HEWLETT-PACKARD

Setting Up Vectra LS/12

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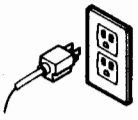
Setup Order

This sheet shows the major steps you must go through to set up and learn to use your computer. *Review this information now, and then refer to it whenever you have questions about what to do next.*

Step 1:

Read the System Checklist included with your computer for information about your computer's configuration. Save the checklist for future reference.

Step 2:



Unpack your computer and connect it to a power source.

Step 3:

Run the SETUP program.
- Option 1: Set System Configuration
- Option 3: Initialize Internal Hard Disk

Step 4:

Install your operating system.

(Continued)

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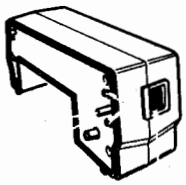
Step 5:

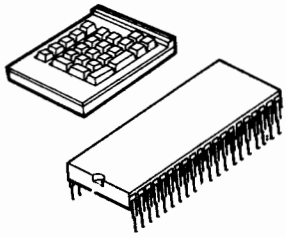
Install your Utilities and Drivers.
(MS-DOS users only)

Step 6:



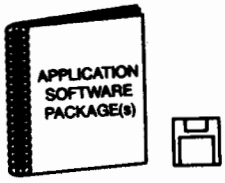
Set up the Battery.
- Fully charge to prevent "memory effect."
- Run the Battery Watch utility.

Step 7:



Add accessories and connect peripherals to your computer.

Step 8:



Install your software applications.

Printing History

October, 1988 Printed in USA

FCC Statement

Federal Communications Commission (FCC) Radio Frequency Interference Statement (USA Only)

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, monitors, 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 with radio and television reception.

More About Radio and Television Interference

Because the HP Vectra personal computer generates and uses radio frequency energy, it may cause interference with radio and television reception in a residential installation.

Hewlett-Packard's system certification tests were conducted with HP-supported peripheral devices and HP shielded cables, such as those you received with your system.

Warning: Cables used with this computer must be properly shielded to comply with the requirements of the FCC.

The Vectra personal computer meets the requirements for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of FCC Rules. These rules are designed to provide reasonable protection against such interference in a residential installation.

Hewlett-Packard provides instructions for using this computer in manuals covering setup, connection of peripheral devices, operation, service, and technical reference.

Installing and using the computer in strict accordance with Hewlett-Packard's instructions will minimize the chances that your Vectra personal computer will cause radio or television interference. However, Hewlett-Packard does not guarantee that the computer will not interfere with radio and television reception.

If you think your computer is causing interference, turn it off and see if the radio or television reception improves. If the reception improves, your computer is causing the problem.

To correct interference, take one or more of the following interference remedies, as needed:

- Relocate the radio or television antenna.
- Move the computer away from the radio or television.
- Plug the computer into a different electrical outlet, so that the computer and the radio or television are on separate electrical circuits.
- Make sure that all your peripheral devices are also certified Class B by the FCC.
- Make sure you use only shielded cables to connect peripheral devices to your computer.
- Consult your computer dealer, Hewlett-Packard, or an experienced radio/television technician for other suggestions.

Electrical Safety

Warning

For your safety, the power cords supplied with this product have grounded plugs. The power cords should be used with properly grounded (3-hole) wall outlets to avoid electrical shock. You can also use multiple-outlet strips that have their own circuit breakers.

Batteries

Warning

This computer uses an internal lithium battery, which may explode if mistreated. DO NOT recharge, disassemble, or dispose of in fire. When the battery needs replacement (every 3 to 5 years), have your dealer or HP service representative replace it.

Corrections and Updates

The *HP PC Communicator* magazine provides current information about Hewlett-Packard computers and software. Some of the things that you can find in *The Communicator* include announcements of software updates, updates to manuals, articles on usage and programming techniques, and answers to frequently asked questions. We recommend that you order a subscription (available in English only).

Warranty Information

Hewlett-Packard warrants this product against defects in materials and workmanship for a period of one year from receipt by the user. During this warranty period, Hewlett-Packard or an authorized dealer will, at their option, either repair or replace products that prove to be defective.

For complete information, please refer to the section on "Limited One-Year Warranty" in the *Support and Services Information* booklet, which is shipped with your HP Vectra personal computer.

Statement for the United Kingdom

Special United Kingdom Instructions

Interconnection directly, or by way of other equipment, with equipment not complying with BS6301 may produce hazardous conditions of the British Telecom (BT) networks. Advice should be obtained from an engineer before such a connection is made.

Connection to the BT network must be unplugged before the main plug is disconnected.

Connection to the BT network must not be hard wired.

This equipment complies with BS6301. Connect only to equipment complying with BS6301 to the ports of this equipment.

Setting Up Your Vectra LS/12 Laptop PC

HP Part No. D1024-90001
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1

Getting Started

Unpacking and Connecting the Computer

1. Carefully unpack your computer and place it on a work surface. (Save the boxes in case you ever need to ship or return equipment.) Handle your computer gently; the internal hard disc drive is fragile and can be easily damaged, especially when the computer is on.
2. Locate your computer away from heat sources to prevent it from overheating.
3. Find the computer power cord and power adapter. Plug the appropriate end of the power cord into the connector on the adapter. Plug the power cord into a properly rated power outlet. Then, plug the adapter into the back of the computer as shown in Figure 1-1.

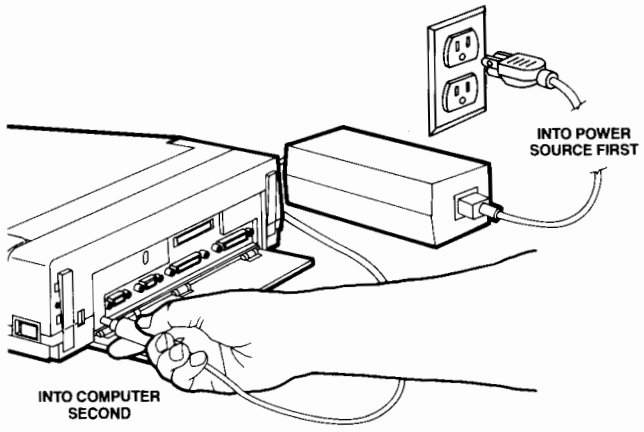

Figure 1-1. Power Adapter Connection

4. Open your computer by pulling the latch on each side of the computer toward the front as shown in Figure 1-2. Lift the top up from the front. Note that the latches will open only when the computer is laying flat.

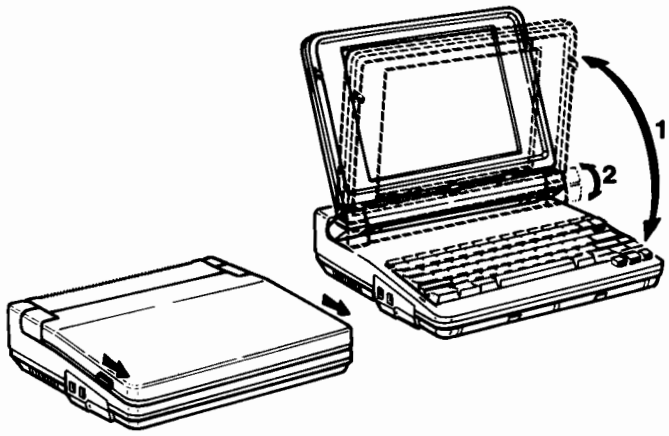

Figure 1-2. Opening the Computer

5. The top contains the liquid crystal display (LCD) screen. Operate your computer in locations where lights or windows will not cause reflections on the screen.

Before You Run the SETUP Program

The following section contains information that you should be familiar with before you run the SETUP program.

Backlight Powerdown

Your computer is pre-set at the factory to turn off the backlight in the LCD screen after two minutes have passed since the last key was pressed on the keyboard. This setting helps to conserve power when you are using the battery. When the backlight is turned off, the LCD screen will be dark and the characters will be barely legible.

To turn the backlight on, just press any key other than the Fn key. You can change the backlight powerdown setting with the SETUP program (described in Appendix A) and the HPMODE command (described in your *Utilities and Drivers Packet*).

Brightness and Contrast Controls

The brightness and contrast controls are located below the LCD screen as shown in Figure 1-3.

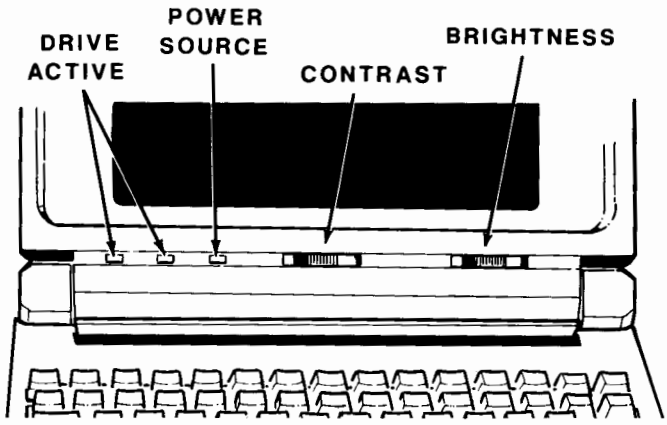

Figure 1-3. Brightness and Contrast Controls

Use these controls when you need to increase or decrease the brightness and contrast of the LCD screen.

Note

After your computer has been running for a few hours, you may notice that the characters on the screen begin to fade. This happens when the LCD screen temperature increases. To correct the problem, adjust the contrast control. The fading will level off after a few hours.

Hard Disc Drive

A hard disc drive is installed in your computer. The hard disc drive type and capacity are listed on the *System Checklist* that was included with your computer.

Drive and Power Indicators

The Light Emitting Diode (LED) indicators located to the left of the brightness and contrast controls are the drive activity and power source indicators. These indicators show whether the power is on, and whether the disc drives are in use. The power indicator may light in different colors. Table 1-1 lists the colors and their meanings.

Table 1-1. Power Indicator Colors

Color	Indication
Amber	Power adapter supplying power to computer
Green	Battery pack supplying power to computer
Flashing Red	Battery pack power is low (approximately two minutes of battery power left)
Red	Battery dead, automatic shut-down begins

For information about the keyboard indicators, refer to Chapter 4.

Memory

The four different kinds of computer memory are system base memory, reserved memory, extended memory, and expanded memory.

System base (or conventional) memory is the memory located from 0 KB (Kilobytes) to 640 KB. You can set system base memory to 512 KB if necessary. It is used by your computer's operating system and applications. Reserved memory is used for the system services, such as BIOS. Your computer automatically keeps track of reserved memory.

Your computer comes standard with 256 KB of expanded memory which can be accessed only if you enable it with the SETUP program and install the LIM EMS driver. Running the SETUP program is described in Appendix A; installing the driver is discussed in this chapter.

If you add an internal memory expansion card to your computer, you can use the memory on the card as either extended memory or expanded memory, but not both. If you set it up as expanded memory, the total expanded memory available is the amount on the card plus the 256 KB that comes with your computer.

Extended Memory

Extended memory can be used as a RAM disc using VDISK.SYS (which is included with current versions of MS-DOS).

Expanded Memory

Expanded memory is the memory that can be accessed by the LIM EMS driver included in your *Utilities and Drivers Packet.* MS-DOS applications that conform to the Lotus/Intel/Microsoft Expanded Memory Specification (LIM EMS) can take advantage of expanded memory.

Specifying a Video Adapter/Display

The SETUP program will ask you for the primary display used by your computer. The primary display is the internal LCD screen of your computer. It may also be another display attached to the "Monitor" port on the back of your computer.

However, when you are installing an application, you may also need to specify the video adapter/display you are using. In this case, choose "Color Graphics Adapter/Display." Do not specify "LCD" (Liquid Crystal Display).

Setting Up Your Computer

The next steps in setting up your computer are:

- Running the SETUP program
- Installing the operating system
- Installing the utilities and drivers
- Setting up the battery

Running the SETUP Program

You must run Option 1 "Set System Configuration" and Option 3 "Initialize Internal Hard Disc" of the SETUP program.

Run Option 1: Set System Configuration

You must run Option 1 of the SETUP program when your computer is started for the first time, to correct the time and date, to change battery conservation settings, and after adding accessories such as a modem or expansion chassis. Refer to your System Checklist for information about the items installed in your computer.

Follow these steps to run the SETUP program.

1. Insert the SETUP and Utilities Program disc (located at the back of this binder) in drive A: as shown below.

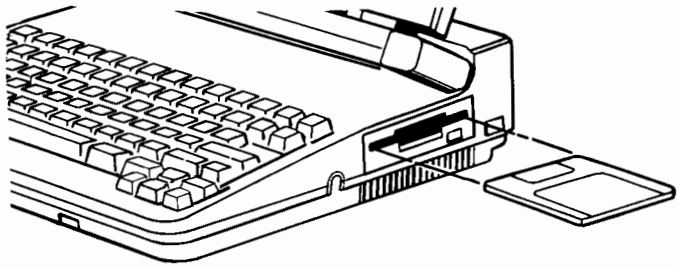

Figure 1-4. Inserting the SETUP Program Disc

2. Turn on the power to the computer by sliding the switch on the right side of the computer to the "1" setting, as shown in Figure 1-5.

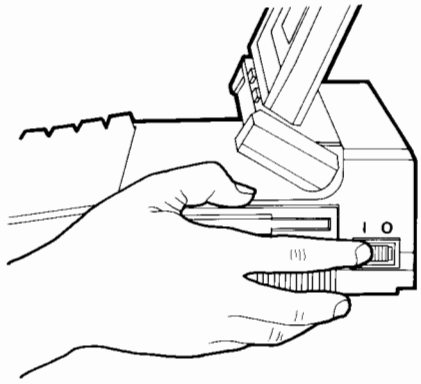

Figure 1-5. Turning On the Power

3. Your computer automatically performs a series of internal self-tests that check the major circuits and verify that various functions operate properly. If some part of the computer fails to operate correctly, the computer will display an error message on the LCD screen. Appendix D contains more detailed information on these self-tests and error messages.
4. A message is displayed in the upper left corner of the LCD. These numbers tell you how much system base, reserved, extended and expanded memory the computer has.
5. If you are asked to select the language type of your keyboard, do so.
6. The SETUP main menu will then appear.
7. Adjust the LCD for the best contrast and brightness.

8. An expansion chassis is an external box used to add accessory cards to your computer.

   Do you have an external expansion chassis for your computer?

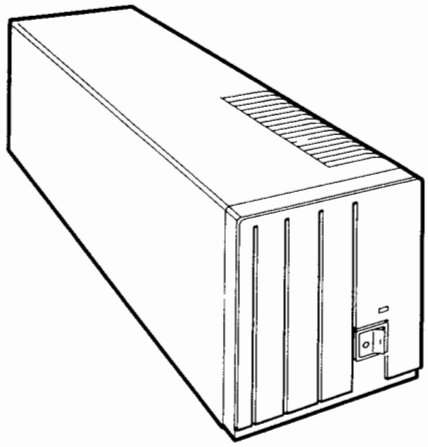

Figure 1-6. External Expansion Chassis

- **NO.** Skip to step 9.
- **YES.** You must set TWO system configurations:

  a. A system configuration for using your computer as a portable (without an expansion chassis attached)

  b. A system configuration for using your computer with accessory cards installed in the expansion chassis

After you have set the first system configuration, screens will be displayed for you to enter information for the second system configuration. After you have completed both, your computer will automatically choose the correct system configuration each time you turn on your computer. When you want to use the expansion chassis, be sure to turn it on before you turn on your computer.

9. Select Option 1 by typing

   1

   and pressing Enter.

10. Follow the instructions and answer the questions on the screen. If you need more information on how to answer a question, refer to Appendix A.

11. When you have set your system configuration(s), the SETUP main menu is displayed. Go to the next section and follow the instructions for Option 3 to initialize your hard disc.

