

Main Circuit Board Jumpers

The jumpers on the main circuit board control the following functions:

- Number of wait states for EPROM. If necessary, you can change the number of wait states (1 or 2) used by the EPROM. Selectable wait states are available only when your computer is running at 12MHz. Please consult your dealer for assistance.
- Number of wait states for 16-bit device access. If necessary, you can change the number of wait states (1, 2, 3, or 4) required by the 16-bit optional devices. Selectable wait states are available only when your computer is running at 12MHz. Please consult your dealer for assistance.

- Math coprocessor clock speed. If you or your dealer installs an 80287 math coprocessor, you may need to set the jumpers for a different clock speed. The jumpers determine the speed of the coprocessor.

As it is easy to damage a math coprocessor, you should have your dealer install it for you. In addition to checking the jumper settings, you or the dealer should also use the diagnostics' Setup program to change the settings in the CMOS RAM, and use the System Diagnostics program to test the coprocessor.

Table A-2 shows the functions for the jumpers on the main circuit board.

Table A-2. **Main** circuit board jumper settings

Jumper number					Function
1	2	3	4	5	
A					1 wait state for EPROM access .
B					2 wait states for EPROM access
	A	A			1 wait state for 16-bit option card *
	B	A			2 wait states for 16-bit option card
	A	B			3 wait states for 16-bit option card
	B	B			4 wait states for 16-bit option card .
			A	A	Set coprocessor clock at 8 MHz *
			B	B	Set coprocessor at 1/3 of CPU speed

* Default setting

To access the main circuit board jumpers, you must remove the memory card from the computer, as described above. Do not try to access the jumpers while this card is still in the computer.

Figure A-5 shows the locations of jumpers J1-J5 on the main circuit board. Refer to Table A-2 above to set them as needed.

When you finish changing the jumpers, carefully replace the memory card in its slot and secure it with the retaining screw.

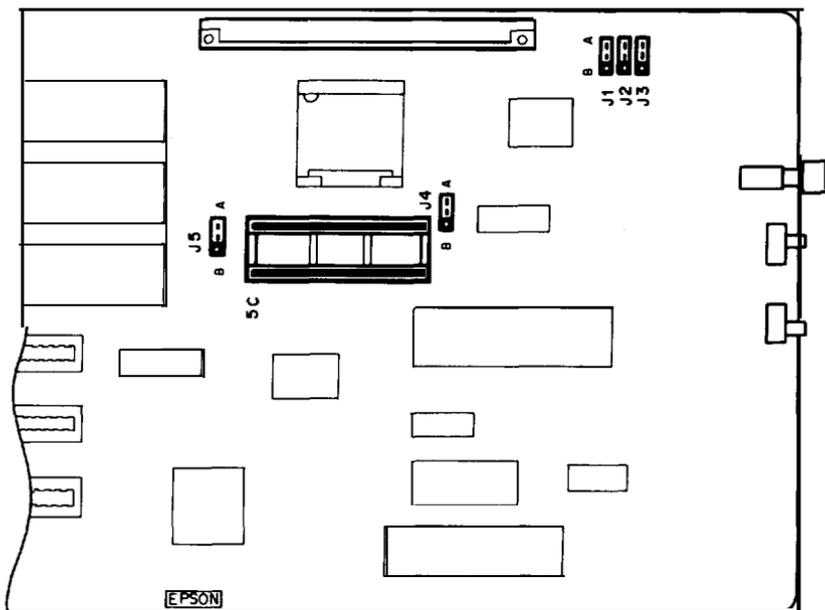


Figure A-5. Main circuit board jumpers

Multi-function Card Jumpers

The jumpers on the multi-function card control the parallel port address and the serial port address. You normally address the parallel and serial ports in the computer as the primary ports (LPT1 and COM1). However, if you install an additional parallel or serial port and want it to be the primary port, you need to change the jumpers on the multi-function card so the built-in port becomes secondary (JPT2 and COM2).

Table A-3 shows the jumpers on the multi-function card that control the parallel port.

Table A-3. Multi-function card jumper **settings** for parallel port

Jumper number			Function
3	4	10	
A	A	A	Enable built-in port as primary .
B	A	B	Enable built-in port as secondary
A	B	A	Enable compatibility with IBM monochrome display/printer adapter
B	B		Disable built-in port

. Default setting

Table A-4 shows the jumpers on the multi-function card that control the serial port.

Table A-4. Multi-function card jumper settings for serial port

Jumper number			Function
5	6	9	
A	A	A	Enable built-in port as primary *
A	B	B	Enable built-in port as secondary
B			Disable built-in port

- Default setting

To access the multi-function card jumpers, you need to remove the card from the computer:

1. Unplug the disk drive cable from the card as shown in Figure A-6. Pull it straight up and out, then lay it to one side.

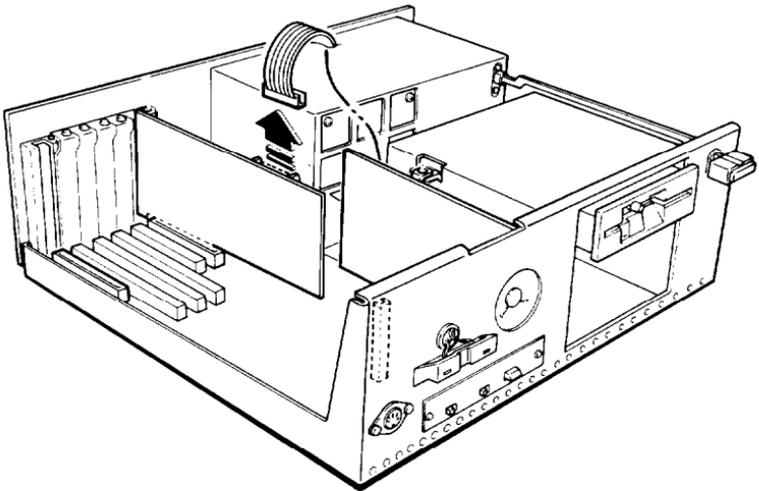


Figure A-6. Disconnecting disk drive cable
from multi-function card

2. Remove the retaining screw from the multi-function card at the back panel of the computer, as shown in Figure A-7.

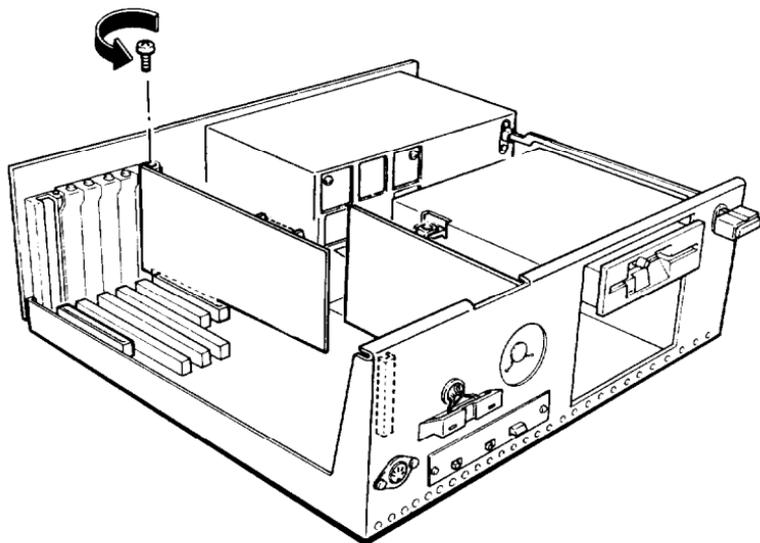


Figure A-7. Removing multi-function card retaining screw

3. Remove the card from the slot (pull it straight up) and set it on a soft surface with the components facing up.

Figure A-8 shows where the jumpers are located. Change them as needed and then reverse the three steps above to reinstall it.

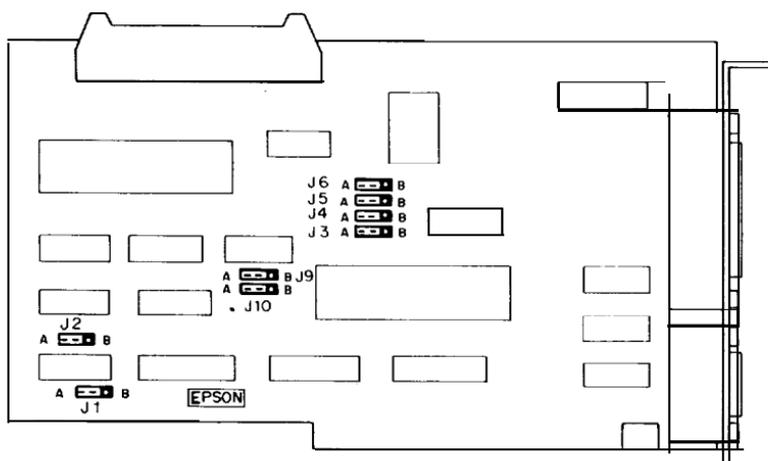


Figure A-8. Multi-function card jumpers

Appendix B

Equity II+ Specifications

CPU and Memory

16-bit CPU	80286 microprocessor; 8 or 12 MHz clock-rate, switch-selectable Real address (8086-compatible) and protected virtual address (multi-tasking or multi-user) modes 24-bit address and 16-bit data bus
Main memory	640KB RAM on memory card; expandable to 15.5MB maximum with expansion cards
ROM	32KB, expandable to 64KB, selectable alternate ROM for custom use
Math coprocessor	80287 (8 MHz) support (optional)

Controllers

Floppy disk	Supports up to two drives available in any of four formats: double-density (360KB), double-density (720KB), high-density (1.2MB), or high-density (1.44MB); controller on multifunction card
Hard disk	Supports up to two drives available in multiple formats (including 10MB, 20MB, 30MB, and 40MB); installs in option slot

Interfaces

Serial	RS-232C, programmable, asynchronous, DB-9P male connector
Printer	Standard 8-bit parallel, DB-25S female connector

Interfaces (continued)

Option slots	Six IBM-compatible input/output expansion slots: one occupied by parallel and serial interface and floppy disk controller card; five slots available for options in base configuration: three with 16-bit bus and two with 8-bit bus
Speaker	Internal, programmable
Clock/calendar/ RAM	Real-time clock, calendar, and 64-byte CMOS RAM for configuration; battery backup

Power Supply

Switching type, fan-cooled, 115/230 VAC, 140 W (peak); + 5 VDC, + 12 VDC, - 5 VDC, -12 VDC; **50/60** Hz

Mass Storage

	Three drives maximum, configurable using three half-height slots (horizontal mounts)
Standard	5¼-inch, half-height floppy disk drive; double-sided, high-density, 1.2MB storage capacity
Optional	5¼-inch, half-height floppy disk drive; double-sided, high-density, 1.2MB storage capacity
Optional	5¼-inch, half-height floppy disk drive; double-sided, double-density, 360KB storage capacity
Optional	3½-inch, half-height floppy disk drive; double-sided, high-density, 1.44MB storage capacity
Optional	3½-inch, half-height floppy disk drive; double-sided, double-density, 720KB storage capacity

Optional 3½-inch or 5¼-inch, half-height or full-height internal hard disk drive.