Run Option 3: Initialize Internal Hard Disc

Initialization is the first step in a multi-step process for preparing a new hard disc to receive data. Follow these steps to initialize your hard disc.

1. At the SETUP main menu, select Option 3 by typing

   3

   and pressing Enter. Answer the questions on the screen.

Note

Hard disc initialization could take two to three minutes per megabyte of hard disc capacity.

2. After initialization is complete, read the information displayed and return to the SETUP main menu. Type

   6

   and press Enter to exit the SETUP program.

3. The following message is displayed:

   ```
   Your system must now be restarted.

   Remove SETUP disc from drive A: if
   necessary.

   Press any key to continue.
   ```

4. Remove the SETUP and Utilities Program disc from drive A:. Then, press any key.

5. Go to the next section and follow the instructions for installing your operating system.

Installing Your Operating System

After you have set your system configuration and initialized your hard disc, you are ready to install your operating system.

Are you installing the MS-DOS operating system?

- **YES.** MS-DOS is available on both 3.5-inch and 5.25-inch discs. The installation instructions in the *Installing Your Operating System* manual are for 5.25-inch discs. Because you have 3.5-inch discs, you should use your **Startup/Operating** disc whenever the instructions refer to either the Startup **or** Operating disc. (The second disc is the HP+ disc.) Follow these steps to install your operating system.

1. Install MS-DOS. Refer to your *MS-DOS Volume I* binder for instructions.
2. After you have installed MS-DOS, go to the next section in **this chapter** and install your utilities and drivers.

- **NO.** Follow these steps to install your operating system.
  1. Install your operating system. Refer to your operating system documentation for instructions.
  2. After you have installed your operating system, go to the "Setting Up Your Battery" section in **this chapter** and prepare your battery for use. Do not install the MS-DOS utilities and drivers.

Installing Your Utilities and Drivers

Utilities and drivers are programs which increase your computer's capabilities and performance. The following MS-DOS utilities and drivers are included with your computer.

- **SETUP Program.** The SETUP program allows you to change your system configuration, computer speed selection, and battery conservation settings.
- **HPMODE Command.** This command allows you to temporarily change your computer speed selection, battery conservation settings, modem setting, and display characteristics.
- **Battery Watch.** This utility monitors your battery usage and estimates how much battery charge remains. Battery Watch also has a deep discharge utility which corrects the NiCad

battery memory effect problem and restores the battery to its full charge capacity.

- **Disc Cache Program.** This program increases the speed at which your computer reads information from a hard disc. Many applications (such as accounting packages, spelling checkers, and data base programs) run faster and more efficiently using disc caching. The LIM EMS driver must be installed to set up a disc cache in expanded memory.
- **LIM EMS Driver.** The Lotus/Intel/Microsoft Expanded Memory Specification (LIM EMS) driver allows software that conforms to the specification to use *expanded* memory in your system. With this driver, you can use the Disc Cache program to set up a disc cache in expanded memory. You can also set up a RAM disc in expanded memory; however, this is not recommended unless you have added a memory expansion card to your computer.
- **READ.ME File.** A READ.ME file containing current information may be included with your utilities and drivers. If it is included, it will be displayed during installation.
- **KEYB.COM File.** A new KEYB.COM file is included and will replace the KEYB.COM file on your hard disc, if one exists.

- **3.5-Inch Driver.** This driver allows you to exchange data on double-sided discs used in the HP 110, HP Portable PLUS, HP 150, HP 150II or HP Vectra *external* 3.5-inch flexible disc drives.

  Because most users do not need this driver, it is not installed automatically. Installation instructions are included in the *3.5-Inch Driver* manual in your *Utilities and Drivers Packet.*

Determining If You Can Install Automatically

You can automatically install your utilities and drivers if the following conditions apply to you.

1. You want to copy the utilities and drivers to the root directory of your hard disc.
2. You do not have a memory expansion card installed in your computer.
3. You want to set up a disc cache in expanded memory with a size of 128 KB.
4. You do not want a RAM disc in expanded memory.
5. You do not want to use extended memory.

Do the above conditions apply to you?

- **NO.** Install your utilities and drivers by following the instructions in *each* manual contained in your *Utilities and Drivers Packet.* If you have not yet placed the packet behind the *Additional Utilities and Drivers* tab in the *MS-DOS Volume I* binder, look for them in your *Setting Up* Binder.

  After you have installed your utilities and drivers, return to **this chapter,** and follow the instructions for setting up your battery and adding accessories and peripherals.

- **YES or UNSURE.** Follow these steps to automatically install your utilities and drivers.

1. Start your computer and display the MS-DOS prompt.
2. If the PAM (Personal Applications Manager) main menu appears, select `MS-DOS COMMANDS` (**move the arrow pointer** to the selection) and press Enter.
3. To make sure you are in the root directory of your C: drive, type

   ```
   C:
   ```

   and press Enter. Then type

   ```
   CD \
   ```

   and press Enter.
4. Insert the SETUP and Utilities Program disc (located at the back of this binder) in drive A:.

5. At the MS-DOS prompt, type

```
A:INSTUTIL
```

and press Enter. You will see this message:

```
***Installation will be from disc A: to disc C:\.
***If this is NOT correct, hold down [CTRL] and press C.
***If this IS correct, press any alphanumeric key to continue.
Strike a key when ready ...
```

6. Press any alphanumeric key (A–Z, 0–9). When the utilities are installed in the root directory of your hard disc, you will see this message:

```
All utilities installed onto disc drive C:\.
```

7. Do you want to be able to exchange data on double-sided discs used in the HP 110, HP Portable PLUS, HP 150, HP 150II or HP Vectra *external* 3.5-inch flexible disc drives.

   - **NO.** Skip to step 8.
   - **YES.** Install the 3.5-Inch Driver by following the instructions in your *Utilities and Drivers Packet.* When you are done, continue with step 8.

8. Remove the SETUP and Utilities Program disc from the drive and put it away.

9. Restart your computer by holding down Ctrl and Alt, and pressing DEL at the same time.

   You have finished installing your utilities and drivers. When you have time, learn how to use them by referring to the manuals contained in your *Utilities and Drivers Packet.* You can ignore the installation instructions in those manuals since you have already installed your utilities and drivers.

10. Go to the next section and set up your battery.

Setting Up Your Battery

When you first receive your battery, it is not charged. After you have charged your battery the first time, you must always FULLY DISCHARGE your battery and then FULLY RECHARGE it.

Caution

Failure to properly discharge and recharge your battery will result in a severely reduced operating period. This is known as *memory effect.* See Chapter 3 for more information about memory effect.

Follow these steps to prepare your battery to be used for the first time.

1. Turn off your computer. Unplug the power adapter from the back of the computer.
2. Position the battery as shown below.

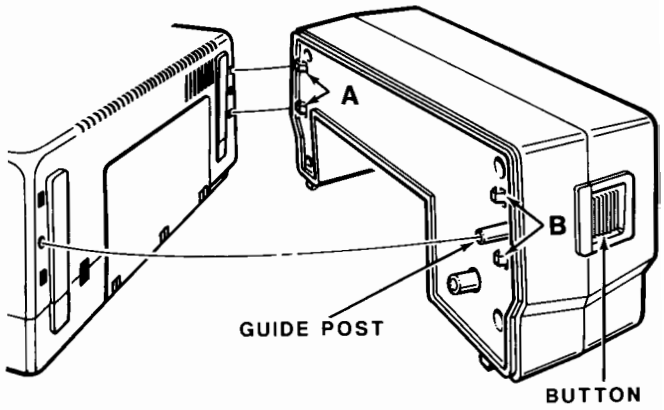

Figure 1-7. Battery Installation

3. Insert the battery hooks labeled A into the holes in the back of the computer as shown.
4. Rotate the battery toward the computer until the guide post enters its receptacle in the computer.

5. Insert the hooks labeled B into the holes in the computer and press in on the battery until it locks in place.
6. Make sure the power adapter is plugged into a power outlet. Then, plug the power adapter into the battery. Your battery is now being recharged.
7. Recharge the battery for eight hours if the computer is turned off. Recharge it for twelve hours if the computer is turned on. (Your battery has overcharge protection.)
8. You may continue to use your computer while you are recharging the battery. Using your computer will increase the time it takes to recharge the battery to twelve hours. (You can also recharge the battery if it is not attached to the computer.)
9. If you want to monitor your battery's charge level as you use it, run the Battery Watch utility *after* your battery is fully recharged (8-12 hours). Set the estimated charge level to "full." You should have already installed the Battery Watch utility when you installed your utilities and drivers. See Appendix B for general information or your *Utilities and Drivers Packet* for complete information about Battery Watch.

Note

Be sure to read the procedures for recharging your battery in Chapter 3. The procedures are critical for prolonging battery life and avoiding permanent damage to your battery. Chapter 3 also includes information about conserving battery power and the low battery power indicators.

Transporting the Computer

To prepare your computer for transportation, follow these steps:

1. Remove any flexible disc that may be in the drive. It is not necessary to park the hard disc heads as they will park automatically when you turn off your computer.
2. Turn off your computer by positioning the power switch to the "0" setting.
3. Disconnect the power adapter.
4. Close the lid and make sure it latches. Note that the computer will beep if the lid is closed while the computer is on.
5. Pull out on the handle, as shown in Figure 1-8.

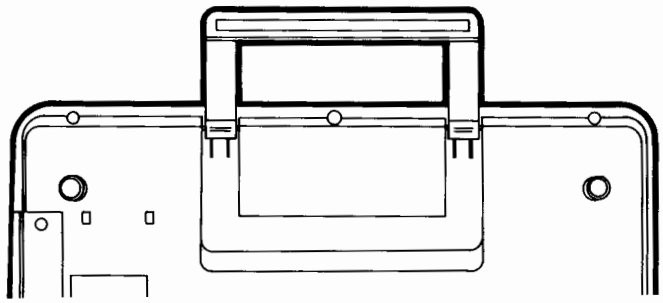

Figure 1-8. Built-In Handle

Note

The handle is designed to carry the computer for a short distance. A carrying case should be used if the computer will be taken to different locations, or if it will not be handled gently in transit. The original shipping box is recommended for shipping or when checking your computer as airline baggage.

What's Next

Do you have any accessories or peripherals to add to your computer?

- **YES.** Go to Chapter 2 to learn about adding accessories and attaching peripherals. Then, go to Chapter 3 to learn about proper use of your battery. Refer to the rest of this manual to learn more about using your computer.
- **NO.** Go to Chapter 3 to learn about proper use of your battery. Refer to the rest of this manual to learn more about using your computer.

2

Adding Accessories and Connecting Peripherals

If you have accessories to add or peripherals to connect to your computer, read the appropriate section(s) of this chapter. Then, go to Chapter 3 to learn about proper use of your battery.

Adding Accessories

Some of the accessories available for your computer are:

- Memory Expansion Card
- Numeric Coprocessor
- Numeric Keypad
- Internal Modem
- Expansion Chassis

Memory Expansion Card

A memory expansion card can be used as either EMS (Expanded Memory Specification) or extended memory. However, this memory expansion card can only be installed by a qualified dealer or HP service representative.

If memory is added to your computer, be sure to use the SETUP program to update your system configuration. Refer to Appendix A for information on using the SETUP program.

If you want to use the memory as expanded memory, be sure you have installed the LIM EMS driver.

Instructions for installing this driver are included in the *Utilities and Drivers Packet.*

Numeric Coprocessor

Handling Your Coprocessor Safely

Before you remove your coprocessor from its container, read these rules for safe handling.

HANDLE GENTLY. Do not drop or handle roughly. Take care when unpacking and when handling during installation.

PROTECT FROM STATIC ELECTRICITY. Coprocessors contain electrical components that are easily damaged by small amounts of static electricity.

- Leave the coprocessor in its anti-static container until you are ready to install it.
- If possible, use an anti-static wrist strap and a grounding mat such as those included in the Electrically Conductive Field Service Grounding Kit (HP Product Number 9300-0933).
- Before you remove the coprocessor from its container, touch the surface of the container to help discharge static electricity.
- When you remove the coprocessor from its container, handle it only by its edges. Try not to touch the metal legs.

Installing the Numeric Coprocessor

Be sure to use only approved CMOS 80C287 coprocessors to avoid physical damage to your computer. To install a numeric coprocessor in your computer, you will need a small flat blade screwdriver. Follow these steps.

1. Turn the computer off.

2. Close and latch the lid.
3. Remove the battery if necessary by pressing in on the battery button and rotating the battery away from the computer.
4. Place a soft cloth on your work surface and turn the computer upside down on your work surface.
5. Open the back panel door on your computer.
6. Use a screwdriver to carefully pry up the coprocessor socket cover as shown in Figure 2-1.

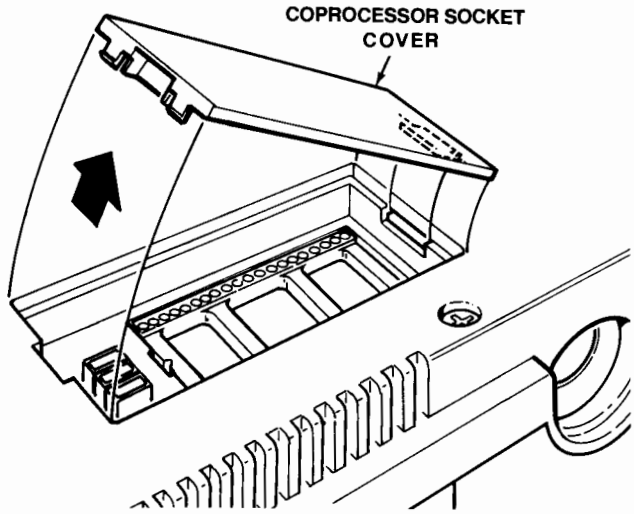

Figure 2-1. Removing the Coprocessor Socket Cover

7. The pins on the coprocessor are bent out at an angle so they do not line up with the holes in the coprocessor socket. The pins must be straightened before installation; incorrect installation may damage the coprocessor pins or the socket, causing intermittent and unreliable contact.

8. Follow these steps to straighten the pins of the coprocessor.

    a. Hold the coprocessor in one hand and place your other hand on your work surface before you touch the coprocessor to your work surface. This will equalize the static electricity between the work surface and the coprocessor.

    b. Lay the coprocessor on its side, as shown in Figure 2-2, and roll it very carefully toward the pins to straighten them.

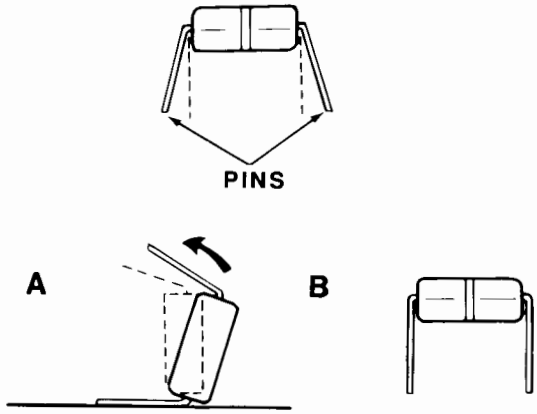

Figure 2-2. Rolling to Straighten the Pins

    c. Then turn the coprocessor over and straighten the pins on the other side in the same manner.

9. Hold the coprocessor with one hand and touch the metal panel behind the back panel door with the other hand. This will equalize the static electricity between your computer and the coprocessor.

10. Position the coprocessor over the coprocessor socket. Make sure that the index mark of the coprocessor is positioned toward the jumpers next to the socket as shown in Figure 2-3.

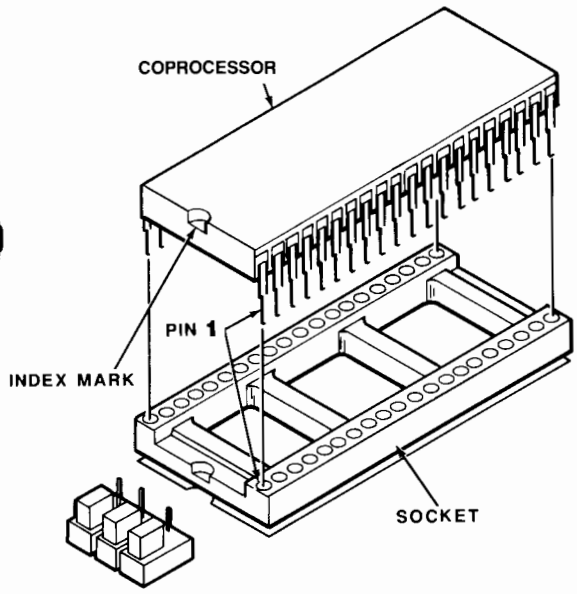

Figure 2-3. Orientation and Alignment of the Coprocessor

11. Make sure that the pins are aligned with the holes in the socket.
12. Use two fingers to evenly press the coprocessor firmly into the socket.

Note

A pin can become bent under the coprocessor and will appear to be correctly seated in its socket. If a malfunction occurs, examine the coprocessor (and remove it, if necessary) to be certain that all pins are correctly inserted.

13. Replace the coprocessor socket cover. Close the back panel door.
14. Turn your computer over, attach the battery if necessary and then plug in the power adapter.

Note

Using a numeric coprocessor will reduce battery power.

Numeric Keypad

The numeric keypad accessory provides you with the convenience of a calculator type keypad without changing the mode of the keyboard on your computer. Combined with your computer's keyboard, the numeric keypad gives you all the functions of a 101-key keyboard.

Connecting the Numeric Keypad

Turn off your computer. Then, connect the numeric keypad cable to the keyboard connector on the side of the computer, as shown in Figure 2-4. Place the keypad at any convenient location on your work surface. You can adjust the tilt of the keypad to one of two angles, as shown in the inset of Figure 2-4.

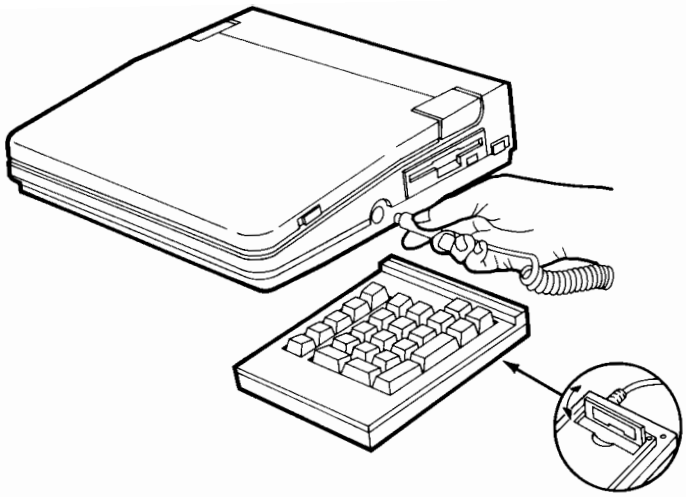

Figure 2-4. Connecting the Numeric Keypad

Using the Numeric Keypad

When the external keypad is connected to the computer, its mode is indicated by the NUM LOCK indicator. If the indicator is lit, the keypad is in numeric mode. If it is not lit, it is in cursor mode.

In numeric mode, pressing a number or the period key displays that character on the screen. Pressing either of the Shift keys on the main keyboard and then pressing a number key selects the cursor function printed on that key.

Pressing the Num Lock key on the external keypad toggles the keypad between the numeric mode and the cursor mode.

Pressing the Num Lock key on the main keyboard also toggles the NUM LOCK function on the external keypad.

Pressing Fn+Pad Lock on the main keyboard places the keypad on the main keyboard in the same mode as the external keypad. The NUM LOCK indicators on the external keypad and on the main keyboard will be lit when both keypads are in the numeric mode.

Pressing Fn+Pad Lock on the main keyboard again deactivates the keypad on the main keyboard but does not affect the external keypad.

Pressing either Scroll Lock key activates that function and causes both SCROLL LOCK indicators to light.

Internal Modem

Instructions for installing and using an internal modem are supplied with the modem.

Expansion Chassis

The expansion chassis is an external box you use to add up to three full size PC/XT-compatible (8 bit) accessory cards to your computer. Instructions for attaching and using an expansion chassis are supplied with the expansion chassis.

Connecting Peripherals

The following connectors are located on the back of your computer for connecting peripherals, such as printers and plotters.

- The video connector (labeled MONITOR)
- The parallel connector (labeled PARALLEL PRINTER)
- The serial connector (labeled SERIAL)
- The external disc drive connector (labeled EXT. DISC)

When connecting a peripheral to a serial or parallel connector, be sure you know how the connectors are

configured, for example, COM1, LPT1, etc. You need to know this information if you have an application that allows you to select a peripheral. If you are unsure of the configuration, you can run the SETUP program (described in Appendix A) to check your system configuration.

Also, make sure you have the correct cable to connect between your computer and peripheral. If you are unsure, contact your dealer or HP service representative about which cable you need.

Follow these steps to connect a peripheral to your computer.

1. Plug the appropriate end of the cable into the connector on the back of your computer.
2. Tighten the cable screws to secure it to the computer.
3. Set up your peripheral using the manual that came with it. Then connect the free end of the cable to the peripheral and tighten the screws.
4. Run the SETUP program and update your system configuration. See Appendix A for instructions on how to run the SETUP program.

3

Using the Battery

Your battery is a rechargeable nickel-cadmium battery; sometimes referred to as a NiCad battery. The length of time your computer will operate with the battery depends upon the computer's features and battery conservation settings you have chosen with the SETUP program or HPMODE command.

Battery Features

NiCad batteries have two unique features:

- They are rechargeable.
- **If they are not cared for properly, they can develop memory effect which severely reduces their operating period.**

Memory Effect

You should always fully discharge your battery and then fully recharge it. If you always use your battery for an hour and then recharge it, it will only hold a charge for an hour before it stops working. This is known as memory effect.

Once memory effect occurs, it cannot be corrected by discharging and recharging in the *normal* manner. You must use the deep discharge function of the Battery Watch utility to correct memory effect. Refer to your *Utilities and Drivers Packet* for more information on Battery Watch. You can avoid memory effect by fully discharging your battery and then fully recharging it.

Attaching the Battery

Use the following procedure to attach the battery to your computer. You do not need any special tools. Refer to Figure 3-1 for the following steps.

1. Turn off your computer. Unplug the power adapter from the back of the computer if necessary.
2. Position the battery as shown below.

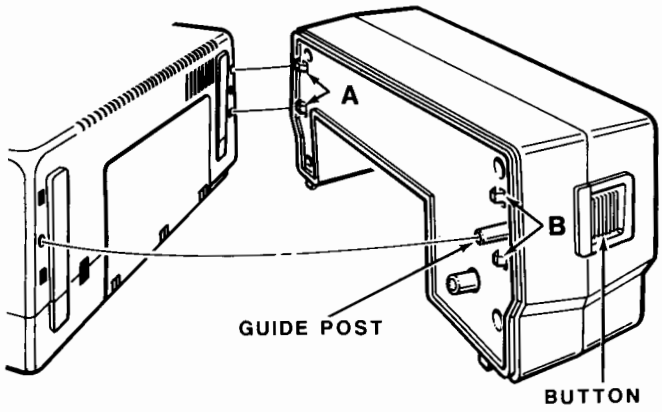

Figure 3-1. Battery Installation

3. Insert the battery hooks labeled A into the holes in the back of the computer as shown.
4. Rotate the battery toward the computer until the guide post enters its receptacle in the computer.
5. Insert the hooks labeled B into the holes in the computer and press in on the battery until it locks in place as shown in the figure.

Removing the Battery

Use the following procedure for removing the battery from the computer.

1. Turn off your computer.
2. Press in on the battery button and rotate the button side of the battery away from the computer.
3. Remove the hooks from the holes in the back of the computer.

Discharging and Recharging Your Battery

The most important step you can take to prolong battery life is to recharge it correctly and avoid memory effect problems as described previously. Follow these steps to correctly discharge and recharge your battery.

1. When the battery power is low, the power indicator will flash red. You then have about two minutes to complete and save your work. *Save your files and stop using your computer.* When the power indicator stops flashing and remains red, automatic shut-down will begin.
2. Leave the computer on until automatic shut-down completes (the backlight and all the indicators stop functioning). Your battery is now fully discharged.

Note

Always recharge your battery as soon as it is fully discharged. If you do not recharge your battery within six hours, it may be permanently damaged. It may lose its capacity to be recharged.

3. Connect the proper end of the power cord into the connector on the power adapter and then plug the power cord into a power outlet.
4. Plug the power adapter into the battery.
5. Recharge the battery for eight hours if the computer is turned off. Recharge it for twelve hours if the computer is turned on. (Your battery has overcharge protection in case you leave it plugged in for more than twelve hours.)
6. You may continue to use your computer while you are recharging the battery. Using your computer will increase the time it takes to recharge the battery to twelve hours. (You can also charge the battery if it is not attached to the computer.)
7. If you want to monitor your battery's charge level as you use it, run the Battery Watch utility *after* your battery is fully recharged (8-12 hours). Set the estimated charge level to "full". See Appendix B for general information or your *Utilities and Drivers Packet* for complete information about Battery Watch.

Conserving Battery Power

The following hints will help you to conserve battery power.

- Keep disc drive use to a minimum. Some applications access the disc frequently. For these applications, set up a virtual disc (sometimes called a RAM disc, VDISK, or memory disc), and use the SETUP program to set a low hard disc powerdown value. Refer to your operating system documentation for more information on virtual

discs. Refer to Appendix A to learn about the SETUP program.

Note that a hard disc powerdown value of less than 30 seconds is not recommended. The hard disc takes extra time and power to return to normal operation after being powered down.

- Keep the display backlight set to the lowest level possible for comfortable operation. In some situations, natural light may be enough for normal operation without the backlight. This is particularly true in bright sunlight.
- Use the SETUP program or HPMODE command to change your computer speed and battery conservation settings. The SETUP program (described in Appendix A) changes the settings permanently. The HPMODE command (described in the *Utilities and Drivers Packet*) changes the settings until you turn off or restart your computer.
- Use the SETUP program or HPMODE command to turn off the modem port if it is not being used. The HPMODE command (described in the *Utilities and Drivers Packet*) changes the settings until you turn off or restart your computer.
- Turn your computer off when not in use.

Low Battery Power Indicators

A fully charged battery will allow you up to four hours of operating time, depending on how you are using your computer. When the battery becomes low and requires recharging, the power indicator will begin flashing red and the keyboard beeper will begin to beep.

The beeper can be turned off by pressing the Fn key and the space bar at the same time. As the battery continues to discharge, the indicator will stop flashing and remain red and the beeper will beep again. It can also be turned off using the Fn+space bar key combination.

If you have turned the beeper off and the battery power increases above the low battery level and then decreases to the low battery level again, the beeper will start beeping again.

4

Using the Keyboard

The keyboard's 79 keys are arranged in the following groups, as shown in Figure 4-1:

- Alphanumeric keys
- Control and special purpose keys
- Cursor control keys
- Numeric keypad

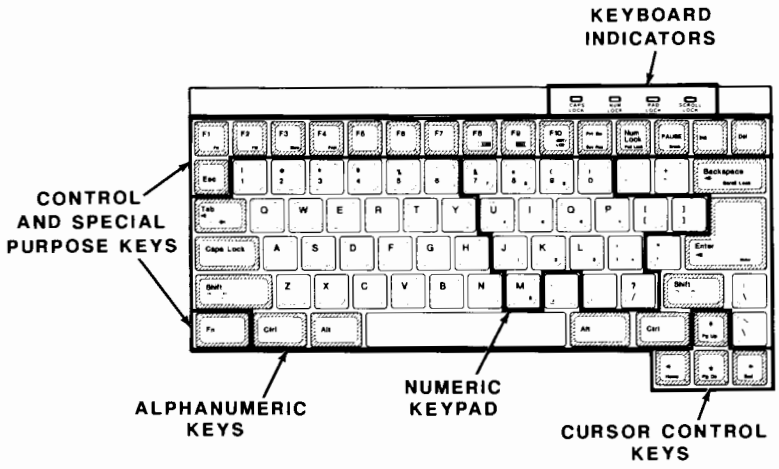

Figure 4-1. Keyboard Arrangement

Some of the key groups contain familiar keys, like those found on a typewriter keyboard. Others contain unique keys. Some familiar keys also have unique functions; your computer and application software can program

them with special features. The unique keys and special features of familiar keys are described in the following pages.

Auto Repeat Feature

Almost every key on the keyboard auto-repeats. This means that the key repeats itself as long as you hold it down. The longer you hold an auto-repeat key down, the faster it repeats itself. This feature is useful with keys that move the cursor, like the Del (delete) key, the Enter key, the space bar, and the arrow keys. The only keys that do not have the auto-repeat feature are Shift, Ctrl (control), Alt (alternate), Fn (function), Caps Lock, Scroll Lock, and Num Lock.

Keyclick Feature

All keys, except Shift, Ctrl, Alt, and Fn, have audible feedback (keyclick). Audible feedback is the clicking sound made each time a key is pressed. You can toggle the keyclick on or off by holding down Alt and pressing the ~ (tilde) key at the same time.

Keyboard Indicators

Figure 4-2 shows the keyboard indicators located above the top row of keys. These indicators light when the Caps Lock, Num Lock, Pad Lock or Scroll Lock keys are active. These keys are discussed later in this chapter.

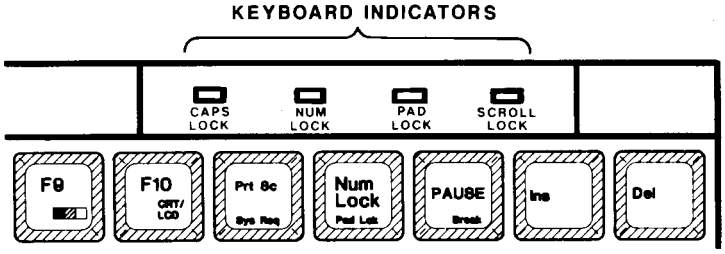

Figure 4-2. Keyboard Indicators

Alphanumeric Keys

Many of the alphanumeric keys are the same as on a typewriter keyboard. These keys are shown in Figure 4-3. To help touch typists keep their fingers on the proper keys, the F and J keys have a raised dot.

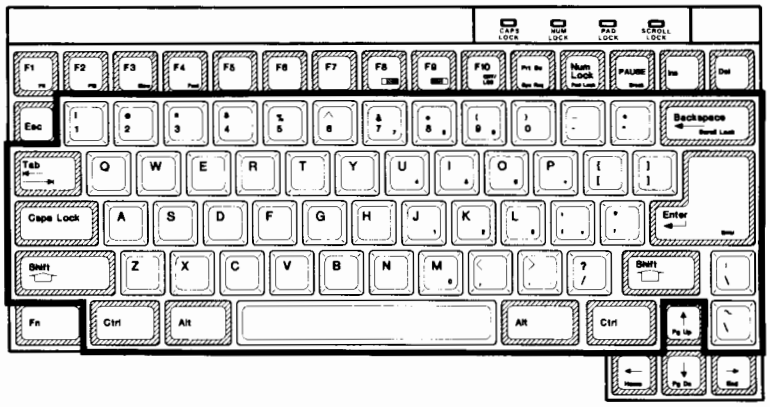

Figure 4-3. Alphanumeric Keys

Most of these keys also perform like typewriter keys. When a number, letter, punctuation mark, or symbol key is pressed, that character appears on the screen. The **Caps Lock** key acts similar to a typewriter shift lock key, and the **Enter** key acts like a typewriter carriage return key.