Keyboard

Detachable, three positions, 101 sculpted keys

Layout 58-key QWERTY main keyboard; 17-key numeric/cursor pad; 10 cursor keys; 12 function keys (user-definable)

Function keys Three levels (normal/shift/alternate), user-definable

Environmental Requirements

Temperature Operating range: 41° to 90°F
(5° to 35°C)

Storage range: -4° to 140°F
(-20° to 60°C)

Humidity Operating range: 20% to 80%,
non-condensing

Storage range: 10% to 90%,
non-condensing

Physical Characteristics (CPU Only)

Width, inches (mm) 15.7 (400)

Depth, inches (mm) 16.3 (414)

Height, inches (mm) 6.1 (155)

Weight, pounds (kg) 19.8 (9) Single floppy disk drive
25.08 (11.4) Single floppy disk drive and
one 40MB hard disk

Power Requirements

115/230 VAC ± 20%, 50/60 Hz, 5 amps;
140 W output capacity (peak)

Options

Monochrome video card	Supports Epson- or IBM-compatible monochrome monitor; 80-character x 25-line display; 9 x 14 character block; installs in option slot
TTL green or amber monochrome monitor (12-inch diagonal)	High-persistence, P-39 phosphor screen; etched surface to reduce glare; 22 MHz video bandwidth; 35 W
Color/graphics video card	Supports Epson- or IBM-compatible RGB color or composite video monitor; 40-character x 25-line display (low-resolution text); 80-character x 25-line display (high-resolution text); 640 x 200 (high-resolution graphics), 320 x 200 four colors, 160 x 200 eight colors; installs in option slot
RGB color monitor (13-inch diagonal)	High-contrast screen; 16 colors; etched surface to reduce glare; 18 MHz video bandwidth
Multiple graphics video card	Supports Epson- and IBM-compatible monochrome or color monitor; monochrome text, color graphics, and Hercules™ (monochrome) graphics, switch-selectable; installs in option slot
Enhanced graphics video card	Supports Epson- and IBM-compatible monochrome, color, or enhanced color monitor; monochrome text (80-character x 25-line display), Hercules text (80-character x 43-line display); color graphics, 640 x 200 pixels B/W; monochrome graphics, 640 x 350; color/graphics, 640 x 350, 16 colors; installs in option slot
Enhanced graphics monitor (13-inch diagonal)	Enhanced color monitor; 80-character x 25-line display (high-resolution text); 640 x 350 high resolution; 640 x 200 resolution compatibility; 16 colors

Appendix C

Glossary

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. Files transmitted in ASCII code can be used by many different computers, printers, and programs.

Asynchronous

A method of data transmission in which one machine sends data one character at a time to another, 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 your computer to perform a specific function.

Configuration

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

Control code

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

CPU

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

Cursor

The highlighted marker that 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.

Diagnostics

The tests and procedures the computer performs to check its internal circuitry and set up its configuration.

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 that 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, 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 standard-density format. A double-density diskette for the Equity II+ has a storage capacity of 360KB or 720KB.

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.

Graphics

Lines, angles, curves, and other nonalphanumeric data.

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.

High-density

A type of diskette format that allows you to store up to 1.2MB or 1.44MB 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 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 that 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 that 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—for example, MS-DOS.

Option card

A card you install inside the Equity II+ main unit to provide additional capabilities, such as more memory, a hard disk drive, or a mouse.

Parallel

The type of interface that transmits data in groups of bits. See Interface, Serial.

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.

PROM

Programmable Read-Only Memory. A PROM is a ROM that can be altered.

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 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 initial diagnostics procedures a system performs to check its hardware.

Serial

The type of interface that transmits data one bit at a time. See Interface, 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, resembling the grooves on a record, which 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, quad-density or 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 (5¼-inch) or setting the write-protect switch (3½-inch). When a diskette is write-protected, you cannot erase, change, or record over its contents.

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Diagnostics

This section describes the diagnostics programs you use the first time you set up your system and any time you make changes to it.

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Introduction

This special section of your manual describes how to initialize your Epson® system after it is assembled, and how to test the condition of your computer and peripherals.

To set up and test your system, you use a group of programs called diagnostics on the reference diskette. Depending on the system you purchased, these programs and some of the screen displays may vary. The five main diagnostics programs are:

Setup	Use this program when you first set up the computer, and each time you make changes to the system.
Format hard disk	Use this program to check or format the entire hard disk after installation.
Format diskette	Use this program to format a diskette for use by the System diagnostics tests. This program is provided for convenience only, so that you can format a diskette without exiting diagnostics.
System diagnostics	Use these programs whenever you add or remove optional devices, or if you suspect that the system is defective. You also run these diagnostics after moving the system from one place to another and after replacing the internal battery.
Prepare hard disk for moving	Use this program before moving the computer to another location.

The reference diskette also contains these MS-DOS commands:

EXE2BIN	Converts an executable file to a binary file.
HDCACHE	Enhances hard disk performance by storing copies of requested sectors in a cache buffer.
HDSIT	Prepares the hard disk for moving.
LINK	Combines several programs into one.

ROMBIOS	Displays the computer's ROM BIOS version number.
SYSTAT	Displays the system parameters.

These commands are easy to use. The ROMBIOS command displays the ROM BIOS version number for your computer. When you type ROMBIOS and press **Enter**, you see a message similar to this:

ROM BIOS Version 2.00

The SYSTAT command displays the system information you supply when you run the Setup program. After you run Setup, you can type SYSTAT and press **Enter** to display the system parameters.

See your MS-DOS manual for information regarding the use of EXE2BIN, HDCACHE, HDSIT, and LINK.

Starting the Diagnostics

To start the diagnostics programs, follow these steps:

1. Turn off the computer and wait for a few seconds.
2. Place the reference diskette in drive A, and close the door of the disk drive.
3. Turn on the computer.

When you turn the power on, the computer performs a self test and then automatically starts the diagnostics program.

The Power-on Self Test

Whenever you turn on or reset the computer, the system performs a built-in diagnostics program called the power-on self test. This test checks the RAM (random access memory), keyboard, system board, and peripherals before the computer begins normal operation.

If the self test finds a discrepancy between the equipment installed on the computer and the equipment list maintained by the computer, the system asks you to run the Setup program (on the reference diskette) to change the equipment list.

For a complete description of the power-on self test and any error messages it may produce, refer to Appendix C.

The OPERATION MENU

After the power-on self test completes successfully, the diagnostics programs start. Depending on the exact system you purchased, these programs and certain screen displays may vary. A typical OPERATION MENU looks like this:

OPERATION MENU

- 1 - Setup
- 2** - Format hard disk
- 3 - Format diskette
- 4 - System diagnostics
- 5 - Prepare hard disk for moving
- 0 - Exit to DOS for more utilities

Enter selection number:

To select one of the diagnostics programs, press a number from 1 to 5 and press **Enter**.

Option 3, Format diskette, is included on the OPERATION MENU for convenience only. This option lets you format diskettes for use by the System diagnostics tests without exiting from the diagnostics programs.

To use the other utility programs on the reference diskette, select 0 from the OPERATION MENU. Then start the utility from the MS-DOS prompt.

Option 0 exits the diagnostics programs in one of the following ways:

- If you have not run a diagnostics program, you see this selection on the OPERATION MENU:

0 - Exit to DOS for more utilities

In this case, when you press 0 and **Enter**, you see the MS-DOS prompt.

- If you have run a diagnostics program, you see this selection:

0 - Exit and reset

In this case, when you press 0 and **Enter**, the system is reset. Before selecting this option, remove the reference diskette from drive A and insert your startup diskette so the system can boot normally. To boot from your hard disk, be sure to remove the diskette from drive A.

This manual describes each menu item in the order it appears on the OPERATION MENU.

Diagnostics and MS-DOS Commands

Each choice on the OPERATION MENU corresponds to an MS-DOS command:

OPERATION MENU Choice	MS-DOS Command
Setup	SETUP
Format hard disk	HDFMTALL
Format diskette	FORMAT
System diagnostics	DIAGSYS
Prepare hard disk for moving	HDSIT

You can copy these MS-DOS commands, with the exception of DIAGSYS, to your hard disk or to a directory on another floppy disk. You can then execute them as individual MS-DOS commands. To copy these commands, use the COPY command described in your MS-DOS manual.

You can also execute the commands directly from the reference diskette, without loading diagnostics. For example, if you are logged onto drive C, and you want to prepare your hard disk for moving, follow these steps:

1. Insert the reference diskette into drive A.
2. In response to the C) prompt, type:

A : HDSIT

3. Press **Enter**.

To use the diagnostics program, DIAGSYS, you must always boot the system with the reference diskette in drive A. If you attempt to start this program in any other way, the tests may produce unreliable results.

Setting Up the System

This chapter describes how to use the Setup program to make changes to the list of equipment maintained by the computer. You can select Setup from the OPERATION MENU, or you can execute the MS-DOS SETUP command.

You must run Setup when you use your computer for the first time. You also need to use Setup if you change your system configuration by installing or removing optional devices, or if your system has a real-time clock and you want to alter the date or time.

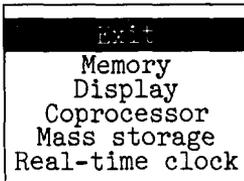
Your computer stores the information you define with Setup in CMOS RAM, which is backed up by a battery. When you turn on the computer, it searches CMOS RAM to obtain the correct installation information. If there is a difference between the information in CMOS RAM and the actual configuration, you see a prompt to run the Setup program.

Using the Setup Program

To start the Setup program from the diagnostics OPERATION MENU, press **1** and then press **Enter**.

To run the Setup program from the MS-DOS prompt, type SETUP and press **Enter**.

When you start Setup, the main menu appears:

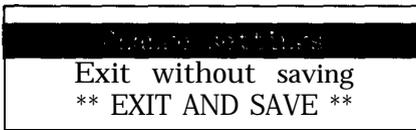


Use **↑** and **↓** to move the cursor block through the options on this menu. Once you highlight the option you want, press **Enter** to select it. Each option on the main menu (except Exit) displays an additional submenu of choices.