The space bar, **Shift** keys, **Backspace**, and **Tab**, when programmed by applications, perform differently from typewriter keys. For example, the **Shift** keys affect some keys, but not others.

There are also some alphanumeric keys that are unique to computers. The two modifier keys, **Ctrl** and **Alt**, are always used with other keys. These keys perform no function when used alone.

Two other important differences between a typewriter keyboard and your computer keyboard are:

- The computer understands the difference between the number 1 and the lower case letter l. Be sure you do not type the letter l when you want the number 1.
- The number 0 (zero) and a capital letter O may look alike, but they have different meanings to the computer. Make sure you type the correct character.

The Shift Key

There are two Shift keys on the keyboard; one is located on the right side of the keyboard and one on the left. Usually, when a Shift key is pressed, capital letters, symbols, and alternate punctuation marks are generated. If Caps Lock is engaged, pressing a Shift key causes the letter keys to generate lowercase letters. In some applications, the Shift keys are also used in combination with other keys to type commands.

The Caps Lock Key

This is almost the same as a typewriter shift lock key: press it once to begin typing capital letters, press it again to stop typing capital letters. The difference is that Caps Lock only affects the letter keys. You must press either the right or left Shift key to change the top row of numbers into special symbols (!, @, #, etc.) and to engage the alternate punctuation marks and symbols ({, :, ?, <, etc.). Also, when Caps Lock is engaged, the right and left Shift keys allow you to type lowercase letters. The Caps Lock indicator lights when Caps Lock is engaged.

The Enter Key

This key returns the cursor to the left side of the screen. Applications usually add a line feed instruction as well. Also, pressing the Enter key after data or instructions have been entered tells the computer to process them.

The Tab Key

This key moves the cursor to the next tab setting. Many applications allow you to change the tab settings. Your application documentation will give you specific instructions on setting tabs.

The Space Bar

When you press the space bar, it usually enters a blank character (space). The space bar is also used with some applications to move the cursor around the screen or to change the text on the screen.

The Backspace Key

This key moves the cursor one space to the left and usually erases any characters in the cursor's path. The Backspace key is also used with some applications to move the cursor around the screen without erasing characters. Other programs use the Backspace key to view previous text.

The Ctrl Key

There are two Ctrl keys on the keyboard, one on the right and one on the left. This key is one of the main keys used to enter commands. Typically, you hold down the Ctrl key and press another key at the same time. The Ctrl key is often symbolized by a caret (^). For example, to enter ^K, you would hold down the Ctrl key and press K at the same time, and then release both keys.

The Alt Key

There are two Alt keys on the keyboard, one on the right and one on the left. The Alt key is similar in operation to the Ctrl key. It is used with other keys to enter commands. Usually, the function of the Alt key depends on the application.

Control and Special Purpose Keys

The control and special purpose keys, illustrated in Figure 4-4, provide control over the computer and keyboard. The normal function of each key is described below. However, applications can direct almost any key to perform a function.

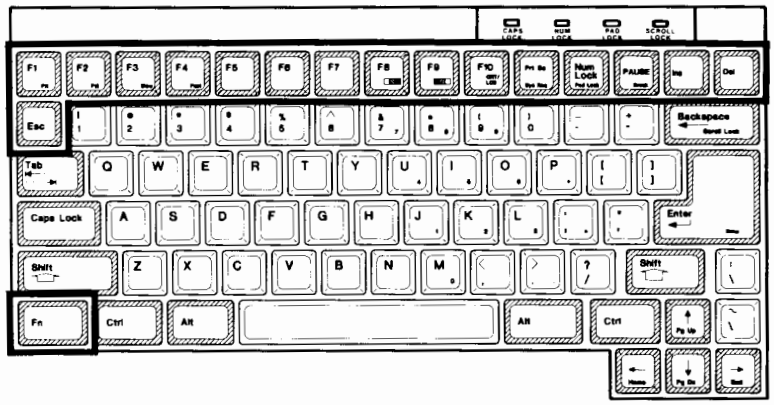

Figure 4-4. Control and Special Purpose Keys

The Esc Key

The ESC key, located just above the Tab key, performs special functions when you press it and another key in sequence. It is commonly used to stop the execution of a program or exit a function.

The Fn Key

The function key, located in the lower-left corner of the keyboard, acts similar to the Ctrl key. It provides additional functions when you hold it down and press another key. The Fn key causes the keys with blue labels to generate those characters and functions.

Function Keys

The F1 - F12 function keys are used for special purposes by applications. For example, in some word processing applications, the function keys perform indenting, setting right and left margins, underlining, and boldfacing. The function keys have special capabilities in the MS-DOS operating system. To use F11, hold down Fn and F1 at the same time. To use F12, hold down Fn and F2 at the same time. In some applications, F11 and F12 may not perform any functions.

The Prt Sc/SysReq Key (Print Screen/System Request)

When the Prt Sc key is pressed, whatever is on the screen will be sent to the printer to be printed. This key is particularly useful when you run operating system commands like DIR and TYPE and want to have a paper copy of the information. If your printer is turned off, not on-line, or out of paper, the computer pauses for about 10 seconds. If the printer is still not ready at the end of this time, the computer ignores the command.

When used with the Alt key, SysReq performs a function similar to the Break key. Various applications use it to return to the operating system.

The Num Lock/Pad Lock Key

This key provides two functions. When used with the Fn key (Fn+Pad Lock), it toggles the keypad lock. The Pad Lock indicator lights when the keypad lock is active. When the keypad lock is active, the Num Lock key toggles the keypad between the numeric mode and the cursor control mode.

The Pause/Break Key

Pressing the Pause key freezes the display of text on the screen. For example, if you enter an MS-DOS TYPE command, the text scrolls up the screen faster than you can read it. Pressing the Pause key will stop the display temporarily. Pause can be canceled by pressing any other key except the Fn key.

The Break key is generally used to halt commands or programs as they are running. For example, if you begin an MS-DOS DISKCOPY routine, then realize that you cannot find the disc you want to copy, you can return to the operating system prompt by pressing the Ctrl key and the Break key in combination.

The Ins Key

In many applications, this key allows text or commands to be inserted.

The Del Key

Many applications use this key to erase characters, words, or whole documents. When pressed in combination with the Ctrl and Alt keys, the Del key causes the computer to restart.

The Scroll Lock Key

When you press the Fn key and the Scroll Lock key, an indicator on the keyboard lights. This indicates that scroll lock is engaged. Press the keys again to turn scroll lock off. Some programs use scroll lock to keep the cursor on the same screen line while moving the text.

Cursor Control Keys

The cursor control keys are shown in Figure 4-5. The arrows on the keys indicate the direction in which they move the cursor. They can be used with word processing applications to move the cursor for typing and positioning text. With many spreadsheet programs, these keys move the active cell.

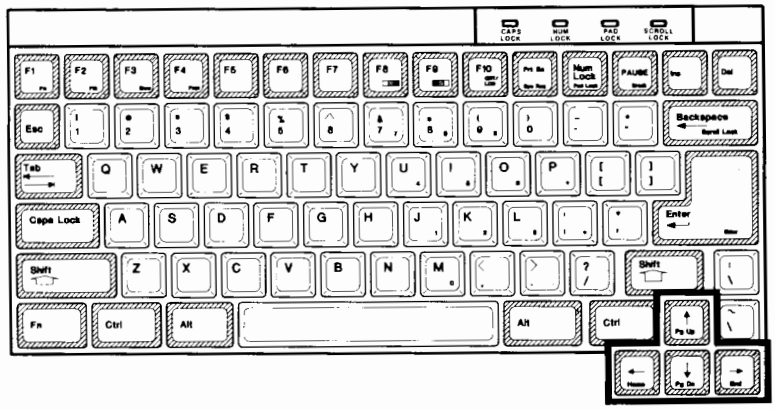

Figure 4-5. Cursor Control Keypad

A few older applications may not allow some functions to be performed using a separate cursor control keypad. If you are running one of these programs, it may be necessary to use the corresponding keys in the numeric keypad section of the keyboard.

The Home Key

In many applications, pressing the Fn+Home key combination moves the cursor to the upper-left corner of the screen. Some word processing programs use the Home key to move the cursor to the beginning of the current line. With spreadsheet programs, pressing the Home key usually moves the active cell indicator to the upper-left corner of the spreadsheet.

The End Key

Pressing the Fn+End keys typically moves the cursor to the lower-left corner of the screen. With some word processing programs, the End key moves the cursor to the end of the current line. Many spreadsheets use the End key to move the active cell indicator to the most remote cell.

The PgUp and PgDn Keys

The Fn+PgUp and Fn+PgDn keys move the cursor a set number of lines upward or downward.

Numeric Keypad

The numeric keypad, shown in Figure 4-6, has many of the same keys as a calculator keypad. For example, the number keys are arranged like a calculator keypad to allow numeric data to be entered rapidly. The Fn+Pad Lock key combination toggles the keypad lock on and off. Pressing the Fn key while pad lock is engaged causes the keypad keys to generate alphanumeric characters. These keys are also dependent on the state of Caps Lock. An indicator on the keyboard lights when pad lock is engaged.

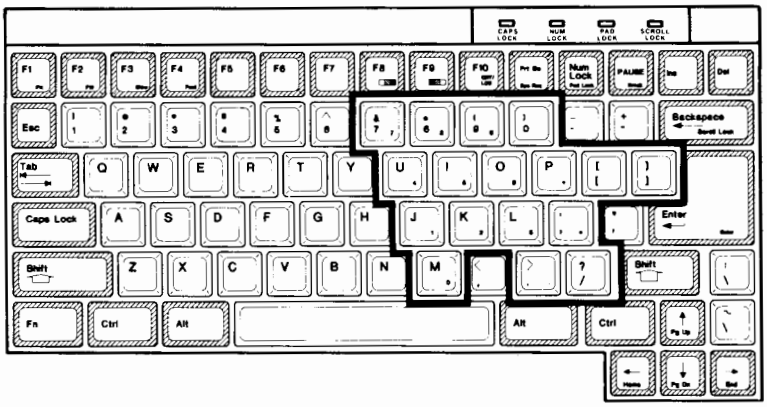

Figure 4-6. Numeric Keypad

When pad lock is engaged, the Num Lock key toggles the numeric and cursor control modes of the keypad. The numeric mode causes the keys with blue labels to generate numbers and the cursor control mode causes the keys with blue labels to move the cursor. When the Num Lock key is active, an indicator on the keyboard lights. When only the PAD LOCK indicator is lit, the keypad is in the cursor mode. When both the PAD LOCK and the NUM LOCK indicators are lit, the keypad is in the numeric mode. The Shift keys reverse the action of the Num Lock key. If the keypad is in the numeric mode, press a Shift key to move the cursor. If the keypad is in the cursor control mode, press a Shift key to type a number.

Table 4-1 lists the results of pressing a keypad key in the unshifted mode, with the Shift (or Caps Lock) key, with the Fn key, and with the Shift and Fn keys for each of the possible combinations of the pad lock and num lock modes.

Table 4-1. Keypad Results

Key Pressed	Normal Keyboard Result$_1$	Normal Keyboard Result$_2$	Numeric Mode Result$_3$	Cursor Mode Result$_4$
Keypad Key	Lowercase letter or number printed in red.	Lowercase letter or number printed in red.	Number or symbol printed in blue.	Cursor function printed in blue.
Shift + Keypad key	Uppercase letter or symbol printed in red.	Uppercase letter or symbol printed in red.	Cursor function printed in blue.	Number or symbol printed in blue.
Fn + Keypad key	Number or symbol printed in blue.	Cursor function printed in blue.	Lowercase letter or number printed in red.	Lowercase letter or number printed in red.
Shift + Fn + keypad key	Cursor function printed in blue.	Number or symbol printed in blue.	Uppercase letter or symbol printed in red.	Uppercase letter or symbol printed in red.

Notes:

1. NUM LOCK on, PAD LOCK off (default at power-up).
2. NUM LOCK off, PAD LOCK off.
3. NUM LOCK on, PAD LOCK on.
4. NUM LOCK off, PAD LOCK on.

Keyboard Selectable Modes

In addition to the keypad modes mentioned previously, other operating modes can be selected from the keyboard. These modes are described in the following paragraphs and summarized in Table 4-2. Some applications also create special keyboard modes not described in this manual.

Slow/Fast Speed

The SETUP program determines the speed at which the computer operates. The normal (default) speed is fast (12 MHz). There are also two function key combinations that *temporarily* affect the computer's speed. Fn+F3 slows the computer to slow speed (6 MHz) to conserve battery power or for compatibility with timing sensitive applications. Fn+F4 returns the computer to fast speed. These key combinations may not work with operating systems other than MS-DOS or with certain applications. You must use the SETUP program to select smart speed (flexible disc operations at 6 MHz, all other operations at 12 MHz).

Video Palettes

Three function key combinations affect video operation. Fn+F8 and Fn+F9 toggle the LCD through eight display palettes. These two key combinations do not affect the normal color video palettes. Fn+F10 toggles the video output between the monitor connector and the LCD.

The video system in your computer is similar to the color graphics adapter in PC-compatible computers for applications that check for color and automatically go into a color display mode. However, although the computer can produce a gray scale on the LCD, not all colors are dark enough to be readable. Eight LCD display palettes allow you to select a gray scale that makes these colors more visible. Since color combinations vary from one program to another, a gray scale that works for one program may not work for another.

To see these gray scales, press Ctrl+Alt+Ins to run the Monitor program, press C to display the color bar, and use the Fn+F8 and Fn+F9 key combinations to change the gray scales. See Appendix C for more information about using the Monitor program.

Table 4-2. Keyboard Modes

Key Combination	Description
Fn+(blue labels)	Generates the function printed in blue. If the keypad lock is active, this combination generates the alphanumeric character for the keypad key pressed.
Fn+Pad Lock	Toggles the keypad lock on and off. The keypad lock establishes the keys in Figure 4-6 as a numeric keypad. An indicator lights when the keypad lock is on.
Fn+space bar	Resynchronizes the keyboard with the keypad lock and the cursor control keys. (Also turns off the low battery indicator beep.)
Fn+F3	Places the computer in the slow mode of operation (6 MHz).
Fn+F4	Places the computer in the fast mode of operation (12 MHz).
Fn+F8 and Fn+F9	These two combinations toggle the display palette. You can move the display palette selection forward (Fn+F8) or backward (Fn+F9) through eight different gray scales.
Fn+F10	Toggles between the internal LCD and an external monitor.

Key Combinations

Table 4-3 describes the most common key combinations used by your computer. The words "application dependent" in the description indicate those key combinations that depend on an application to produce an action.

Table 4-3. Commonly Used Key Combinations

Key Sequence	Description
Alt+SysReq	System request (application dependent).
Ctrl+Alt+Del	Restarts the computer.
Ctrl+Alt+Ins	Restarts the computer and runs the Monitor program.
Ctrl+Break	Stops operation (application dependent).
Ctrl+S	Output on the screen pauses until you press another key.
Ctrl+C	Any operating system program that is in progress is halted.
Fn+(keypad keys)	Numeric keypad characters.
Fn+PgDn	Page down (application dependent).
Fn+Home	Home (application dependent).
Fn+End	End (application dependent).
Fn+PgUp	Page up (application dependent).

Table 4-3. Commonly Used Key Combinations Continued

Key Sequence	Description
Fn+F1	F11 (application dependent).
Fn+F2	F12 (application dependent).
Fn+F8	Changes LCD gray scale palette.
Fn+F9	Changes LCD gray scale palette.
Fn+Slow	Activates slow mode of operation (6 MHz).
Fn+Fast	Activates fast mode of operation (12 MHz).
Fn+CRT/LCD	Toggles CRT/LCD output.
Fn+Pad Lock	Toggles numeric keypad lock.
Fn+Scroll Lock	Scroll lock (application dependent).
Fn+Shift+keypad keys	Activates cursor control keys on keypad.
Alt+~ (tilde)	Toggles keyclick (audible feedback).
Fn+Space bar	Turns off the low battery indicator beep.
Shift+Alt+B	Default key combination to display the Battery Watch Window.

5

Introduction to the Hardware

This chapter describes your computer's disc drives, each of the external connectors, alternate display fonts, and hardware specifications.

Disc Drives

Computers use disc drives to transfer applications and data between memory and discs. Your computer has one flexible disc drive and one hard disc drive.

Flexible and hard disc drives are given names (drive A, B, C, etc.). You use the drive name to let the computer know where to look for the information you want to work with. Drive names are usually specified by the operating system you are using.

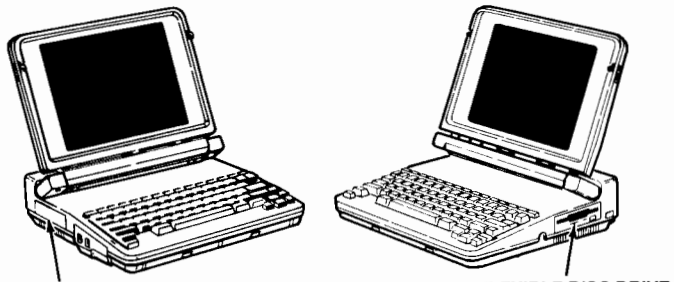

Figure 5-1. Disc Drive Identification

Flexible Disc Drives

Flexible disc drives transfer applications and data between flexible discs and your computer's memory. This allows you to use applications stored on discs and to transfer information from one computer to another. The drive access indicator lights when information is being transferred. Figure 5-2 shows the features of a flexible disc drive.

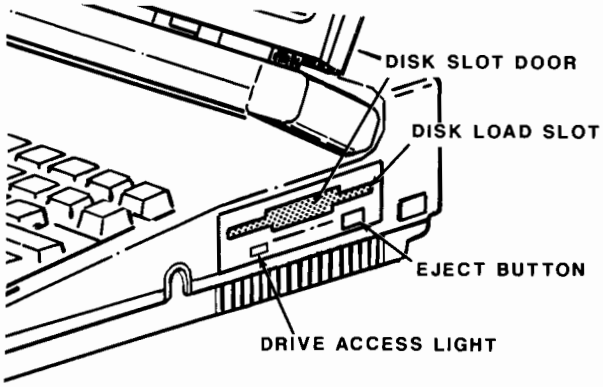

Figure 5-2. Disc Drive Features

Disc Load Slot

This is where you insert flexible discs. The flexible disc should slide smoothly into the drive until you hear a click and the eject button pops out.

Disc Slot Door

This door protects the drive from dust and dirt when it is not in use.

Eject Button

To remove a flexible disc from the drive, press this button in. The button will remain pressed in until you insert another disc in the drive.

Drive Access Light

This indicator lights when the computer is attempting to read from or write to the disc. There is also a drive activity indicator located below the LCD screen.

Flexible Discs

Your computer uses flexible discs that are 3.5-inch, double-sided, double-density, *high-capacity,* and have 80 tracks. These flexible discs provide 1.44 MB of data storage. Your computer can also use flexible discs that are 3.5-inch, double-sided, double-density, and have 80 tracks. These discs provide 720 KB of data storage. Refer to your operating system documentation for information about formatting each type of disc. See your *Utilities and Drivers Packet* for information about using discs formatted by the HP 150.

The write-protect hole in the lower left corner of the disc has a small, movable tab in it. When the hole is exposed, the disc is write-protected and you can only read data from the disc; you cannot write anything onto it. When the small tab covers the hole, the disc is unprotected and you can read and write data on the disc.

Use the suggestions in Figure 5-3 to properly care for your 3.5-inch discs.

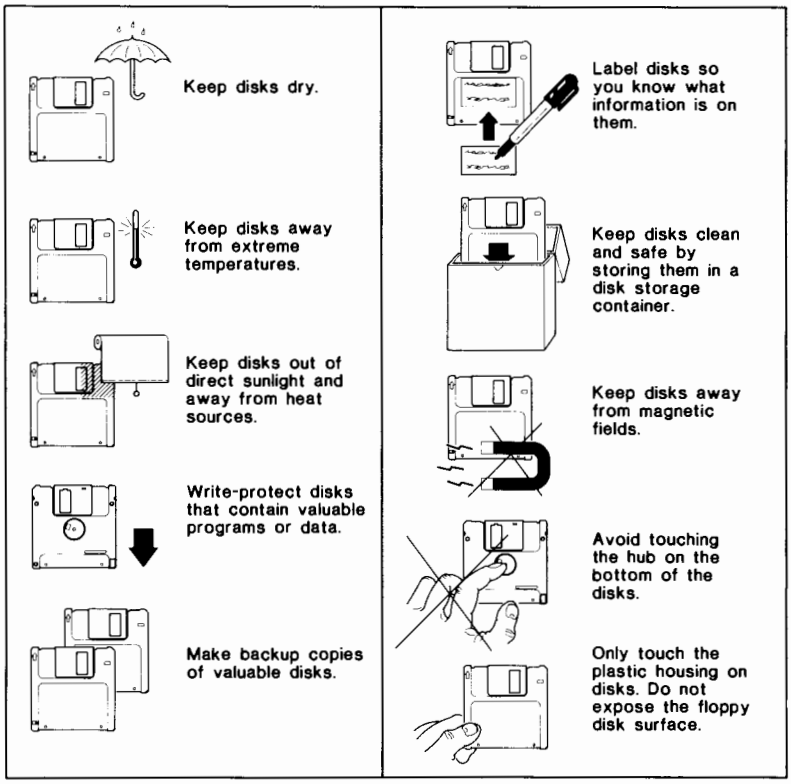

Figure 5-3. 3.5-Inch Flexible Disc Care

Flexible Disc Drive Care

The 3.5-inch flexible disc drive is extremely reliable and requires no special maintenance. Use the following guidelines to ensure trouble-free operation of the 3.5-inch drive:

- Make sure the disc load slot is empty and the eject button is pressed in all the way before inserting a disc.

- Insert flexible discs into the drive properly (label side up and metal shutter toward the inside of the computer).
- Do not remove discs while the drive access light is on.
- Remove the disc from the drive before turning off the power.
- Keep dust, dirt, and smoke away from the drive.
- Throw away damaged flexible discs.
- Do not attempt to disassemble, clean, or adjust the drive.

Hard Disc Drives

You may occasionally see these drives referred to as rigid disc drives or Winchester drives. Some of the advantages of having a hard disc drive in your computer are:

- An increased data storage capacity. A 40 MB hard disc drive has the same capacity as two dozen 1.44 MB flexible discs; a 20 MB hard disc drive has the same as one dozen 1.44 MB flexible discs.
- Immediate access to the information stored in it. Because the hard disc drive is built into your computer, the information is always available, ready for use. Your computer can find information on a hard disc ten to twenty times faster than on flexible discs.
- The ability to customize space on a hard disc drive for particular applications. You can make efficient use of the drive's large storage space by dividing it into sections, called partitions, and storing different information on each partition.
- The ability to protect the information stored on the hard disc. The operating system includes

commands that help minimize the possibility of accidentally erasing or destroying information.

Drive Types

One of two types of hard disc drives may be installed in your computer. It is important to remember this when you run the SETUP program. The factory installed hard disc drive type in your computer is listed on the *System Checklist* which was included with your computer.

Hard Disc Drive Care

Your hard disc drive is designed for trouble-free operation and requires no periodic maintenance. To avoid damaging the drive, observe the following precautions:

- Be careful not to drop or shake your computer.
- Do not attempt to disassemble, clean, or repair the hard disc drive.

Flexible and Hard Disc Usage

The following paragraphs explain some of the procedures for handling both flexible discs and hard disc drives as you use them in your computer.

Backups

The information stored on either hard or flexible discs can be accidentally changed, distorted, or destroyed, so keep a backup copy of all valuable information stored on discs. Backing up means creating an identical copy of the disc, which you can use if the original is lost or damaged. Your operating system's documentation contains instructions for backing up your discs.

Write-Protecting

The description of the flexible disc earlier in this section described the write-protect hole in the lower left

corner of the disc. This write-protect hole prevents the computer from erasing or changing the information on the disc. Be sure your operating system and application master discs are write-protected. Some application master discs are supplied without a write-protect tab. This prevents the files from being accidentally destroyed.

Formatting

Before you can use a flexible or hard disc to store information, you must prepare, or format, the disc so that it can accept information. Any disc that is not write-protected can be formatted. However, formatting a disc erases everything on it. Be sure the disc you are formatting does not contain anything valuable before you format it. Your operating system documentation provides you with more information about formatting discs.

Organizing Data

Three types of information are stored on discs:

- The operating system. You need to load the operating system into your computer's memory before you can load and use any other information stored on a disc. The operating system is responsible for managing your computer so it can run applications.
- Applications. Word processing, spreadsheet, and graphics applications that must be loaded into your computer are provided on flexible discs. These flexible discs contain all the files needed to perform the functions of the application.
- Data. Data is the information used or generated by applications.

To make more efficient use of their large storage capacity, hard discs are often divided into partitions.

You can divide your hard disc into as many as four partitions. Each partition may contain an operating system, applications, data, or a combination of these. Dividing the disc into partitions is a function of the operating system. Refer to that documentation for more information.

Monitoring Disc Space

Always keep track of the available storage space on your discs. Otherwise, you may spend hours working on a document, only to find that there is no room to store it on the disc. A full page of single-spaced text occupies approximately 3 KB (kilobytes) of disc space. You can use your operating system to find out what files are stored and how much available space you have on each disc.

External Connectors

The external connectors are on the back and sides of the computer as shown in Figure 5-4. The connectors are:

- The DC power connector (DC)
- The expansion chassis connector (EXP. CHASSIS)
- The video connector (MONITOR)
- The parallel connector (PARALLEL PRINTER)
- The serial connector (SERIAL)
- The external disc drive connector (EXT. DISC)
- The modem connectors (left side, not shown)
- The external keypad connector (right side, not shown)

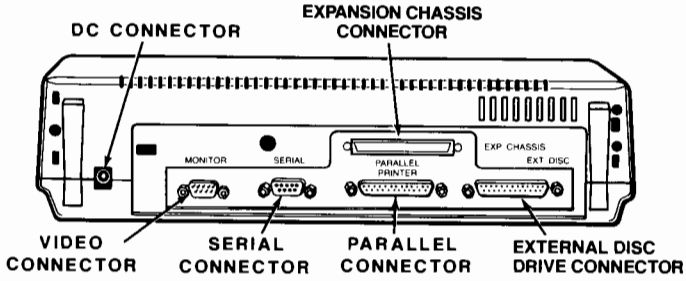

Figure 5-4. Back View

DC Power Connector

This connector provides the power used by the various circuits in the computer. Power for the computer comes from an external power adapter (120-volt AC line, or 240-volt AC line) or an external battery pack.

Expansion Chassis Connector

This XT-compatible chassis allows you to add three full size 8-bit accessory cards to your computer. The expansion chassis connects to the expansion chassis connector with a special cable. The cable is supplied with the expansion chassis. The expansion chassis connector and pinout are shown below.

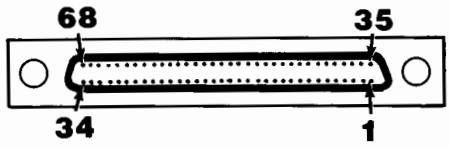

Figure 5-5. Expansion Chassis Connector

Pin	Signal	Pin	Signal
1	I/O channel check	35	Data bit 7
2	Reset	36	Data bit 6
3	Ground	37	Data bit 5
4	Interrupt request 9	38	Data bit 4
5	DMA request 2	39	Data bit 3
6	Interrupt request 7	40	Ground
7	Terminal count	41	Data bit 2
8	ZX bus enable	42	Data bit 1
9	I/O channel ready	43	Data bit 0
10	Ground	44	Address bit 19
11	Address enable	45	Address bit 18
12	Memory write	46	Ground
13	Memory read	47	Address bit 17
14	I/O write	48	Address bit 16
15	Ground	49	Address bit 15
16	I/O read	50	Address bit 14
17	DMA acknowledge 3	51	Address bit 13
18	DMA request 3	52	Ground
19	DMA acknowledge 1	53	Address bit 12
20	DMA request 1	54	Address bit 11
21	Ground	55	Address bit 10
22	Refresh	56	Address bit 9
23	Write configuration	57	Ground
24	Clock	58	Ground
25	Data buffer enable	59	Address bit 8
26	Interrupt request 6	60	Address bit 7
27	Ground	61	Address bit 6
28	Interrupt request 5	62	Address bit 5
29	Interrupt request 4	63	Address bit 4
30	Interrupt request 3	64	Ground
31	DMA acknowledge 2	65	Address bit 3
32	Data buffer direction	66	Address bit 2
33	Ground	67	Address bit 1
34	Address latch enable	68	Address bit 0

Video Connector

This connector supplies RGB video output for an external color video monitor. The video connector and pinout are shown below.

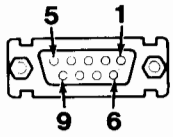

Figure 5-6. Video Connector

Pin	Signal
1	Ground
2	Ground
3	Red
4	Green
5	Blue
6	Intensity
7	Not used
8	Horizontal sync
9	Vertical sync

Parallel Connector

This connector provides Centronics-type output signals for a parallel printer or peripheral. The operating system contains the necessary commands to configure this connector for use with most parallel devices. It can be software configured as either LPT1 or LPT2. The parallel connector and pinout are shown below.

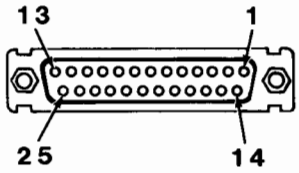

Figure 5-7. Parallel Connector

Pin	Signal
1	Strobe
2	Data bit 0
3	Data bit 1
4	Data bit 2
5	Data bit 3
6	Data bit 4
7	Data bit 5
8	Data bit 6
9	Data bit 7
10	Acknowledge
11	Busy
12	Paper out
13	Select
14	Automatic feed
15	Error
16	Initialize
17	Select in
18-25	Ground

Serial Connector

This connector is an RS-232C DTE input/output port for use with a serial printer, mouse, or peripheral, or as a host connection. The operating system contains the necessary commands to configure the connector for use with most serial devices. It can be software configured as either COM1 or COM2. The serial connector and pinout are shown below.

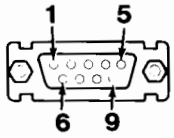

Figure 5-8. Serial Connector

Pin	Signal
1	Carrier detect
2	Receive data
3	Transmit data
4	Data terminal ready
5	Signal ground
6	Data set ready
7	Request to send
8	Clear to send
9	Ring detect

External Disc Drive Connector

This connector provides the signals necessary to connect an external disc drive to the computer. The external disc drive connector and pinout are shown below.

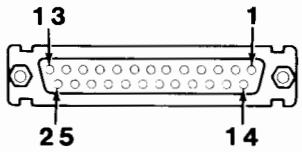

Figure 5-9. External Disc Drive Connector

Pin	Signal
1	Write gate
2	NC
3	Drive select 2
4	Write data
5	Direction select
6	Step
7-13	Ground
14	NC
15	Head select
16	Read data
17	Write Protect
18	Track 0
19	Index
20	Motor on
21	Disc Change
22	NC
23	RPM
24	NC
25	NC

Modem Connectors

If a modem has been installed, two connectors are present on the left side of the computer. The phone connector supplies the necessary signals for a standard telephone when the telephone company line is connected to the line connector. The line connector supplies the necessary signals for telephone-to-telephone communication. It connects the internal modem to the telephone company line. The modem can be configured as either COM2 or off. Figure 5-10 shows a view of the left side of the computer. Figure 5-11 shows the phone and line connectors.