You can exit a submenu in one of the following ways:

- To exit the submenu without making any changes, press ↑ until the cursor block returns to the main menu, or simply press ESC. This cancels any changes you just made to the configuration.
- To set your changes, press ↓ to highlight ** SAVE SETTINGS ** and then press **Enter**. When you exit Setup, the computer writes the changes to CMOS RAM and reboots using the new settings.

When you finish using the Setup program, select the Exit option from the main menu. The program displays a list of the current settings you just made. Check the list before placing the settings in CMOS RAM. Below the list you see this menu:



If any setting is incorrect, press **Enter**. The main menu appears again, and you can correct the setting.

If you did not make any changes, or if you want to cancel the changes you made, you can return to the OPERATION MENU or the MS-DOS prompt without re-booting the computer. Press 1 to highlight the option Exit without saving and press **Enter**.

When the settings are correct, press ↓ to highlight the option ** EXIT AND SAVE ** and press **Enter**. The program writes the settings in CMOS RAM, and then resets the computer using the new configuration.

If the computer displays a Setup error message during the power-on self test, run Setup again and check all your settings.

Changing the Amount of Memory

Use the Memory option to change the amount of memory the system recognizes after you install or remove an optional memory board. The maximum amount of memory MS-DOS uses is 640KB. Certain MS-DOS applications and other operating systems may require expansion memory. You can also use expansion memory to set up RAM disks for temporary storage, using the VDISK.SYS driver. See your MS-DOS manual for information regarding VDISK.SYS.

Using a Different Type of Display

Use the Display option if you change the monitor or video card you are using with your computer. The Display setting in CMOS RAM controls the amount of memory used for storing the image on your monitor screen.

Note: Make sure that the monitor switch on the front panel or the DIP switch inside the main unit is set correctly for the type of monitor you are using. See your User's Guide for instructions.

To change the display type, follow these steps:

1. On the main menu, press **↓** to move the cursor block to Display and press **Enter**. Another menu appears to show the current setting. If you have an 80-column, color monitor installed, you see:

```
Color/graph.  80 col
** SAVE SETTINGS **
```

2. To change the monitor type, press **Enter**. This menu displays listing the various options:

```
* Special options *
Color/graph.  80 col
Color/graph.  40 col
Monochrome    80 col
```

Choose the monitor type according to the combination of monitor and video card that you are using:

- If you have a monochrome monitor, choose Monochrome 80, regardless of the type of video card to which you connect it.
- If you have an RGB color monitor, use Color/graph 80.
- If you have an enhanced color monitor and an enhanced graphics video card, select Special options. (If you are using a compatibility mode provided by the video card, you may need to set a DIP switch on the video card, which will override the display setting in CMOS RAM.)

- If you have a composite color monitor, such as a color television with a video input, try selecting Color/graph 80. If resolution is poor, run Setup again and select Color/graph 40.
 - If you have any other combination of monitor and video card, consult the documentation supplied with your video card.
3. Press ↓ or ↑ to move to the appropriate option and press **Enter**.
 4. Now save your settings, and return to the main menu.

Adding an 80287 Coprocessor

Use the Coprocessor option when you add an Intel 80287 numeric coprocessor to your system. You can run software on your computer that makes use of the 80287 coprocessor. The 80287 works together with the 80286, which is the main processor, to process mathematical computations very quickly.

When you install an 80287, use this option to notify the computer so it will use the coprocessor. If you remove the 80287, use this option to delete the coprocessor from the equipment list; this prevents software from trying to use the 80287 commands.

Follow these steps:

1. On the main menu, press ↓ to move the cursor to Coprocessor and press **Enter**. You see this menu:

```
80287 not installed
*** SAVE SETTINGS ***
```

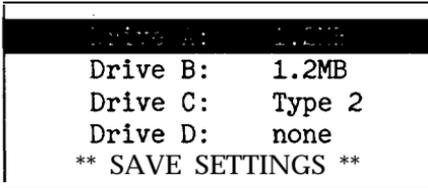
2. Press **Enter** to display the correct setting. The display changes from 80287 not installed to 80287 installed each time you press Enter.
3. Display the correct setting, save it, and return to the main menu to change other settings.

Changing Disk Drives

Use the Mass storage option if you install an additional floppy or hard disk drive, or if you remove an existing drive and replace it with another type.

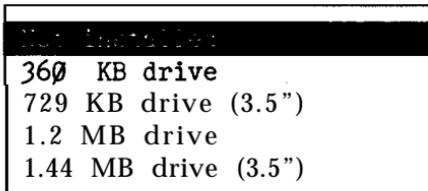
Follow these steps:

1. On the main menu, press ↓ to move the cursor to Mass storage and press **Enter**. You see a menu like this:



Press ↓ to move the cursor to the drive you want to change.

2. To change a floppy disk drive, position the cursor block to Drive A or Drive B and press **Enter**. You see this menu:



3. Press ↓ to move the cursor block to the appropriate drive type, and press **Enter** to make your selection.

To return to the menu of drives without changing the drive type, press ↑ or ESC.

4. To change a hard disk drive, consult the list of drive types in Appendix B to find the correct number for the type of drive you have installed. Then position the cursor block to Drive C or Drive D. Now press + to increase or - to decrease the number shown for the drive you have changed.
5. When the disk drive data is correct, save the settings, and return to the main menu to change other settings.

Setting the Real-time Clock

If your system has a real-time clock, it automatically keeps track of the time and date. This kind of clock is backed up by a battery so it keeps running even while the computer is turned off.

The MS-DOS TIME and DATE commands, as well as many software packages, display the time and date held in the clock, but they cannot make permanent changes to the time and date settings.

Use the Real-time clock option if you need to change the time and date permanently. For example, you may need to change the clock to accommodate seasonal adjustments, such as daylight saving time. Your computer automatically adjusts for leap years. Note that even though MS-DOS and your applications programs may use a different format, the real-time clock uses a 24-hour time format to store the time.

To set the real-time clock, follow these steps:

1. On the main menu, press ↓ to move the cursor block to Real-time clock and press **Enter**. The time and date appear like this:

19:45:55	Time
10-01-1987	Date

2. To set the time, move the cursor to Time and press **Enter**. You see:

hh:mm:ss
-

Enter the time in the exact form shown in the box, using two digits for each part; the program automatically inserts the colons (:).

When the time is correct, press **Enter**. If you enter an invalid time, the computer beeps, and the time does not change.

3. To set the date, move the cursor to Date and press **Enter**. You see:

mm-dd-yyyy -

Enter the date in the exact form shown in the box, using two digits for the month and the day; the program automatically inserts the dashes.

When the date is correct, press **Enter**. If you enter an invalid date, the computer beeps, and the date does not change.

4. When both the time and date are correct, press ↑ to return to the main menu to change other settings.

Formatting a Hard Disk

This chapter describes how you use diagnostics to check or format a hard disk drive after installation. You can also use the MS-DOS command HDFMTALL. Formatting a hard disk destroys all data on the hard disk, in all partitions, so use this program with extreme care.

When you install a hard disk drive, run the Setup program to identify the hard disk. Then, select the Format hard disk program, option 2 on the OPERATION MENU. This program offers several formatting options. In most cases, you would use option 1, Conditional format (Normal).

After formatting, you need to partition and format the hard disk for your operating system(s). You can divide your hard disk into as many as four partitions. If you are using only MS-DOS, you need only one partition. Refer to your MS-DOS manual for details on using FDISK to create a partition and using SELECT to format it for this operating system.

You may need to reformat a hard disk if you have a serious problem with the drive. However, before completely reformatting the disk, use the Non-destructive surface analysis test to decide if formatting is necessary. If errors occur during this test, backup your disk, and run the Conditional format option followed by Destructive surface analysis. These tests are described in this chapter.

Formatting and Checking Options

When you select option 2, Format hard disk, from the OPERATION MENU, you see a menu of formatting and checking options:

HARD DISK FORMAT MENU

- 1 - Conditional format (Normal)
- 2 - Unconditional format
- 3 - Destructive surface analysis
- 4 - Non-destructive surface analysis
- 0 - Exit

Enter selection number:

The first two options format a hard disk. Normally you use option 1, Conditional format (Normal). This option automatically locates any tracks that are flagged by the manufacturer and marks them so that they are never used. Option 2, Unconditional format, locates any tracks that are flagged as bad, and then allows you to edit the list of bad tracks.

The other two options test a hard disk for problems. Use option 3, Destructive surface analysis, to test the entire disk and update the bad track table. Because this option writes data to the disk as well as reads it, it destroys all data on any track that produces an error. To check for unflagged bad tracks without destroying data, use option 4, Non-destructive surface analysis.

Many hard disk drives are supplied with a list of bad tracks, but without the bad tracks flagged on the disk. Other hard disks are supplied with the bad tracks already flagged. In all cases, run Non-destructive surface analysis before formatting the disk; this routine finds all bad tracks that are not flagged.

If the analysis shows that all the tracks listed as bad are already flagged, you can then use the Conditional format (Normal) option to format the disk. If the analysis matches the list of bad tracks, but they are not flagged, run the Destructive surface analysis (to flag the tracks) before formatting the disk. If the list provided by the drive manufacturer contains bad tracks that the analysis does not detect, you can use the Unconditional format option to flag those tracks manually.

When you select an option from the HARD DISK FORMAT MENU, the program determines the number of hard disk drives installed in your computer. If you have more than one drive, then each time you select a test you see this prompt:

Enter drive letter (C/D)?

Press C or **D**, and then press **Enter**.

If you have only one hard disk drive, the option you select starts immediately.

Conditional Format (Normal)

Use this option to format the hard disk. All flagged tracks are marked so that they are never used.

To start the Conditional format, press 1 and then **Enter**.

The program starts to scan the disk to find all tracks flagged as bad, starting from the innermost cylinder of the disk. During the scan, you see the number of the cylinder the program is currently checking. For example, if you have a hard disk, the first messages you see are:

```
Format Hard Disk
Scanning for flagged bad tracks...
Current cylinder is nnn
```

When the scan is complete, the program displays information about the condition of the disk. For a hard disk with no bad tracks, the display looks like this:

```
Scanning finished.
Count of tracks flagged bad           =    n
Count of tracks with other errors     =    n
Count of good tracks                  = nnnn
```

The program then displays a warning about the consequences of proceeding with formatting:

```
WARNING! ALL DATA WILL BE DESTROYED IN ALL
PARTITIONS OF HARD DISK, NOT JUST IN MS-DOS
PARTITION!
Do you want to start formatting (Y/N)?
```

If there are no tracks with other errors, and you are absolutely sure that you want to format the hard disk, press **Y** and **Enter**.