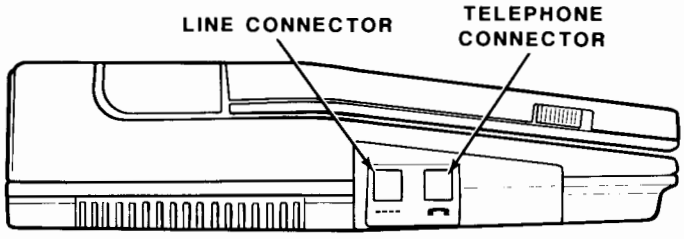

Figure 5-10. Left Side View

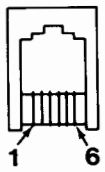

Figure 5-11. Phone and Line Connectors

Pin	Signal
1-2	Not connected
3	Ring
4	Tip
5-6	Not connected

Numeric Keypad Connector

This connector, located on the right side of the computer, supplies the necessary power and signal lines for an external numeric keypad. Figure 5-12 shows a view of the right side of the computer. The numeric keypad connector is shown in Figure 5-13.

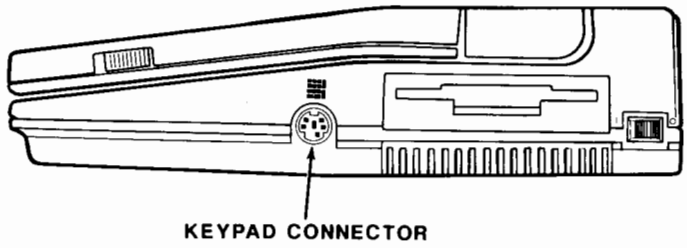

Figure 5-12. Right Side View

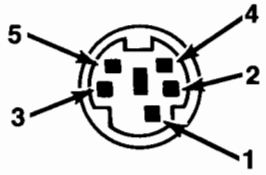

Figure 5-13. Numeric Keypad Connector

Pin	Signal
1	Keyboard interrupt
2	Keypad data
3	keypad interrupt
4	ground
5	+5 volts DC

Alternate Display Font Selection

Your computer can display several fonts other than the standard English font. Jumpers located under the cover on the bottom of the computer determine which font is displayed.

To select a different font:

1. Turn off and unplug the computer.
2. Close and latch the lid.
3. Place a soft cloth on your work surface and lay the computer upside down on the cloth.
4. Use a flat blade screwdriver to carefully pry up on the cover, as shown in Figure 5-14.

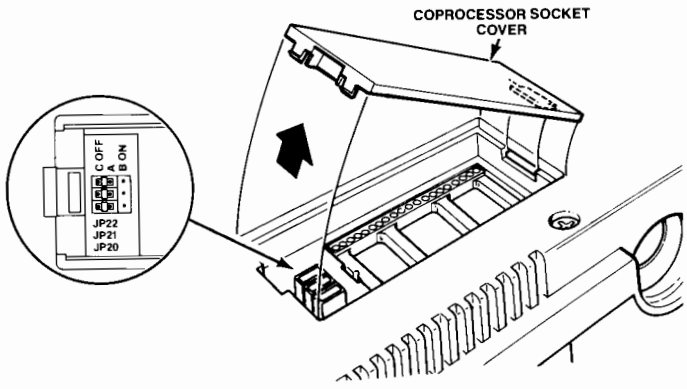

Figure 5-14. Removing the Cover

Note

Touch the metal panel behind the back panel door with one hand before moving jumpers with the other hand.

5. Table 5-1 lists the jumper settings for the various fonts. Set the jumpers according to this list for

the desired font. To set a jumper to "OFF," place the jumper on the two pins labeled "C" and "A". To set a jumper to "ON," place the jumper on the two pins labeled "A" and "B".

Table 5-1. Display Font Jumper Settings

Jumper			
J20	J21	J22	Language
OFF	OFF	OFF	English
OFF	ON	OFF	Norwegian
OFF	OFF	ON	Turkish
OFF	ON	ON	Greek
ON	OFF	OFF	Hebrew
ON	ON	OFF	English
ON	OFF	ON	English
ON	ON	ON	Reserved

6. Replace the cover.

Specifications

Processor:	80286-compatible low power 16-bit processor (NMOS).
Clock speed:	User selectable; 12 MHz or 6 MHz.
Memory:	1 MB base memory; can be expanded with a memory expansion card.
Display:	640 x 400 (text) or 640 x 200 (graphics) double scan CGA pixel white flat panel liquid crystal; 16-bit software programmable fonts.
Sound:	Miniature transducer.

Input/Output

Serial port:	Asynchronous serial RS-232C port (DB-9 connector), COM1 or COM2.
Parallel port:	Centronics-type parallel output port (DB-25 connector), LPT1 or LPT2.
Video:	RGB (color) video with intensity signals from a single 9-pin connector.

Disc Drives

Flexible disc:	3.5-inch double-sided, high density, 1.44 MB formatted capacity flexible disc drive.
Hard disc:	3.5-inch 20 MB or 40 MB hard disc drive.

Power Requirements

AC power:	115V/230V power adapter/charger included.
Battery power:	12V (4.0 AHr) removable battery pack with overcharge and short circuit protection. Battery life is 200 discharge/recharge cycles.

Keyboard

79 keys; full 84-key keyboard and 101-key keyboard compatibility maintained by using mode switching and multiple keys to duplicate keypad and special function key operation

A

Using the SETUP Program

Running the SETUP Program

1. Insert the SETUP and Utilities Program disc (found at the back of this binder) into drive A:.
2. If the computer is already on, hold down Ctrl and Alt and press Del at the same time. If the computer is off, turn it on.

Note

If you have copied the SETUP program to your hard disc as described in your *Utilities and Drivers Packet,* you can run the SETUP program by typing SETUP and pressing Enter at the PAM main menu or the MS-DOS prompt.

3. If you are prompted to select the language type of your keyboard, do so.
4. You may save your system configuration(s) as a file for later use or for backup purposes with the /SA command line option described in this appendix. If you are prompted to enter a file name of a previously saved configuration file and you have one you wish to use, do so.
5. The SETUP main menu will then appear. Select the option that you need to run by typing the number and pressing Enter. If your system configuration is incorrect, pressing any key will automatically select Option 1.

All options are documented on the screen. However, if you need more information on any option, this appendix contains:

- Option 1: Set System Configuration
- Option 2: Prepare Internal Hard Disc for Moving
- Option 3: Initialize Internal Hard Disc
- Option 4: Computer Speed Selection
- Option 5: Battery Conservation

Note

The section "SETUP Command Line Options" lists additional options that are designed for use by SERVICE PERSONNEL or advanced users. Type `/H` from the SETUP main menu for a list each command line option and a short description of its function.

Option 1: Set System Configuration

You MUST run the Set System Configuration option when your computer is started for the first time, to correct the time and date, to change battery conservation settings, and after adding accessories such as a modem or expansion chassis.

Each screen is self-documenting; however, if you need more information for a particular screen, look through this section for the screen title (shown at the top of each screen) that you are interested in. When done with all screens, you will be shown the System Configuration again and asked if it is correct. If you made a mistake while making system configuration settings, you can answer `N` and be shown the screens again.

Time and Date Screen

The Time and Date screen displays the current system time and date. Once you set the system time and date on this screen, your computer will keep track of it even when it is turned off.

Note

If the time and date are wrong every time you turn on your computer, or you continually get a message telling you that your configuration is invalid, you either have something set wrong in the System Configuration screen, or the computer's internal back-up battery needs replacing. Carefully check the System Configuration screen and correct anything necessary. If that does not solve the problem, have your battery replaced by a dealer or HP service representative.

Expansion Chassis Screen

The Expansion Chassis screen asks if you have an expansion chassis that you will be attaching to your computer. An expansion chassis is an external box used to add accessory cards to your computer.

If you have an expansion chassis, answer `Y` to this question. You will then be asked to set two system

configurations for your computer. One for when you are using your computer as a portable computer without the expansion chassis, and one for when you are using your computer with the expansion chassis attached. After specifying the system configuration without an expansion chassis attached, you are asked for the system configuration *with the expansion chassis attached.* Each time you start your computer it will automatically use the correct system configuration.

If you do not have an expansion chassis, answer **N** to this question. You will then be asked for your system configuration.

Note

If you add an expansion chassis in the future, remember to set the second system configuration.

System Configuration Screen

The System Configuration screen displays configuration information about items installed in your computer and asks you if it is correct.

If the information is correct, type **Y** and press Enter.

If any of the information is not correct, type **N** and press Enter. You will then be asked some questions about what is installed in your computer. Correct any information that is wrong. The following pages contain a description of each screen that will be displayed.

External Flexible Disc Drive Screen

The External Flexible Disc Drive screen shows you what the computer reports is installed and asks you if it is correct. You must change this if it is wrong.

If you have an external flexible disc drive attached to your computer, specify the capacity and size of the drive.

Hard Disc Drive Screen

The Hard Disc Drive screen shows you what the computer reports is installed and asks you if it is correct. You must change this if it is wrong.

You need to know what the Hard Disc Drive Type is for your hard disc drive. The Hard Disc Drive Type is a number between 1 and 46 (this number IS NOT the number of megabytes on the hard disc). If you give an incorrect Hard Disc Drive Type, the drive will not work properly.

The Hard Disc Drive Type is listed on your *System Checklist.* Typically, it will be either 6 (for 20 MB drives), or 44 (for 40 MB drives).

System Base Memory Screen

The System Base Memory screen shows you what the computer reports is the current setting and asks you if it is correct. You must correct it if it is wrong.

System base (or conventional) memory is the memory located from 0 KB (Kilobytes) to 640 KB. It is used by your computer's operating system and applications.

Your computer is shipped with 640 KB of system base memory. This is the normal setting.

You can specify 512 KB of system base memory to allow some specialized applications to run on your computer, even though it actually has 640 KB of system base memory.

Extended or Expanded (EMS) Memory Screen

The Extended or Expanded (EMS) Memory screen shows you what the computer reports is the current memory setting and asks you if it is correct. You must correct it if it is wrong.

Your computer comes standard with 256 KB of expanded memory which can be accessed only if you enable expanded memory with the SETUP program and

install the LIM EMS driver included in your *Utilities and Drivers Packet.*

If you have added an internal memory expansion card to your computer, you can use the memory on the card as either extended memory or expanded memory, but not both. If you set it up as expanded memory, the total expanded memory available is the amount on the card plus the 256 KB that comes with your computer.

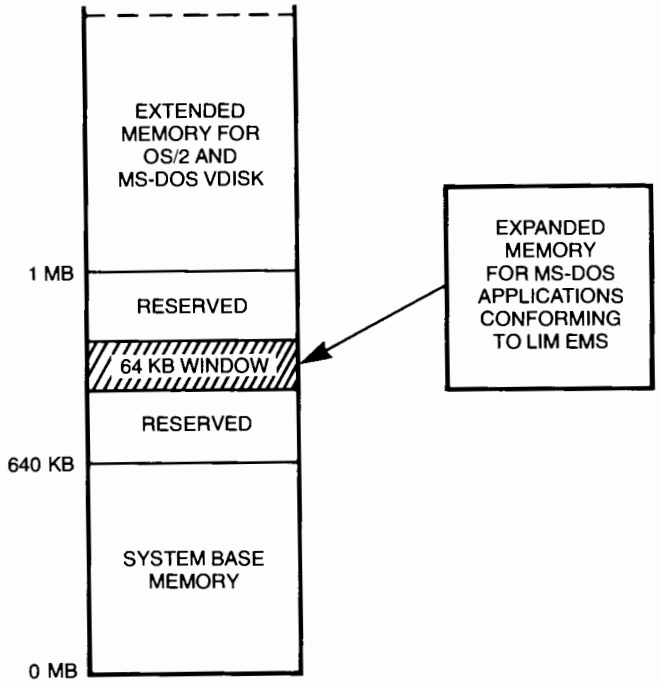

Figure A-1. Memory Locations

Extended Memory

Extended memory can be used as a RAM disc using VDISK.SYS (which is included with current versions of MS-DOS).

Expanded Memory

Expanded memory is the memory that can be accessed by the LIM EMS driver included in your *Utilities and Drivers Packet.* MS-DOS applications that conform to the Lotus/Intel/Microsoft Expanded Memory Specification (LIM EMS) can take advantage of expanded memory.

Specifying Your Memory Setting

- **If you have not added an internal memory accessory card to your computer,** enable expanded memory. Set the size of your expanded memory to 0 KB. These settings and the installation of the LIM EMS driver will enable you to use the built-in 256 KB expanded memory.
- **If you have added a memory accessory card to your computer,** enable all the memory on the card as either extended or expanded memory.

  Enable **expanded memory** if you have MS-DOS applications requiring a large amount of memory.

  Enable **extended memory** for a RAM disc (using VDISK.SYS) if you are using MS-DOS.

  Be sure to enable the total amount of memory you have added to your computer.

Primary Display Screen

The Primary Display screen shows you what the computer reports is being used and asks you if it is correct. You must correct it if it is wrong.

The primary display is the video/graphics adapter card (and display) used by your computer when you turn it on. Normally, this is the internal LCD screen of your computer. It may also be another display attached to the "Monitor" port on the back of your computer.

If you use your computer with a video/graphics adapter card installed in an expansion chassis, there are other possibilities for the primary display:

- VGA, EGA, PGC or Similar Card

  Select this for computers with most high resolution color graphics cards. If you have one of these cards in your expansion chassis, it must be chosen as the Primary Display.

Note 

If you have an HP 82960A Graphics Controller adapter you MUST select one of the "HP Multimode Card Display" options or you will receive an error message every time you turn on the computer.

- HP Multimode Card: 40 Column Display

  Select this for a CGA-type card and a display on which you want only 40 columns shown. Use this only for applications which require it.

- HP Multimode Card: 80 Column Display

  Select this for an HP Multimode Card, or a CGA type card, and a display on which you want the standard 80 columns shown.

- Monochrome Card

  Select this for a monochrome card and a monochrome (single-color) display. An example would be the HP Monochrome Plus Card and display. Do not select this option if you are using the HP Multimode Card.

Parallel Port Screen

The Parallel Port screen shows you what the computer reports is being used and asks you if it is correct. You must correct it if it is wrong.

The parallel port is normally used for a printer.

- If you are not using a printer attached to your parallel port, set the parallel port to OFF.
- If you are using a printer, set the parallel port to either LPT1 or LPT2.

Serial Port and Modem Screen

The Serial Port and Modem screen shows you what the computer reports are the current serial port and modem settings and asks you if they are correct. You must correct them if they are wrong.

The serial port can be addressed as either COM1 or COM2. The modem can be addressed as COM2 only. So, if you want to use the serial port and the modem, the serial port must be addressed as COM1 and the modem as COM2.

If you want to conserve battery power and will not be using the modem, set the modem to off.

Start-up Selection Screen

The Start-up Selection screen shows you what the computer reports is the current start-up selection. You must correct this setting if it is wrong.

The start-up selection determines how your computer will start. Normally, you should set the start-up

selection to Flexible Disc then Hard Disc. Use the other settings as appropriate.

Computer Speed Selection Screen

The Computer Speed Selection screen reports the speed at which your computer operates each time it is started. This screen is the same screen displayed when you select Option 4. It will only be displayed with Option 1 if your system configuration is wrong.

Your computer comes pre-set from the factory to run at the fastest speed possible. However, in some instances, you may want to run the computer at a slower speed. For example, you would set your computer to run at a slower speed if:

- You want to conserve battery power.
- You are installing copy-protected software that needs to initially run at a slower speed (such as Lotus 1-2-3).
- You are using software that needs to run at a slower speed all the time (such as some games and communication software).