The program then asks you once more if you want to continue. You see this message and prompt:

```
DOUBLE CHECK THAT YOU HAVE BACKUP DISKETTE COPIES OF
ALL YOUR FILES.
Do you want to exit and check your file copies
(Y/N)?
```

When you are certain no valuable data will be destroyed, press **N** and **Enter**.

If you cancel formatting at either stage, you see these messages:

```
Format cancelled.
Press ENTER to return to the menu.
```

If you continue with formatting, you see:

```
Format started.  
Current cylinder is xxxx
```

When formatting is complete, any bad tracks are flagged, and you see a series of messages like these:

```
Format finished.  
Flagging bad tracks...  
Cylinder is xxxx, head is yy  
Format completed.  
Press ENTER to return to the menu.
```

Flagged tracks are identified by xxxx and yy. At this point, press **Enter** to return to the HARD DISK FORMAT MENU.

If there are any tracks with other errors, scanning stops and you see this message:

```
Scanning cancelled.  
Warning: This drive has an unflagged error(s),  
or is unformatted.  
Press ENTER to return to the menu.
```

Press **Enter**.

This may mean that the drive has never been formatted or that an error was not flagged. If you see this message, it is best to consult your dealer.

If you want to format the disk after receiving this error message, do the following:

1. If the drive is not formatted, perform the Unconditional format (Option 2) and enter any tracks you know are bad in the Bad Track Table. (See “Unconditional Format” below.)
2. Run the Destructive surface analysis (Option 3) to flag any remaining bad tracks. (See “Destructive Surface Analysis,” which appears later in this chapter.)
3. Run the Conditional format again. No errors should occur; if one does, contact your dealer.

Unconditional Format

Use this option to format your hard disk when you want to enter the list of bad tracks before formatting begins. The main difference between unconditional and conditional formatting is the way in which bad tracks are identified. With the unconditional format, you must enter the list of bad tracks before formatting begins.

To start the Unconditional format routine, press **2** and then **Enter**.

You are first given the option to change the interleave factor for formatting from the default value of three. Only do this if the documentation with your hard disk recommends a different value. You see this prompt:

Do you want default interleave of **3** (Y/N)?

To accept the default, press **Y** and **Enter**. To change the value, press **N** and **Enter**. You see this prompt:

Enter interleave factor **(1-16)**:

Type the recommended value, and press **Enter**.

The next screen allows you to edit the table of bad tracks. The empty bad track table looks like this:

Bad Track Table				
Cylinder	Head	Cylinder	Head	Cylinder

Move highlighted area to desired track with cursor keys.
A = Add track, C = Change track, D = Delete track, F = Finish editing

Enter command letter :

Some of the messages change if the table is full or empty. However, the way that you add a bad track or make a correction is the same.

To add a bad track, follow these steps:

1. Press **A**. You see this prompt:

Enter cylinder number (1 - xxxx):

2. Type the number of the cylinder containing the missing bad track, and press **Enter**. You see this prompt:

Enter head number (0 - yy) :

3. Type the head number for the bad track, and press **Enter**. The maximum valid cylinder and head numbers (xxxx and yy) vary according to the capacity of the hard disk.

To cancel this operation, press **Enter** without entering a value. You see this message:

Table unchanged.

If you enter an invalid cylinder or head number, a reminder of the range of values appears and the program asks you to enter the value again. When you complete a valid entry, it appears in the table, and you can select another command.

If you make a mistake, move the cursor block to the incorrect track, and press C to alter the track data. Or you can press D to remove the track from the table. Change the track data just like you add a track.

Once you complete editing, check the entries in the table once more. When you are sure the table is correct, press **F**.

The program displays a warning about the consequences of proceeding with formatting, and the remaining steps are exactly the same as for a normal conditional format.

Destructive Surface Analysis

Use this option to accurately locate any bad tracks on a hard disk, and to flag any bad tracks that are not flagged.

WARNING: If any errors occur during this check, all data on the track that produces the error is destroyed. For this reason, if you think that an unflagged bad track is causing trouble, first run option 4, Non-destructive surface analysis, to check the disk surface.

This test operates by a complex process of writing, reading, and verifying information on every track of the hard disk, except for tracks that are already flagged as bad tracks.

To start the test, press 3 and then **Enter**. You see these messages:

```
Analyze Hard Disk
Read/Save/Write/Read/Restore/Read check for all
tracks. . .
Current cylinder is xxxx
```

As each track is checked, the cylinder number (xxxx) counts down to zero. When the analysis is complete, the program displays a complete report on the status of the disk, including a table of unflagged tracks that produced write, read errors. For a hard disk with one flagged bad track, a display like this appears:

```
Analysis finished.
Count of tracks flagged bad           =    n
Count of tracks with write, read errors =    n
Count of good tracks                  = nnn
No write, read error was detected.
No data was destroyed.
Press ENTER to return to the menu.
```

If the program finds one bad track that is not flagged, the summary would show one track with a write, read error. The report is then followed by a table like this:

Write, Read Error Tracks			
Cylinder	Head	Cylinder	Head
237	2		

Confirm to register the tracks in the Write, Read Error Track Table as bad tracks.

Do you want to register the error tracks as bad tracks (Y/N)?

To flag the error tracks as bad, press Y and **Enter**. You then see a list of the tracks as they are flagged. You see these messages:

Flagging bad tracks...
Cylinder is 237, head is 2
Press ENTER to return to the menu.

Press **Enter** to return to the HARD DISK FORMAT MENU.

Non-destructive Surface Analysis

The Non-destructive surface analysis is slightly simpler than the Destructive surface analysis described in the previous section. This option does not destroy any data, and can safely be used to check the condition of your hard disk drives. However, this test will not flag any bad tracks that are detected.

To start the test, press 4 and then **Enter**. You see these messages:

Analyze Hard Disk
Read/Verify check for all tracks...
Current cylinder is xxxx

As each track is checked, the current cylinder is displayed. The cylinder number counts down to zero as the disk is checked.

When the analysis is complete, the program displays a summary of the status of the disk. This summary lists these counts:

- Flagged bad tracks
- Tracks with read, verify errors
- Good tracks.

If no errors occur, you see this message:

No read, verify error was detected.

If errors are found, the program displays a table of the tracks that gave errors, similar **to** the one displayed by the destructive analysis.

After the status reports you see this message:

Press ENTER to return to the menu.

Check the information displayed, then press **Enter**.

Chapter 3

Formatting a Diskette

This chapter briefly describes how, you format a diskette. Normally, you format a diskette using the MS-DOS FORMAT command. However, if you are running diagnostics and decide to test your floppy drives (which requires a formatted diskette), you can select option 3, Format diskette, from the OPERATION MENU. This option is included with the diagnostics for convenience only; it lets you format a double-density diskette without exiting diagnostics.

Note: This program always formats diskettes in 360KB format, regardless of the type of drive. If you plan to test a 1.2MB drive, use the MS-DOS FORMAT command to format a high-density diskette. Also, to test a 360KB drive, always use a double-density diskette that you formatted in a 360KB drive.

The Format diskette program destroys any data on the diskette. When formatting your diskettes, the program also initializes the directory and file allocation tables.

When you select option 3 from the OPERATION MENU, you see this message and prompt:

```
Format Diskette
Insert diskette for drive A:
and strike ENTER when ready
```

Remove your diagnostics diskette, then insert the diskette you want to format into drive A and press Enter. You see this message:

```
Head: x Cylinder: xx
```

You see the number of each cylinder as the program formats the diskette.

When the format is complete, you see these messages:

```
Format complete
362496 bytes total disk space
362496 bytes available on disk
Format another (Y/N) ?
```

You can format another diskette or return to the OPERATION MENU.

If drive A is a 1.2MB drive and you format a double-density diskette, you see this warning message:

WARNING! This disk is not suitable for testing a
360, KB drive.

Press Enter to return to the menu.

For a complete description of the FORMAT command, refer to the MS-DOS manual.

Performing System Diagnostics

This chapter describes how to check the operation of the main unit and peripheral devices of your system. You check these devices using System diagnostics, option **4** on the **OPERATION MENU**.

Always run diagnostics after adding or removing optional devices, or if you are unsure whether a device is performing correctly. You should also run these tests after moving your computer from one place to another, and after you replace the internal battery.

Note: To run System diagnostics, boot your system with the reference diskette in drive A. Then select option 4 from the OPERATION MENU. If you start this program in any other way, some tests may produce strange results.

You can test these devices; the program identifies each one with a specific reference number:

- 1 - System
- 2 - Memory
- 3 - Keyboard
- 4 - Monochrome display adapter and CRT
- 5 - Color graphics adapter and CRT
- 6 - Floppy disk drives and controller
- 7 - Math coprocessor (80287)
- 9 - Parallel port (printer interface)
- 11 - Serial port (RS-232C port)
- 12 - Alternate serial port
- 14 - Dot-matrix printer
- 17 - Hard disk drives and controller
- 21 - Alternate parallel port
- 81 - Parallel port (on video adapter)

Appendix A lists the error messages that may occur when testing these devices.

Using the System Diagnostics Program

When you start the System diagnostics, the computer checks:

- The setting of the monitor switch (for monochrome or color)
- The positions of the internal jumpers
- The peripheral devices that are connected to the system.

After these items are checked, you see a list of the devices available for testing. This list includes only the devices that are installed in the system. The list looks something like this:

The following devices have been installed

DEVICE LIST

- 1 - System board
- 2 - Memory
- 3** - Keyboard
- 5 - Color graphics adapter and CRT
- 6** - Floppy disk drives and controller
- 9** - Parallel port (printer interface)
- 11 - Serial port (RS-232C port)
- 14** - Dot-matrix printer
- 17 - Hard disk drives and controller

Is the DEVICE LIST correct (Y/N)?

If the list correctly describes your system, press Y and then **Enter**. If a device is missing from this list, or if you wish to change the list, press **N** and **Enter**.

Note: **Once you** confirm the DEVICE LIST, you can only test those items. If you decide later that you need to add another device, you must return to the main menu and re-select System diagnostics.

Modifying the DEVICE LIST

If an installed device is missing from the DEVICE LIST, it is important that you add it to the list and test it carefully. In response to this prompt:

Is the DEVICE LIST correct (Y/N)?

press **N** followed by **Enter**. You see a new menu:

Modify DEVICE LIST

- 1 - Add devices
- 2 - Delete devices
- 0 - Exit

Enter selection number:

To add a device to the list, press **1** and then **Enter**.