We recommend that you use fast speed when you are not using your battery. Then, to use software that needs to run at a slower speed (initially or all the time), we recommend that you use the HPMODE command utility or the Fn+Slow key combination to change the speed.

Use slow speed to obtain maximum battery conservation.

LCD Backlight Powerdown Screen

The LCD Backlight Powerdown screen shows you what the computer reports as the current value and asks you if it is correct. This screen is the same screen displayed when you select Option 5. It will only be displayed with Option 1 if your system configuration is wrong.

Setting a low backlight powerdown value helps to conserve battery power by turning off the backlight. For

example, if you set a value of two minutes, the backlight will turn off when two minutes have passed and no key has been pressed on the keyboard. To turn the backlight on again, simply press any key except the Fn key.

In areas of bright light, you may not need the backlight. In this case, you can turn the backlight off completely to obtain maximum battery conservation.

You can also set the backlight to be on all the time.

Hard Disc Powerdown Screen

The Hard Disc Powerdown screen shows you what the computer reports as the current value and asks you if it is correct. This screen is the same screen displayed when you select Option 5. It will only be displayed with Option 1 if your system configuration is wrong.

Setting a low hard disc powerdown value helps to conserve battery power by turning off the hard disc. For example, if you set a value of two minutes, the hard disc will stop spinning when two minutes have passed since the last disc activity.

Be careful to set a hard disc powerdown value that works best with your applications. Turning the hard disc off and on repeatedly takes more battery power than leaving it on all the time. Turning the hard disc off and on excessively may result in poor performance and reliability. A value of less than 30 seconds is not recommended.

After your hard disc has powered down, it will take about five to seven seconds for it to return to operating speed the next time it is accessed.

Option 2: Prepare Internal Hard Disc for Moving

The heads on your internal hard disc are autopark heads. This means whenever you turn your computer off, the heads will park automatically to prevent data loss.

If you need to move your computer and do not want to turn it off, use this option to park the disc drive heads. Parking the drive heads protects the data on your hard disc when your computer is moved. If you perform any other procedure that requires the computer to access the hard disc drive, the heads will unpark. The heads automatically unpark when you turn on the computer.

Option 3: Initialize Internal Hard Disc

Option 3 "Initialize Internal Hard Disc" must be run the first time your computer is started after purchase. Initialization of your hard disc is the first step in a multi-step process to prepare your hard disc for use.

Once initialization is complete, you MUST then go through a formatting process which is different for each operating system (MS-DOS or other). If you are going to use an operating system other than MS-DOS, you will need to refer to the manual that came with that operating system.

MS-DOS USERS ONLY: To prepare your hard disc, you must:

1. INITIALIZE your hard disc using SETUP option 3.
2. Refer to the *MS-DOS Volume I* binder to install your operating system.

For advanced users and Service Personnel, there are SETUP command line options that allow you to perform special initialization operations on a hard disc. For a description of these options, refer to the end of this appendix.

Note

Hard disc initialization could take 2 to 3 minutes per megabyte.

Initialization Failure

If your hard disc initialization fails, you will see the following error message:

```
Initialization of disc failed. Error returned=>
```

Before attempting to rerun this option, make sure the hard disc is properly configured with Option 1 by verifying that the hard disc drive type is correct.

Option 4: Computer Speed Selection

This option allows you to change the speed at which your computer operates. The Computer Speed Selection screen is the same screen displayed with Option 1 if your system configuration is wrong.

Your computer comes pre-set from the factory to run at the fastest speed possible. However, in some instances, you may want to run the computer at a slower speed. For example, you would set your computer to run at a slower speed if:

- You want to conserve battery power.
- You are installing copy-protected software that needs to initially run at a slower speed (such as Lotus 1-2-3).
- You are using software that needs to run at a slower speed all the time (such as some games and communication software).

We recommend that you use fast speed when you are not using your battery. Then, to use software that needs to run at a slower speed (initially or all the time), we recommend that you use the HPMODE command or the Fn+Slow key combination to change the speed.

Use slow speed to obtain maximum battery conservation.

Option 5: Battery Conservation

In addition to turning the modem off, you can set an LCD backlight powerdown value and a hard disc powerdown value to conserve battery power.

LCD Backlight Powerdown Screen

The LCD Backlight Powerdown screen shows you what the computer reports as the current value and asks you if it is correct. This screen is the same screen displayed with Option 1 if your system configuration is wrong.

Setting a low backlight powerdown value helps to conserve battery power by turning off the backlight. For example, if you set a value of two minutes, the backlight will turn off when two minutes have passed and no key has been pressed on the keyboard. To turn the backlight on again, simply press any key except the Fn key.

In areas of bright light, you may not need the backlight. In this case, you can turn the backlight off completely to obtain maximum battery conservation.

You can also set the backlight to be on all the time.

Hard Disc Powerdown Screen

The Hard Disc Powerdown screen shows you what the computer reports as the current value and asks you if it is correct. This screen is the same screen displayed with Option 1 if your system configuration is wrong.

Setting a low hard disc powerdown value helps to conserve battery power by turning off the hard disc. For example, if you set a value of two minutes, the hard disc will stop spinning when two minutes have passed since the last disc activity.

Be careful to set a hard disc powerdown value that works best with your applications. Turning the hard disc off and on repeatedly takes more battery power than leaving it on all the time. Turning the hard disc off and on excessively may result in poor performance and reliability. A value of less than 30 seconds is not recommended.

After your hard disc has powered down, it will take about five to seven seconds for it to return to operating speed the next time it is accessed.

SETUP Program Command Line Options

Listed below are the SETUP command line options that allow service personnel and advanced users to perform specialized operations within the SETUP program.

/BAK	Make work disc of SETUP master disc
/D	Manually mark hard disc defects
/F	Fast initialization
/H	Display all available options
/I	Set hard disc interleave factor
/Kn	Specify MS-DOS keyboard language driver
/M	Display SETUP screens in monochrome
/P	Park hard disc heads
/R	Restore system configuration from a file to non-volatile RAM (CMOS)
/S	Make SETUP program the shell
/SA	Save system configuration from non-volatile RAM (CMOS) to a file
/X	Scan hard disc and list all marked defects

Using the Command Line Options

The command line options can be typed either at the MS-DOS prompt or directly within the SETUP program itself. Both procedures are listed here:

Typing Command Line Options at the MS-DOS Prompt

1. Start your computer so that the PAM main menu or the MS-DOS prompt is displayed.
2. Insert the SETUP and Utilities Program disc in drive A:.

3. Type `A:SETUP` followed by a blank space, then the command line options you want, each separated by a blank space. For example:

```
SETUP /M /R
```

4. Then press Enter to load SETUP and initiate the command line option(s). Note that some command line options change the way SETUP program Options 1 - 6 run. See "Command Line Option Descriptions" in this appendix for an explanation of each option.

Typing Command Line Options from the SETUP Main Menu

1. Start your computer so that the PAM main menu or the MS-DOS prompt is displayed.
2. Insert the SETUP and Utilities Program disc in drive A:.
3. Type `A:SETUP` and then press Enter.
4. When the SETUP main menu is displayed, type *only* the command line options you want, each separated by a blank space. For example:

```
Enter option number and press <Enter>: /M  /R
```

5. Then press Enter to start the command line option(s). Note that some command line options change the way SETUP program Options 1 - 6 run. See "Command Line Option Descriptions" in this appendix for an explanation of each option.

Command Line Option Descriptions

The following is a complete description of each SETUP command line option. It is important that you completely understand each option before attempting to use it.

/BAK

Make work disc of SETUP master disc. This option helps you create a SETUP work disc from the master SETUP and Utilities Program disc. It is common to make a work disc of an application. In this way, if your work disc is ever damaged you will still have the original copy of your application.

/D

Manually mark hard disc defects. This option allows you to manually enter hard disc defects. You MUST have a list of defects from the factory to do this.

This option changes the way Option 3 (Initialize Internal Hard Disc) runs. You will be prompted for the cylinder(s) and head(s) that contain defects. The cylinder and head prompts alternate until you press Enter without entering a number at the cylinder prompt or until you have entered eight lines. If you have entered eight lines, you will be asked if you want to enter more. If you enter any defects incorrectly, you may change any line on the list.

The /D option runs one media scan, initializes the disc, and then runs a surface analysis. If you add the /F (Fast initialization) option, no media scan or surface analysis are done, and during the initialization only the manually entered defects will be marked (see the /F description).

/F

Fast initialization. This option performs an initialization only. The media scan and surface analysis operations are

eliminated. By itself, this option DOES NOT MARK DEFECTS on a hard disc and therefore use of this option is NOT RECOMMENDED. However, if you choose to use this option in combination with the /D option NO media scan or surface analysis of the hard disc will take place and therefore no defects other than those you have entered manually will be marked. This option changes the way Option 3 (Initialize Internal Hard Disc) runs.

/H

Display all available options. This option displays all SETUP Command Line Options available for use with your computer.

/I

Set hard disc interleave factor. The interleave value determines the way the sectors are numbered on a track. You should only change this value if you have been instructed to by the hard disc installation manual or you understand the reasons for doing so. This option changes the way Option 3 (Initialize Internal Hard Disc) runs.

/Kn

Specify MS-DOS keyboard language driver. This option allows computers that support the various language keyboards (English, French, Spanish etc.) to all use the same SETUP program. With this option, you select your language keyboard first, then you run the SETUP program as explained on the screen or in this manual. Type /K0 (K zero) at the SETUP main menu to get a list of supported languages.

/M

Switch SETUP screens to monochrome. Typically, the screens of the SETUP program are designed to be normally displayed on either color or monochrome displays. If you have a monochrome (single color) display, and the SETUP program screens look as if they are missing text, use this command line option when running SETUP to display screens as text only.

/P

Park hard disc heads. This option can be used for all disc drives in place of Option 2 (Prepare Internal Hard Disc for Moving).

/R

Restore system configuration from a file to non-volatile RAM (CMOS). This option allows you to restore your system configuration by copying the saved configuration from a file to the non-volatile RAM (CMOS).

/S

Make SETUP program the shell. This option is a standard part of the CONFIG.SYS file on the SETUP and Utilities Program disc. It causes the computer to be reset whenever the SETUP program is exited so that your computer's operating system (MS-DOS or other) can then be loaded.

/SA

Save system configuration from non-volatile RAM (CMOS) to a file. This option allows you to save your SETUP configuration by saving the current non-volatile RAM (CMOS) image to a file.

/X

Scan hard disc and list all marked defects. This option allows you to confirm that any defects found on the disc at the factory have been properly marked so that no data is written to them.

When the scan is complete, compare your list with the list displayed. If there is a discrepancy, you may want to reinitialize you hard disc using the /D command line option to manually enter defects. Caution: reinitializing your hard disc will DESTROY all data on it. Do so only after first backing up ALL the data on ALL the volumes of the hard disc with the MS-DOS BACKUP command (or similar command if you are using another operating system).

B

Using Battery Watch

Battery Watch is a utility (for MS-DOS users only) that monitors your battery usage and allows you to keep track of how much battery power is left. Every two and a half seconds, Battery Watch checks to see which of the computer's hardware components (flexible drives, hard discs, display, modem, etc.) are in operation. It then calculates how long your computer's battery will operate at the current rate of power consumption.

Battery Watch is a TSR (Terminate and Stay Resident) program. This means that it runs in the background, monitoring your computer and estimating how much battery power is left. It uses 13 KB of memory.

In addition, Battery Watch has a deep discharge utility. This utility helps correct the NiCad memory effect problem and restores the battery to its full charge capacity. Refer to Chapter 3 for more information on memory effect.

Responding to the Battery Watch Message

When you install Battery Watch, the AUTOEXEC.BAT file is modified so that Battery Watch runs each time you start your computer. Each time Battery Watch runs, the computer beeps and the following message appears on your screen:

```
Press F10 if battery is fully charged, or any key
to resume previously saved battery level.
```

- If the battery is fully charged, press F10.
- If the battery is not fully charged or if you do not know the condition of the battery, press any key to use the previously saved battery level.
- If you do not press a key within 5 seconds, Battery Watch will start by itself. It uses the previously saved battery level.

Note

You will need to reset the battery gauge (battery charge level) if:

- You plugged the power adapter into your battery while the computer was turned off (Battery Watch does not know you charged your battery)
- You ran Battery Watch without the battery attached to your computer (Battery Watch assumed you were consuming battery power when you were not)
- The battery is not fully charged and you did not run Battery Watch the last time you powered your computer with the battery (you took Battery Watch out of the AUTOEXEC.BAT file).

See the section "Resetting the Battery Gauge" in your *Utilities and Drivers Packet.* This section explains how to update the battery charge level.

Checking the Remaining Battery Charge

The Battery Watch Window shows you the estimated charge your battery has left. As you use your battery to power your computer, you will want to periodically check the remaining charge. You can check the Battery Watch Window as you work with other applications.

To display the Battery Watch Window, hold down the left Shift and Alt keys and press B at the same time. Then release all three keys. The Battery Watch Window appears in the center of the screen.

To return to your application, press Esc.

For More Information

Refer to your *Utilities and Drivers Packet* for a complete description of Battery Watch functions.

C

Using the Monitor Program

Your computer contains a special built-in program called the Monitor program. This program is intended for advanced users. It includes:

- The boot command, which lets you choose how your computer will start.
- The color bar command, which allows you to adjust your display.
- Commands which enable experienced programmers to write, edit, and run assembly language programs.
- Video commands that allow you to select text character size, colors, and graphics resolution.
- More extensive tests that can be selected from a menu and started from the keyboard. These tests are for the disc drives, keyboard, base memory, extended memory, and power-up sequence.
- Power-up tests capable of finding most problems that would prevent your computer from operating.
- The setup command, which is an advanced way to specify your computer's system configuration.

The Monitor program helps you customize your computer. You can use this program at any time because it is permanently stored in your computer's read-only memory (ROM).

The Monitor Prompt

Run the Monitor program by holding down Ctrl and Alt, and pressing Ins at the same time. A three-line message will appear in the upper-left corner of the screen. Under this message, you will see the Monitor prompt (->) pointing to a blinking cursor.

If you type a question mark, a list of Monitor program commands will appear on the screen. The commands are a single letter or word.

To exit the Monitor program without typing a command, hold down Ctrl and Alt, and press Del at the same time.

Monitor Commands

When you type a question mark (?) and press Enter at the Monitor prompt, the Monitor command summary is displayed.

```
                    - MFM-200 Command Summary -

CMD:    Explanation             Syntax
----    -----------             ------
?       Help                    ?
B       Boot from disk          B [{F|W}][{0|1|2|3}][:<partition>]
C       Color bar               C
D       Display memory          D [<range>]
E       Examine memory          E <addr>
F       Fill memory             F <range>,{<byte>|"<string>"} ...
G       Execute (Go)            G [=<addr>][,<breakpoint>] ...
H       Hex math                H <number1>,<number2>
I       Input from port         I <port>
M       Move memory block       M <range>,<dest>
O       Output to port          O <port>,<value>
R       Examine Registers       R [<register>]
S       Search memory           S <range>,{<byte>|"<string>"} ...
T       Trace program           T [<count>]
U       Unassemble program      U [<range>]
V       Set Video/Scroll        V [M<mode>][S<scroll>]
        Where <range> is:       <addr>{,<addr>|L<length>}
TEST:   Extended diagnostics    TEST
CONFIG: Define hardware setup   CONFIG

->
```

Note that the corresponding "syntax" for each Monitor command simply means the order or way to enter the command so that the computer recognizes it. Use the following rules when you type Monitor program commands:

Items shown in brackets

`[like this]`

are optional entries and only need to be entered in certain cases.