The program displays a list of other devices that are not currently included in the DEVICE LIST. You see a menu similar to this:

Additional DEVICE LIST

- 4 - Monochrome display adapter and CRT
- 7 - Math coprocessor (80287)
- 12 - Alternate serial port
- 21 - Alternate parallel port
- 81 - Parallel port (on video adapter)
- 0 - Exit

Enter the number of the item to add:

Type the number of the item you wish to add and press **Enter**. **You** can add as many devices as necessary. When the DEVICE LIST is complete, press 0 followed by **Enter**.

Note: Even if you have both monochrome and color monitor video cards installed, you can only test the monitor that is currently selected. You select the monitor either with the monitor switch on the front panel or a DIP switch inside the main unit.

To remove a device from the list, press 2 and **Enter**. The screen displays the current DEVICE LIST and the prompt:

Enter the number of the item to delete:

Type the number of the item you wish to delete and press **Enter**. **You** can delete as many devices as necessary.

When the DEVICE LIST is correct, press 0 and then **Enter**. The screen displays the modified DEVICE LIST for a final check. If the list is correct, press Y and **Enter**.

You are now ready to select a test.

Selecting a test

From the DEVICE LIST, select the device you wish to test. Type the number of the device, then press **Enter**.

Before the test begins, you are asked how many times to perform the test. You see this menu:

Number of times to test device

- 1 - Run test one time
- 2 - Run test multiple times
- 0 - Exit

Enter selection number:

You can specify that the test be performed one time only or any number of times in the range from 1 to 9999. Running a test multiple times is for

reliability testing of essential functions only; in most cases, running a test only once is sufficient.

To perform the test once, press **1** and **Enter**. The program then displays a submenu of more detailed tests for the device you are checking.

To perform the test multiple times, press **2** and **Enter**. **You** see this prompt:

Terminate checking if an error detected (Y/N)?

Press **Y** and **Enter** to terminate checking if the device produces an error, or press **N** and **Enter** to repeat the tests regardless of an error.

You see this prompt:

How many times (1-9999):

Type the number of times you wish to repeat the test, then press **Enter**. The tests for the device now start.

Resuming from an error

If an error occurs during a test, the test stops at that point, and an error code and error message display. If you want to record the problem, you can print out the message on your printer. You see this prompt:

Do you want a printout of the error message(s)
(Y/N)?

To continue without printing the error message, press **N** and **Enter**.

Before you request a printout, be sure your printer is turned on and on-line, and the paper is installed correctly. Then press **Y** and **Enter**. If the printer is not ready, the following message and prompt display:

Printer is not installed correctly.
Install correctly and enter Y, or
Enter N to cancel printing.

Correct the problem and press **Y** and **Enter** to continue printing, or press **N** and **Enter** to cancel printing.

After printing the error message, the program displays this prompt:

Printout is finished. Press ENTER to return to the menu.

The program continues after an error in one of the following ways:

- It returns to the DEVICE LIST, or
- If you are running multiple tests and are not terminating on an error, the program repeats the test that caused the error.

The remainder of this chapter describes the tests you can run on the system's internal devices and on the optional devices installed on your computer. The program displays the title of each check on the screen.

For a complete list of the error codes and messages these tests may display, refer to Appendix A.

System Board Check

Use this option to check the operation of each major component on the system board, including:

- The 80286 CPU chip
- The system ROM
- The real-time clock, CMOS RAM, and battery
- The main integrated circuits.

The checks made on the 80286 CPU chip are extremely comprehensive and ensure that the CPU instruction set, including protected-mode operation, is functioning correctly.

If an error occurs, make a copy or a printout of the error code and message, and contact your dealer or Epson for customer service. Attempting to correct system board errors yourself may violate your warranty agreement.

Memory Check

Use this option to check the memory installed in your computer, including expansion memory. The program checks the internal jumpers to determine the amount of main memory, and reads the CMOS RAM to find the amount of expansion memory. If any settings are incorrect, use Setup to define the correct amount in CMOS RAM and adjust the jumpers on the system memory card.

For this check, the program writes specific data into memory and then reads it back. The data is written and read in blocks of 64KB. A parity check is also made on each block. A memory count displays after each block tests without error. After the program checks the last block, you see a message like:

000640 KB 0K

If an error occurs, make a copy or a printout of the error code and message, and contact your dealer or Epson for customer service. Attempting to correct memory errors yourself may violate your warranty agreement.

Note: Memory above 640KB, which is normally not available to MS-DOS, is checked using the protected mode of the 80286 CPU chip.

Keyboard Check

Use this option to check the operation and the configuration of the keyboard.

The program first checks the keyboard controller; during this check, you see the green indicator lights on the keyboard flash.

Before checking the operation of the keys, you must select the appropriate keyboard layout so that the test display matches the keys on your keyboard. You see this menu:

KEYBOARD SELECT MENU

- 1 - US ASCII
- 2 - United Kingdom
- 3 - French
- 4 - German
- 5 - Italian
- 6** - Spanish
- 0 - Exit

Enter selection number:

Type the number of your keyboard layout, then press **Enter**. You can exit the keyboard test by pressing 0 and **Enter**.

After you select a keyboard layout, the program displays the layout on the screen. When you press a key on the keyboard, the corresponding character displays on the screen. If the character on the screen and the key you press do not match, there is a problem with your keyboard. Test each key.

The status of the Num Lock, Caps Lock, and Scroll Lock indicators is shown on the upper right side of the keyboard layout. On the optional keyboard, the status of these lock keys is indicated by reversing the display of the character inside the key location.

You see these messages on the screen:

KEYBOARD CHECK

Press Y followed by ENTER to exit.

Press N followed by ENTER if screen and keyboard do not match.

If all the keys function correctly and match the characters displayed, press Y and then **Enter**.

If all the keys function, but the characters displayed do not match the keys, press Y and then **Enter**. Then re-select the keyboard test from the DEVICE LIST, and check that you selected the correct keyboard layout. You can find diagrams of all the international keyboard layouts in the MS-DOS manual.

If any key is incorrect, press **N** and **Enter**. Make a copy of the error code and message, or print them out, and contact your dealer or Epson for customer service.

Monochrome Display Adapter and CRT Check

Use this option to verify the operation of a monochrome adapter and display. This test includes several checks that allow you to identify particular problems related to the monochrome display. To run this check, the monitor switch must be set for a monochrome monitor.

You can select the individual checks from this menu:

MONOCHROME ADAPTER AND CRT CHECK MENU

1 - Monochrome adapter check

2 - Attribute check

3 - Character set check

4 - Video check

5 - Sync check

6 - Run all above checks

0 - Exit

Enter selection number:

If an error occurs during any of these tests, record the error code and message, or print them out. Then contact your dealer or Epson for customer service.

Monochrome adapter check

To check the monochrome adapter, press **1** and then **Enter**.

The computer checks the video RAM (display memory) on the display adapter by writing certain data to memory, then reading it back and comparing it to the written data. The computer also tests the video enable signal of the display controller chip.

Attribute check

To check the display attributes of the adapter card, press **2** and then **Enter**.

A series of messages appear showing examples of all the possible display attributes (normal intensity, high intensity, blinking, reverse, and underlining). Check the information that appears on your screen, and then respond to the prompt:

Is the display correct (Y/N)?

Press **Y** and then **Enter** if the display is correct.

Sync check

This test is provided for service purposes only. If you accidentally select this option, press any key to end the test.

Run all above checks

To run all the tests on the menu in sequence, press 6 and **Enter**.

When you choose this option, all checks for the monochrome adapter and CRT are performed automatically in sequential order. Although you do not start each test, you must still supply the appropriate responses to progress from one test to the next. Press any key to return to the menu.

Color Graphics Adapter and CRT Check

Use this option to check the operation of a color graphics adapter and display. This test includes several checks that allow you to identify particular problems related to the color display. To run this check, the monitor switch must be set for a color monitor.

You can select the individual checks from this menu:

COLOR GRAPHICS ADAPTER AND CRT CHECK MENU

- 1 - Color graphics adapter check
- 2 - Attribute check
- 3 - Character set check
- 4 - **40-column** character set check
- 5** - 320x200 graphics mode check
- 6 - 640X200 graphics mode check
- 7 - Screen paging check
- 8 - Light pen check
- 9** - Color video check
- 10** - Sync check
- 11 - Run all above checks

- 0 - Exit

Enter selection number:

If an error occurs during any of these tests, record the error code and message, or print them out. Then contact your dealer or Epson for customer service.

Color graphics adapter check

To check the color graphics adapter, press **1** and then **Enter**.

The computer checks the video RAM (display memory) on the display adapter by writing test data to memory, and then reading it back and comparing it to the written data. The computer also tests the video enable signal of the display controller chip.

Attribute check

To check the display attributes of the color graphics adapter card, press **2** and **Enter**.

Several messages appear showing examples of all the possible display attributes and colors. Check the information on your screen, and respond to the prompt:

Is the display correct (Y/N)?

Press **Y** and then **Enter** if the display is correct.

If the colors are not correct, adjust the controls on your display monitor. If they are still incorrect, press **N** and **Enter**.

Contact your dealer to verify any monitor problems.

Character set check

To check your 80-column character set, press **3** and **Enter**. The character fonts that are included in the internal character generator display on your screen. Compare your screen display to the following illustration.

320x200 graphics mode check

To check your 320x200 graphics mode, press 5 and then **Enter**.

The screen displays three colored squares—light green, brown, and red—against a cyan background. These four colors are Color Set 0. If they are correct, press Y and then **Enter**.

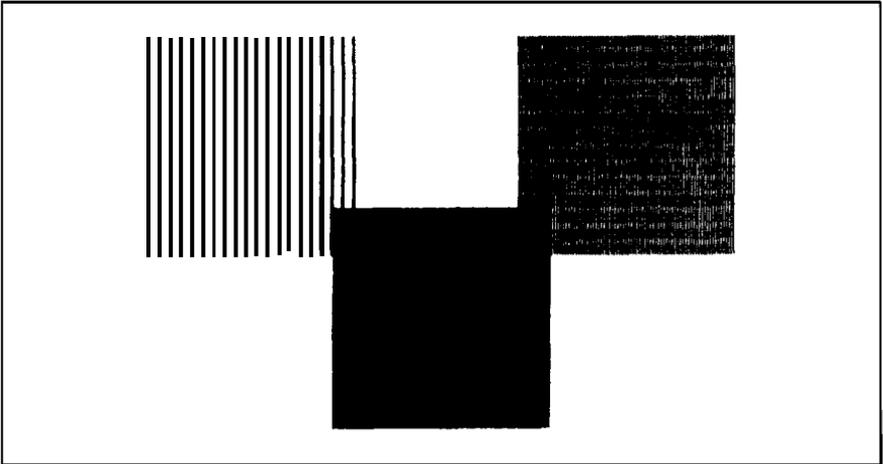
The same pattern displays again; this time the squares are cyan, white, and magenta, and the background is red. These colors are called Color Set 1. If these are also correct, press Y and then **Enter** to end the test.

If any colors display incorrectly, first check the adjustment of your monitor, and make sure that both ends of the cable are plugged in firmly. If a problem still exists, press **N** and **Enter** to display the error message.

640x200 graphics mode check

To check your 640x200 graphics mode, press 6 and followed by **Enter**.

The screen displays three patterned squares against a black background, as shown below.



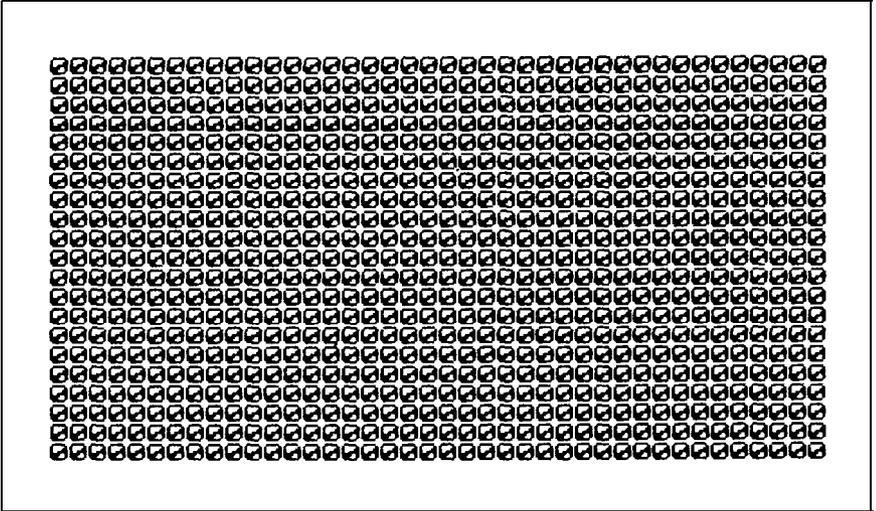
If the patterns on your screen are clear and distinct, press Y and then **Enter**.

If any pattern is not clear, first check the adjustment of your monitor, and then make sure that both ends of the cable are plugged in firmly. If a problem still exists, press **N** and **Enter** to display the error message.

Screen paging check

To check the screen paging of your monitor, press 7 and **Enter**.

The video RAM on the color graphics adapter is divided into eight independent display pages. This test checks the eight pages by first filling all eight with a number corresponding to the page, and then displaying each page in turn. You see this pattern for screen 0:



Once you examine this screen, press any key to display the next page. The eight pages, numbered 0 to 7, display sequentially.

After the eighth page appears, you see the prompt:

Is the display correct (Y/N)?

If all eight pages are correct, press Y and **Enter**. If any page is filled with an incorrect number, press **N** and **Enter** to display the error message.

Light pen check

To check the function of a light pen connected to the color graphics adapter card, press 8 and then **Enter**.

This test checks that a light pen connected to the color graphics adapter is performing accurately. When you select this check, you see these prompts:

Enter Y to start light pen check.

Enter N to return to the menu.

If you do not have a light pen attached, press **N** and **Enter**. To begin the test, press **Y** and **Enter**. You see this prompt:

PLACE LIGHT PEN ON CENTER OF WHITE BLOCK

Touch the center of the white block on the screen with the light pen. When the light pen is correctly positioned, the block moves to another part of the screen for a second test. After three successful tests, the check ends.

An error occurs if:

- The light pen is not connected properly
- The light pen is malfunctioning
- You do not touch the square within 12 seconds.

Color video check

This test displays 16 different screens, each a different color, and a message indicating the color. The screens show the following colors in the order specified below:

1 - Black	9 - Gray
2 - Blue	10 - Light blue
3 - Green	11 - Light green
4 - Cyan	12 - Light cyan
5 - Red	13 - Light red
6 - Magenta	14 - Light magenta
7 - Brown	15 - Yellow
8 - White	16 - White (high intensity)

To start this test, press **9** and **Enter**. Press any key to display each screen. On the last screen, you see this prompt:

Is the display correct (Y/N)?

If all the colors are correct, press **Y** and **Enter** to end the test. If any color is incorrect, first check the adjustment of your monitor, and then make sure that both ends of the cable are plugged in firmly. If a problem still exists, press **N** and **Enter** to display the error message.

Sync check

This test is provided for service purposes only. If you accidentally select this option, press any key to end the test.

Run all above checks

To run all the tests on the menu in sequence, press **11** and **Enter**.

When you choose this option, all checks for the color adapter and CRT are performed automatically in sequential order. Although you do not start each test, you must still supply the appropriate responses to progress from one test to the next.

Floppy Disk Drives and Controller Check

Use this option to test the performance of the floppy disk drives installed in your computer. This test includes several checks that allow you to identify particular problems related to your floppy disk drives.

Before running these tests, format a floppy disk to use for the tests that write data on the disk in the drive. To test a 1.2MB drive, you can use a 1.2MB or a 360KB floppy disk. However, to test the full capacity of the drive, use only a 1.2MB disk. In a 360KB drive, you can only use a 360KB floppy disk.

Note: The Format diskette option on the OPERATION MENU always formats diskettes in 360KB format, regardless of the type of drive. Therefore, to test a 1.2MB drive, use the MS-DOS FORMAT command to format a high-density diskette. Also, to test a 360KB drive, always use a double-density diskette that you formatted in a 360KB drive.

You can select the individual tests from this menu:

FLOPPY DISK DRIVE(S) AND CONTROLLER CHECK MENU

- 1 - Sequential seek check
- 2 - Random seek check
- 3 - Write, read check
- 4 - Speed check
- 5 - Disk change check
- 6 - Run all above checks

- 0 - Exit

Enter selection number:

Before any checks are performed, the program determines the number of floppy disk drives installed in your computer. If you have more than one drive, you see this prompt each time you select a test:

Check which drive (A/B)?

Press **A** or **B** and then **Enter**.

If any errors occur, record the error code and message and contact your dealer. Always have the floppy disk drive serviced by your dealer.

Sequential seek check

This test checks the ability of the read/write heads to locate any part of the diskette. This action by a read/write head is called a seek. During this test, each head seeks sequentially from the innermost track to the outermost track. The innermost track is track 39 for 360KB diskettes and track 79 for 1.2MB diskettes.

Select option 1 from the menu to start this test.

The program displays the number of each track it finds. For example, with a 360KB floppy disk, the first message you see is:

Current track is **39**

The track number counts down (from 39 or 79) to 0.

The seek is performed by each head, so you see the count twice. If no errors occur, the menu displays.

Random seek check

This test is identical to the sequential seek check, except that the seek operation is performed on each track in random order instead of sequential order.

Select option 2 from the menu to start this test.

Write, read check

This test checks the ability of the selected disk drive to read and write data from a diskette. The test writes to and reads from each cylinder on the diskette, starting at the center.

Note: This test destroys all data on the diskette in the selected drive.

Select option **3** from the menu to start this test.

If you have only one floppy disk drive, you see a prompt to remove the diagnostics diskette and insert a blank diskette before running the test. You see these messages:

Use only a formatted blank diskette for this test.
Any data present may be erased.
If using drive A, remove your Diagnostics Disk.
Enter Y to start this check.
Enter N to return to the menu.

Make sure the blank diskette you prepared is in drive A, then press Y and **Enter**.

The program displays the current track number as each cylinder is tested. For example, with a 1.2MB floppy disk, the first message you see is:

Current track is 79

Speedcheck

This test checks the revolution speed of the specified disk drive. Select option 4 from the menu to start this test. You see a message similar to this:

The disk rotation speed should be more than
352.8 rpm and less than 367.2 rpm.

The computer spins the diskette for a few seconds then displays a message like this:

The disk rotation speed is now 360.5 rpm.

The diskette continues to spin and the message listing the rotation speed updates every few seconds. To stop the test, press any key; the program returns to the menu.

If you try to perform a speed test without inserting a floppy disk, or if a read error occurs, you see this message and prompt:

Disk is defective or not installed properly.
Press ENTER to return to the menu.

Disk change check

This check tests the ability of a drive to detect that a diskette has been inserted or removed. Disk changes can only be detected by 1.2MB or 720KB (3 1/2") disk drives.

Select option 5 from the menu to start this test. First the program checks the selected drive type; if the drive is a 360KB drive, you see these messages:

Drive **d** is a 360KB drive.

DISK CHANGE is not allowed with this type of drive.

Press ENTER to return to the menu.

d represents the name of the drive you selected.

When you run the test for a 1.2MB or 720KB (3½") drive, you see this prompt:

Remove the disk from drive **d**.

Release the disk drive lock, and remove the disk. You see:

Re-insert the disk into drive **d**.

Re-insert the diskette and secure the lock. If no errors occur, then the menu reappears. An error occurs if the drive is malfunctioning, or if you do not remove or replace the diskette within a certain time.

Run all above checks

To run all the tests on the menu in sequence, press 6 and then **Enter**.

When you choose this option, all checks for the floppy disk drive(s) and controller are performed automatically in sequential order. Although you do not start each test, you must still supply the appropriate responses to progress from one test to the next.

Math Coprocessor Check (80287)

Use this option to check the operation of the 80287 math coprocessor if you have one installed in your computer. To check the math coprocessor, select option 7 from the DEVICE LIST.

Before running any tests, the computer checks the settings in CMOS RAM to ensure that a coprocessor is installed. If the coprocessor is missing, or if you have not changed the setting in CMOS RAM with the Setup option, an error occurs and the test ends.

If the coprocessor is installed, the program then runs a series of checks on the precision with which the coprocessor performs calculations and handles exceptions.

Parallel Port (Printer Interface) Check

Use this option to test the operation of the primary parallel printer port. To perform the test, you must insert a special loop-back connector into the parallel port so that the computer can check individual pins of the port. Contact your dealer if you need a loop-back connector. Note that a different connector is required to test the serial port.

When you select option 9 from the DEVICE LIST, you see these prompts:

Attach loop-back connector to parallel port.
Enter Y to start this check when connector is
attached, or
Enter N to return to the menu.

Insert the loop-back connector. Then press Y and Enter to start the check.

The computer checks the port by writing and reading data and control information, and reports errors for any pins that are faulty. Note that if you connect a printer cable instead of a loop-back connector, you will get errors.

Parallel Port (on Video Adapter) Check

Use this option to test the operation of an additional parallel port. To perform the test, you must insert the special loop-back connector into the parallel port on the video adapter so that the computer can check individual pins of the port.

This test is similar to the Parallel Port Check. For more details, refer to the description of the Parallel Port (Printer Interface) Check.

Serial Port (RS-232C) Check

Use this option to test the functions of the primary serial communications (RS-232C) port. To perform the test, you must insert a special loop-back connector into the RS-232C port so that the computer can check individual pins of the port. Contact your dealer if you need a loop-back connector. Note that a different connector is required to test the parallel port.

When you select option 11 from the DEVICE LIST, you see these prompts:

```
Attach loop-back connector to serial port.  
Enter Y to start this check when connector is  
attached, or  
Enter N to return to the menu.
```

Insert the loop-back connector. Then press Y and Enter to start the check.

First, the computer checks the serial port control lines to see that they are able to change from high to low and vice versa. No messages display during this part of the test unless an error occurs.

The second test is an echo back check during which the port sends data to itself in a fixed data format, at all the possible baud rates. When this test begins, you see these messages:

```
RS232C echo back check - at various baud rates  
Current baud rate is 75  
Current test data is 00
```

Each baud rate is tested in turn, and the display informs you of the progress of the test. If the port does not become ready correctly, a timeout error occurs. If any data received does not match the data sent, a verify error occurs, and the computer reports the transmitted and received data at the time of the error.

The final test is an echo back check during which the port sends data to itself at 9600 baud, using various data formats. At the start of the test, you see these messages:

```
RS232C echo back check - with various data formats  
Current data format: 5 data bits, 1 stop bits,  
                    parity - NONE  
Current test data is 00
```

Once again, if any data received does not match the data sent, a verify error occurs, and the computer reports the transmitted and received data at the time of the error.

Alternate Serial Port Check

Use this option to test the functions of an additional serial communications (RS-232C) port. To perform the test you must insert a special loop-back connector into the alternate serial port so that the computer can check individual pins of the port.

This test is identical to the check for the primary serial port. For more details, refer to the description of the Serial Port (RS-232C) Check.

Dot-matrix Printer Check

Use this option to check:

- The operation of your printer in IBM-compatibility mode
- The compatibility of your printer with the extended character set your computer uses.
- The ability of your printer to produce bit-image graphics and print images of the graphics screen.

When you select option **14** from the DEVICE LIST, you see this prompt:

Is dot-matrix printer on-line (Y/N)?

Check that your printer is connected to the computer, and that it is turned on, loaded with paper, and on-line. Press **Y** and then **Enter** to continue, or press **N** and **Enter** to return to the menu.

When you continue the test, the computer checks that the printer is responding correctly. This test detects whether the printer is off-line or whether an interface error exists. If no errors occur, the computer sends a repeating sequence of ASCII characters and bit-image data to the printer until you press any key. The pattern looks like this:

The text data includes all the characters commonly used by programs that require foreign languages or graphic characters. If your printer prints different characters than you see in the illustration, you may need to take

care with certain software. The bit-image data is sent to the printer using a command (ESCK) compatible with Epson and IBM® printers. If this pattern is printed correctly, you can use the MS-DOS GRAPHICS program to print out copies of graphics screens.

Note: Even if the test runs only for a short time, your printer may store many characters in its buffer. To stop printing, turn the printer off-line.

Hard Disk Drives and Controller Check

Use this option to test the performance of the hard disk drives installed in your computer. If any errors occur, have your dealer check and service the drive.

When you select option 17 from the DEVICE LIST, you see this menu:

HARD DISK DRIVE(S) AND CONTROLLER CHECK MENU

- 1 - Seek check
- 2 - Write, read check
- 3** - Head select check
- 4 - Error detection and correction check
- 5 - Read, verify check
- 6** - Run all above checks

- 0 - Exit

Enter selection number:

When you select a check from this menu, the program determines the number of hard disk drives installed in your computer. If you have more than one drive, then each time you select a test you see this prompt:

Check which drive (C/D)?

Press C or **D** and then **Enter**.

Seek check

This test checks the ability of the read/write heads to locate any part of the hard disk. This action by a read/write head is called a seek. During this test, each head seeks each cylinder of the disk in sequence, starting from the center.

Select option 1 from the menu to start this test.

The program displays the number of each cylinder it finds. For example, with a hard disk, the first message you see is:

Current cylinder is *nnn*

The cylinder number counts down to 0.

The seek is performed by the read/write heads simultaneously, so you see the cylinder numbers only once. If no errors occur, the menu reappears.

Write, read check

This check tests the ability of the hard disk drive to read and write data. The test writes to and reads from each sector of the innermost cylinder of the disk, using each head.

Note: This test destroys all data on the innermost cylinder of the selected hard disk drive. This cylinder is reserved for diagnostics, and is never used for storage by MS-DOS. Therefore, data created by MS-DOS is not destroyed.

Select option 2 from the menu to start this test. You see these messages:

The data on the highest physical cylinder may be destroyed by this check.

Enter Y to start this check.

Enter N to return to the menu.

Press Y and then **Enter** to continue with the test.

You do not see a cylinder count during the test. If no errors occur, the program returns to the menu.

If an error occurs, make a note of the code and message. Then use the Non-destructive surface analysis (option 4 on the HARD DISK FORMAT MENU) to check the condition of the hard disk.

If this analysis shows no other problems with the disk, follow these steps:

1. Back up all the files on your hard disk.
2. Re-format the disk using option 2, Format hard disk, on the OPERATION MENU.
3. Re-create the MS-DOS partition with FDISK and format it with SELECT. (See your MS-DOS manual.)
4. Restore your files.

Head select check

This test checks whether each head of the hard disk drive can be selected correctly. If both heads are checked without an error, the program returns to the menu.

Select option 3 from the menu to start this test.

Error detection and correction check

This test checks the ability of the hard disk drive to detect a read/write error and to correct the data accordingly.

Note: This test destroys some data on the innermost cylinder of the selected hard disk drive. This cylinder is reserved for diagnostics, and is never used for storage by MS-DOS. Therefore, data created by MS-DOS is not destroyed.

Select option **4** from the menu to start this test. You see these messages:

The data on the highest physical cylinder may be destroyed by this check.

Enter Y to start this check.

Enter N to return to the menu.

Press **Y** and then **Enter** to continue with the test. If no errors occur, the menu reappears.

An error occurs only if the drive is malfunctioning. In this case, back up all your files, and have the drive serviced immediately. (The drive may be corrupting your data.)

Read, verify check

This test reads and verifies data from all tracks of the disk, checking each cylinder and using both heads.

Select option 5 from the menu to start this test.

The program displays the number of each cylinder it finds. For example, with a hard disk, the first message you see is:

Current cylinder is nnn

The cylinder number counts down to 0.

At the end of the test, you see a table of the results of the test. For example, for a hard disk with no bad tracks, you see:

BAD TRACKS	n
READ ERROR TRACKS	n
GOOD TRACKS	nnnn

Press ENTER to return to the menu

Press Enter when you have viewed the table.

Run all above tests

To run all the tests on the menu in sequence, press 6 and then **Enter**.

When you choose this option, all checks for the hard disk drives and controller are performed automatically in sequential order. Although you do not start each test, you must still supply the appropriate responses to progress from one test to the next. The first prompt you see is:

The data on the highest physical cylinder may be destroyed by this check.

Enter Y to start this check.

Enter N to return to the menu.

Press Y and then **Enter** to continue with the test.

Moving the Hard Disk

This chapter describes the procedure you use when you plan to move your computer. Even if you are moving the computer only a short distance, use option 5, Prepare hard disk for moving, to prevent damage to the hard disk.

This program moves the read/write heads of each installed hard disk drive away from the disk surfaces and locks them securely in position. If the heads are not secure and the computer endures a shock or vibration, the heads may bump the disk surfaces which could damage the drive. At the very least, you may lose a considerable amount of data.

To secure the heads, select option 5 from the OPERATION MENU. You see a screen of information reminding you that the heads will not be unlocked until you reset the computer or turn the power off and on again. Next the program moves the heads and disables the keyboard. You can now turn the computer off and move it to the new location.

You can also secure the heads on your hard disk by executing the MS-DOS HDSIT command.

Appendix A

Error Codes and Messages

This appendix lists all the error codes and messages that may appear during diagnostics checks.

Table A-1. Error a&s and messages

Error code	Message
System board	
101	80286 CPU ERROR
102	27256 ROM CHECKSUM ERROR
103	8254 TIMER COUNTER REGISTER ERROR
104	8254 TIMER COUNTER ERROR
105	8237 DMA CONTROLLER REGISTER ERROR
106	8237 DMA REFRESH ERROR
	612 DMA PAGE REGISTER ERROR
107	8042 TIMEOUT ERROR
108	8042 SELF DIAGNOSTIC ERROR
108	8042 WRITE COMMAND ERROR
109	8259 INTERRUPT CONTROLLER ERROR
110	146818 CMOS SHUTDOWN BYTE ERROR
111	146818 CMOS BATTERY ERROR
112	146818 CMOS CHECKSUM ERROR
113	80286 INSTRUCTION ERROR
114	80286 PROTECT MODE ERROR 1
115	80286 PROTECT MODE ERROR 2
Memory	
201	MEMORY/PARITY ERROR
Keyboard	
301	8042 ERROR
301	KEYBOARDERROR
302	KEYBOARD IS NON-STANDARD, OR
	KEYBOARD IS DEFECTIVE
303	KEYBOARD LOCKING ERROR
Monochrome display adapter and CRT	
	V-RAM ERROR
402	VIDEO SIGNAL ERROR
403	ATTRIBUTE ERROR
404	CHARACTER SET ERROR
Color graphics adapter and CRT	
	V-RAM ERROR
503	ATTRIBUTE ERROR
504	CHARACTER SET ERROR
505	40-COLUMN CHARACTER SET ERROR
506	COLOR GRAPHICS ERROR
507	640 x 200 GRAPHICS MODE ERROR
508	SCREEN PAGING ERROR
509	LIGHT PEN ERROR
510	COLOR VIDEO ERROR

Table A-1. Error codes and messages (continued)

Error code	Message
Floppy disk drives and controller	
601	FLOPPY DISK CONTROLLER ERROR
602	SEQUENTIAL SEEK ERROR
603	RANDOM SEEK ERROR
604	WRITE ERROR
605	READ ERROR
606	DISK CHANGE CHECK REMOVE ERROR
607	DISK CHANGE CHECK INSERT ERROR
Math coprocessor (80287)	
	NOT INSTALLED
702	COPROCESSOR INITIALIZE ERROR
703	COPROCESSOR INVALID OPERATION MASK ERROR
704	COPROCESSOR ST FIELD ERROR
705	COPROCESSOR COMPARISON ERROR
706	COPROCESSOR ZERO DIVIDE MASK ERROR
707	COPROCESSOR ADDITION ERROR
708	COPROCESSOR SUBTRACTION ERROR
709	COPROCESSOR MULTIPLICATION ERROR
710	COPROCESSOR PRECISION ERROR
Parallel port	
901	ERROR PIN p
Serial port (RS-232C)	
	<i>control signal</i> ALWAYS LOW
1101	<i>control signal</i> ALWAYS HIGH
1102	TIMEOUT ERROR
1103	VERIFY ERROR
Alternate serial port	
1201	<i>control signal</i> ALWAYS LOW
1201	<i>control signal</i> ALWAYS HIGH
1202	TIMEOUT= ERROR
1203	VERIFY ERROR
Dot-matrix printer	
1401	<i>status</i>
Hard disk drives and controller	
1701	SEEK ERROR
1702	WRITE ERROR
1703	READ ERROR
1704	HEAD ERROR
1705	ERROR DETECTION ERROR
1706	ERROR CORRECTION ERROR
Alternate parallel port	
2101	ERROR PIN p

Appendix B

Types of Hard Disk Drives

This appendix lists the numbers you need to identify a hard disk drive. Refer to this table and the documentation supplied with your hard disk to find the correct number for the type of drive you are installing. You use this drive type number when you run the Setup program after installing a hard disk drive.

Table B-1. Drive Types

Drive type	Cylinders	Heads	Write precompensation	Landing zone (cylinder)	Capacity (MB)
1	306	4	128	305	10
2	615	4	300	615	20
3	615	6	300	615	30
4	940	8	512	940	62
5	940	6	512	940	46
6	615	4	- 1	615	20
7	462	8	256	511	30
8	733	5	- 1	733	30
9	900	15	- 1	901	112
10	820	3	- 1	820	20
11	855	5	- 1	855	35
12	855	7	- 1	855	50
13	306	8	128	319	20
14	733	7	- 1	733	42
15	0	0	0	0	0
16	612	4	0	663	20
17	977	5	300	977	40
18	977	7	- 1	977	58
19	1024	7	512	1023	60
20	733	5	300	732	30
21	733	7	300	732	42
	733	5	300	733	30
22	306	4	0	336	10
24	612	4	305	663	20
25	306	4	- 1	340	10
26	612	4	- 1	670	20
27	698	7	300	732	40
28	976	5	488	977	41
29	306	4	0	340	10
30	611	4	306	663	20
31	732	7	300	732	43
32	1023	5	- 1	1023	43
33-42	0	0	0	0	0
43	1024	8	512	1023	69
44	830	10	512	829	141
45	1024	5	512	1023	43
46	615	8	128	618	40
47	0	0	0	0	0

Appendix C

Power-on Diagnostics

The built-in memory (ROM) of your computer contains a series of diagnostics programs. These programs are run automatically by the system every time you turn on the power. The diagnostics programs check the internal devices such as ROM, RAM, keyboard controller, timer, video controller, floppy disk driver, and hard disk controller.

When you turn on the power, your system performs the tests described in this appendix. If an error is found, a specific error number and error message display. If the error is serious, the computer cancels further checking and halts system initialization. The error message remains on the screen but the computer is inoperable.

If the error is not serious, the computer displays an error message and waits for you to resume further checking. You see this prompt:

(Resume = "F1" key)

Write down the error message and code number, and then press **F1** to resume. Report the error message and code number to your dealer when requesting repairs.

When the self test finds a problem, the system checks all the hardware. This check may take about one minute; during this time, you see only the power light on the computer. After checking the hardware, the diagnostics continue.

System Device Check

The computer first checks its internal devices such as the ROM. If a malfunction is found, the computer displays an error message. In some cases, it may halt with no further information. If this happens, contact your dealer as soon as possible.

If a fault in the main board is found, a number from 101 to 108 and an error message display. This message is in the following format:

10x-System board error

where **x** is a number from 1 to 8 that represents the specific LSI circuit in which the **error** is found. Your service dealer needs this information to find and correct the problem.

If an I/O or checksum error occurs, you see this message:

xxxx0 ROM error

where **xxxx** is the number of the segment of the bad I/O ROM.

Clock and CMOS RAM Check

When the system device check is completed successfully, the computer checks the timer and CMOS RAM. If the information contained in the RAM does not match the actual system installation, you see one of these messages:

161-System options not set
(Run SETUP in DIAGNOSTICS)
162-System options not set
(Run SETUP in DIAGNOSTICS)

The information stored in the CMOS RAM must be corrected. Run the Setup program provided on the diagnostics diskette to correct the installation information.

If the system clock has not been set, this message displays:

163-Timer & Date not set
(Run SETUP in DIAGNOSTICS)

If the memory allocation has not been set, you see this message:

164-Memory size error
(Run SETUP in DIAGNOSTICS)

RAM Check

The computer now begins to check the RAM installed in both the main board and option cards. During this check, this message displays:

xxxxxx KB OK

where **xxxxxx** indicates the amount of memory in which no malfunction is found. This value increases continuously by 64KB up to the amount of RAM installed on the main board. If the computer detects an error in the

first 64KB area, an error message displays and the computer halts with no further information.

If there are faulty RAM chips in your system, you see one of these messages:

202-Memory address error
203-Memory address error

If an I/O or parity error occurs, you see one of these messages:

Parity check 1
Parity check 2

The program also displays the number of the segment causing the problem.

Keyboard Controller and Keyboard Check

The computer checks the keyboard controller and keyboard for problems such as failure of one of the keys to release.

If there are any errors in the connection between the keyboard and the computer, this error message displays:

301-Keyboard error

When this message is preceded by a number (xx), the number represents the key (in hexadecimal) that is the source of the error.

If another failure is found, you see one of these messages:

303-Keyboard or system unit error
304-Keyboard or system unit error

Display Card Check

The computer checks the color or monochrome display card that is installed in the system. An error number and message appear if any faults are found in the display adapter card. Number 401 represents an error in the monochrome display card, and 501 represents an error in the color display card. The messages are:

401-CRT error
501-CRT error

Optional RAM Check

If any additional memory (expansion RAM) is installed, the computer then checks that RAM for any malfunction.

Floppy Disk Drive Seek Check

The computer checks its floppy disk drives by searching the read/write heads for any malfunction.

If any seek errors are found, you see this message:

601-Diskette error

If this error occurs, confirm that the system diskette is inserted into drive A. If this number still appears after you insert the diskette, the disk drive must be repaired.

Hard Disk Controller and Hard Disk Check

The computer next checks the hard disk controller and drive unit. If a malfunction is found in the hard disk controller card, you see this error number and message:

1782-Disk controller failure

If an error is found in the hard disk drive unit, one of these error messages displays:

178x-Disk x error

179x-Disk x error

where x is 0 or 1, and represents the drive number of the hard disk. Drive C is number 0, and drive D is number 1.

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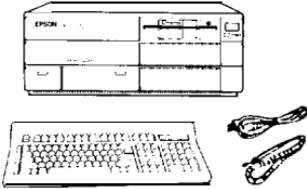
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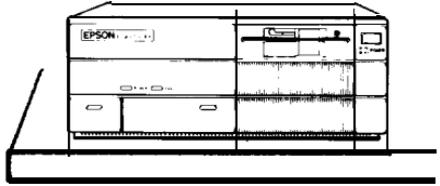
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8 Steps to Setting Up the Equity II+

1 Unpacking Your Computer



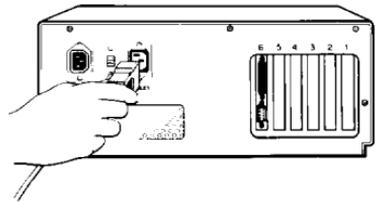
2 Choosing a Location



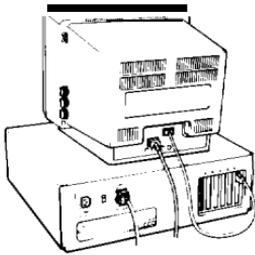
3 Arranging the Components



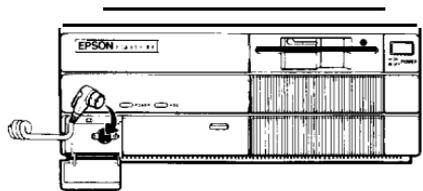
4 Connecting the Power Cord



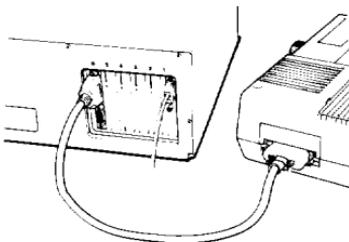
5 Connecting a Video Monitor



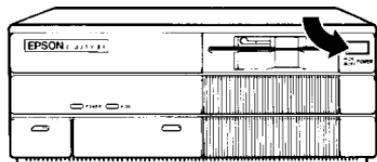
6 Connecting the Keyboard



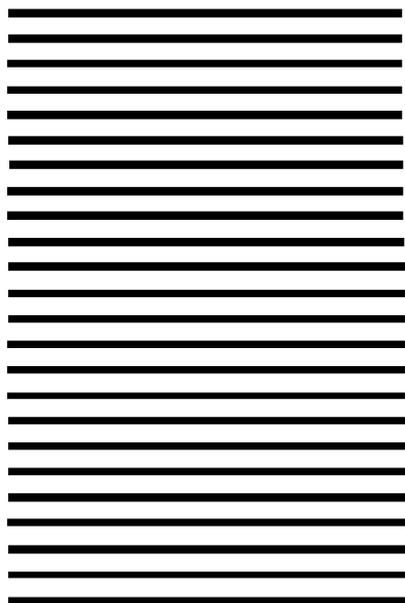
7 Connecting a Printer



8 Turning On the Computer



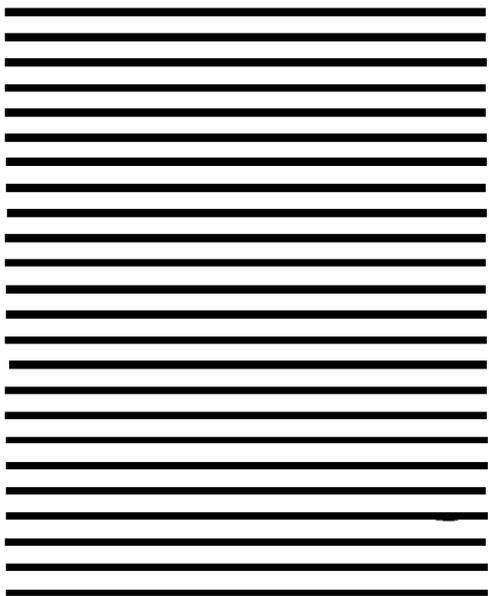
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