Items shown in braces and separated by a vertical bar

`{like this | and this}`

represent a series of choices. Choose only one. For example, for the items shown above you would type either "like this" or "and this".

Items shown in angle braces

`<like this>`

should be replaced with a variable, such as a drive letter, that you have selected.

Boot Command

The boot command allows your computer to start the operating system from either the flexible or the hard disc drive. Note that booting your computer and starting your computer are the same thing.

Starting Your Computer from the Flexible Disc Drive

To start your computer from the flexible disc drive, insert a flexible disc which contains an operating system, type BF (for "boot from flexible disc drive"), and press the Enter key. The computer will then attempt to read the disc in the flexible drive.

If you attempt to start your computer from a disc that does not have the operating system installed on it, one of the following messages will appear on the screen:

```
No system

Non-System disk or disk error

+++ DISK ERROR:  Invalid address mark! +++

+++ DISK ERROR:  Sector not found! +++
```

When this happens, remove the disc from the drive, insert an operating system disc, and press the ESC key. When the Monitor prompt appears (->), re-type the command. If the Monitor prompt does not appear when you press the ESC key, hold down Ctrl and Alt and press Ins at the same time to run the Monitor program.

If there is no disc in the flexible disc drive, this error message will appear on the screen:

```
+++ DISK ERROR: Drive not ready! +++
```

When this happens, simply press the ESC key, insert the correct disc into the drive, and re-type the command.

If you enter a boot command for a drive that is not installed in your computer (such as BF3), one of these error messages will appear on the screen:

```
+++ DISK ERROR:  Bad disk controller! +++

+++ DISK ERROR:  Drive not ready! +++
```

When this happens, press ESC and enter the correct command when the Monitor prompt appears on the screen.

Starting Your Computer from the Hard Disc Drive

You can start your computer from the hard disc drive by typing the command BW and then pressing the Enter key. The W tells the computer to read the operating system from the hard disc drive. If you have not partitioned and/or installed the operating system on your hard disc drive, you will see one of the following messages.

```
Not a bootable partition

No system
```

These messages are normal and mean you have to partition your hard disc and/or install an operating system before you can use the hard disc drive.

If your hard disc has been divided into partitions, you can also start your computer from a particular partition. Use this command, with a drive number (0) and partition number (:1 through :4) for your computer. Press Enter after typing the command. For example:

```
BW0:2
```

If you enter a boot command for a non-existent drive or partition, the following error message will be displayed.

```
+++ DISK ERROR: Bad disk controller! +++
```

Note

The `DISK ERROR: Drive not ready!` message may be displayed if the drive has been powered down and takes longer than ten seconds to reach operating speed.

When this happens, re-run the Monitor program by pressing the ESC key and then type the correct command.

If you attempt to boot using a drive number other than 0 or a partition number that is larger than 4 or less than 1, the following message will appear on the screen:

```
Invalid Command!

->
```

When this happens, simply re-enter the command using a valid drive and/or partition number.

Color Bar Command

You can use the color bar to adjust the contrast and brightness on your LCD display or external monitor. On color and enhanced color monitors, 16 colors will be displayed. On some monochrome monitors, three shades (the normal display color intensified, the normal display color, and black) will be displayed. On other monochrome monitors, 16 shades will be displayed.

To view the color bars, type the letter C at the Monitor prompt and press the Enter key. Use the Fn+F8 and Fn+F9 key combinations to change the video palette. Then, restart your computer with the Monitor program boot command (described previously) to use the palette. Note that when you turn your computer off or restart it with the Ctrl+Alt+Del key sequence, the video palette returns to the default palette.

Assembly Language Debugging Commands

The Monitor program also contains a complete set of assembly language debugging commands. These commands allow experienced programmers to test procedures and routines, examine memory and register contents, and troubleshoot and remove mistakes from assembler programs. Table C-1 lists the commands available and provides a brief description of each.

Note

These commands should be used only if you are familiar with assembly level programming and microprocessor architecture. If you want to know more about the debugging commands and how to use them, contact your dealer or HP service representative for information about the technical reference manual for your computer.

Table C-1. Assembly Language Debugging Commands

Command	Syntax	Description
Display memory	`D<address>`	Displays contents of 128 bytes of memory beginning at specified address.
	`D<address> L<bytes>`	Displays contents of specified number of bytes of memory beginning at specified address.
	`D<range>`	Displays contents of specified block of memory.
Examine memory	`E<address>`	Displays and allows user to alter contents of specified memory location.
Fill memory	`F<range>,<data byte>`	Enters specified data byte into each memory location in specified memory block.
	`F<range>,"<ASCII string>"`	Enters specified ASCII string into specified memory block.
Execute (Go)	`G=<address>`	Begins execution of program at specified address.
	`G=<address>,<breakpoint>`	Begins execution of program at specified address and halts at breakpoint.
Hex math	`H<number1>,<number2>`	Displays the sum and the difference of the specified hexadecimal numbers.

Table C-1. Assembly Language Debugging Commands Continued

Command	Syntax	Description
Input from port	`I<port address>`	Displays contents of specified port.
Move memory block	`M<range>,<destination>`	Copies contents of specified memory block to another specified memory block.
Output to port	`O<port address>,<data>`	Writes specified data to specified port address.
Examine registers	`R<register name>`	Displays contents of specified CPU register and allows modification of contents.
Search memory	`S<address>L<bytes>,<data>`	Searches specified memory block for specified data byte and displays address data found.
	`S<range>,"<ASCII>"`	Searches specified memory block for specified ASCII character or string and displays address character found.
Trace program	`T<count>`	Executes specified number of lines of an assembled program in single-step mode.
Unassemble program	`U<range>`	Displays assembler mnemonics and hex coding for specified memory block.

Video and Scroll Mode Commands

The computer display is created by turning individual dots (called pixels) on the screen on or off. Your computer does this using one of the twelve video modes and two scroll modes contained in the Monitor program. The resolution (sharpness) of the display, the number of characters per line, the number of lines per screen, and the colors available are all defined by the Monitor program video modes. Software programs may also specify particular video or scroll modes. Table C-2 describes the video modes available.

Table C-2. Monitor Program Video Modes

Mode Number	Displayable Colors	Resolution
0 (color)	16	40 x 25 text
1 (color)	16	40 x 25 text
2 (color)	16	80 x 25 text
3 (color)$_1$	16	80 x 25 text
4 (color)$_2$	4	40 x 25 text 320 x 200 graphics
5 (color)$_2$	4	40 x 25 text 320 x 200 graphics
6 (color)$_3$	2	80 x 25 text 640 x 200 graphics
7 (monochrome)$_4$	4	80 x 25 text 720 x 350 graphics
D (color)$_5$	16	40 x 25 text 320 x 200 graphics
E (color)$_5$	16	80 x 25 text 640 x 200 graphics
F (monochrome)$_6$	4	80 x 25 text 640 x 350 graphics
10 (color)$_7$	4 or 16	80 x 25 text 640 x 350 graphics

Notes:

1. This is the default mode. Software determines the specific mode: 320 x 200 16-color graphics, or 640 x 200 4-color graphics.
2. Four colors in two palettes (black/cyan/magenta/white or black/yellow/green/red) plus 16 background colors.
3. The two colors are black and white.
4. This mode is only available with an HGC-compatible (hercules) monochrome monitor. To use the Hercules capability, you must use mode 7. You must also use the MODE command from MS-DOS to operate in the Hercules high-resolution graphics mode. The four colors are black, normal, blink, and intensity.
5. 16 of 64 colors are available.
6. This mode is only available with a HGC-compatible monochrome monitor. The four colors are black, normal, blink, and intensity.
7. With 64 KB of video RAM, 4 of 16 colors are available. With more than 64 KB of video RAM, 16 of 64 colors are available.

Scroll modes determine how information is moved on and off the screen. These scroll modes are available:

S0 (Software Scroll Mode)

This mode is commonly used by PC-compatible software and works in all video modes. When material is scrolled, the display moves one line at a time. This mode is the default scroll mode for your computer.

S2 (Smooth Scroll Mode)

This mode is available with video mode 6 only. When material is scrolled, the display moves a partial line at a time. This mode generates a more readable display and provides a much smoother appearance. A cursor will not be displayed when you use this mode with an external display.

Test Command

Each time you turn the computer on, the Monitor program performs a series of self-tests to make sure the computer is ready to function. If a malfunction is detected, one or more error messages are displayed to alert you of the problem. More extensive tests can be run by typing TEST at the Monitor prompt and then pressing the Enter key. The test menu will appear on the screen. Appendix D contains information about each of these tests.

The Config Command

The config command is used to run the Hardware Setup/Configuration program. This program is an advanced way to set your system configuration information. You can run the program by typing

```
CONFIG
```

and pressing Enter at the Monitor prompt.

The Hardware Setup/Configuration Program screen is displayed. You can use this screen to set the same system configuration settings that you can set with the SETUP program described in Appendix A. If you change settings with the Hardware Setup/Configuration program, they will replace the ones you have made with the SETUP program.

To exit the screen, press the Esc key, type Y if you are done making changes, and then press Enter. Your computer will be restarted.

The Hardware Setup/Configuration program consists of two screens. One displays the system configuration when the computer is used as a portable, that is, when the optional expansion chassis is not attached to the computer. This screen displays the message **Expansion Chassis Not Installed**. The other screen displays the system configuration when the optional expansion chassis is attached. This screen displays the message **Expansion Chassis Installed**. You can change from one screen to the other with the PgUp and PgDn keys. Each screen may contain different information.

Some of the information will be highlighted in rectangular boxes, called "fields." The fields contain information about the hardware currently in your computer. Check to make sure that each field matches the hardware installed in your computer.

You can move up, down, right, or left between the fields of information using the arrow keys. Within each field, except the Time and Date fields, use the space bar and Back Space key to change the entry so that it matches your computer's configuration. The time and date entries must be typed.

Error Messages

The internal back-up battery provides power for the computer memory used to store hardware information. If your internal back-up battery loses power, the information stored by the Monitor Setup/Configuration program is lost and one of the following messages will be displayed:

```
ERROR: Please replace the back-up battery!
ERROR: Bad configuration information found in
CMOS!
```

or

```
ERROR: Bad configuration information found in
auxiliary CMOS!
Errors found!  Please press <Esc> to continue
```

When this happens, update the Monitor Setup/Configuration program to match your computer. The default entry for each field will be highlighted.

If the error message was caused by a faulty internal back-up battery, the information you type now will be lost again when you turn your computer off. If the battery is defective, contact your dealer or HP service representative to have the battery replaced. Refer to Appendix D for more information on error messages and the back-up battery.

Time and Date

The computer's clock and calendar are powered by the internal back-up battery and will run continuously, even when the computer is turned off. Once the time and date are set correctly, you will only need to change them if you replace the back-up battery.

Hard Disc Drive

When the computer is shipped from the factory, the hard disc drive type is set to match the drive that was installed in the computer. You should not change this selection unless the original drive is replaced by a drive of a different type. If the back-up battery is replaced, you will have to enter a new drive type. Press the space bar or Back Space key to step through the drive types.

Serial

The serial port can be addressed as either COM1 or COM2. If there is no serial device attached to the computer or to serial ports located in an optional expansion chassis, the serial port can be turned off.

Modem The modem, if present, can be enabled or disabled. Disabling the modem conserves battery power. If the modem is enabled, it is addressed as COM2.

Parallel The Parallel field determines whether the parallel port is addressed as LPT1 or LPT2. If there are no parallel devices attached to the computer or to a parallel port located in an optional expansion chassis, the parallel port can be turned off.

Base Memory This field allows you to specify the amount of system base memory in your computer. Normally, this value should be 640 KB. However, you can specify a size of 512 KB to allow some specialized applications to run on your computer.

Add-On RAM The Add-On RAM field determines whether the expansion memory will be used as expanded memory or extended memory. If you do not have a memory expansion card, select expanded memory. (If you enable expanded memory, select 0K in the Add-On RAM Size field, and have installed the LIM EMS driver, you can use the built-in 256 KB EMS memory.)

See Chapter 1 of this manual and the information about the LIM EMS driver in your *Utilities and Drivers Packet* for information on using memory.

Add-On RAM Size If you have added a memory expansion card to your computer, you need to specify the size of the memory. The selections are 0K, 1024K, and 4096K. Use the space bar to increase the number and the **Back Space** key to choose a lower number. If you do not have a memory expansion card, select 0K. (If you select 0K, enable expanded memory in the Add-On RAM field, and have installed the LIM EMS driver, you can use the built-in 256 KB EMS memory.)

Speed You have a choice of three speeds: slow (6 MHz), fast (12 MHz), and smart. The fast speed is the normal (and default) speed. However, some applications may require a slower speed in order to run. The smart speed slows the computer down for flexible disc drive operations but allows the fast speed for other operations. If an application does not run properly, it may require slow speed. This speed slows down all operations of the computer. Slow speed provides maximum battery power conservation.

Wini Powerdown This field allows you to set the amount of time the hard disc will continue to spin after the last disc activity. When the value reads "Always On" the disc will continue to spin as long as power is applied to the computer. Use the space bar and the **Back Space** keys to increase or decrease this value in increments of five seconds. Setting this value to a low number conserves battery power unless your application accesses the disc frequently. A value below 30 seconds is not recommended.

Ext. Floppy This field is used to identify what type of external flexible disc drive is attached to the computer: 5.25-inch 360 KB, 5.25-inch 1.2 MB, 3.5-inch 720 KB, or 3.5-inch 1.44 MB.

Video The Video field allows you to choose between the built-in LCD or an external display attached to the computer's Monitor port. If you have an optional expansion chassis, there are four additional selections available:

Color Card: 40x25

This settings displays text at 40 characters per line, 25 lines per screen.

Color Card: 80x25

This setting displays text at 80 characters per line, 25 lines per screen.

Mono Card: 80x25

This setting selects a high-resolution monochrome display.

Enhanced Graphics

This setting selects an EGA or a high-resolution analog display.

Backlight

Use the Backlight field to set the time the backlight remains lit after the last keyboard activity. When the value reads "Always On" the backlight will remain on as long as power is applied to the computer. When the value reads "Always Off" the backlight will remain off. Use the space bar and the Back Space keys to increase or decrease this value in increments of one minute. Setting this value low or off conserves battery power.

Boot

The Boot field allows you to select how your computer will start. You can select any of the following options:

Floppy Drive 0

The computer will attempt to load the operating system from the flexible disc drive.

Hard Disk Drive 0

The computer will attempt to load the operating system from the hard disc drive.

Floppy then Hard Disk

The computer will attempt to load the operating system from the flexible disc drive. If that drive is not ready, the computer will attempt to load the operating system from the hard disc drive.

Enter MFM-200 Monitor

The computer will not attempt to load the operating system from either drive but will run the Monitor program instead.

D

Maintaining and Servicing Your Computer

Your computer is well-designed and needs very little maintenance. However, even the most well-designed and reliable equipment may malfunction and require servicing. Many times the reason for a malfunction is simple and you can solve the problem yourself. Other times, you can detect and isolate potential problems during a test procedure and prevent a malfunction from occurring. This chapter includes:

- A checklist of some commonly experienced problems that can be easily solved.
- A list of power-up messages that might be displayed as a result of the automatic testing that occurs each time you turn on your computer. The list identifies the likely cause of each message and explains various solutions.
- A description of the tests you can run from the keyboard to check various parts of the computer. These tests are built into the Monitor program and can help you diagnose problems.
- Some brief cleaning and general maintenance procedures and information about the internal back-up battery.
- Service support information for those instances when you need to have your computer serviced.

Checklist of Common Problems

What first appears to be a major problem or malfunction may really be a minor problem that can be corrected easily. Read through this section to see if the condition you are experiencing is listed. If it is, check the probable causes listed after it.

Problem	Probable Cause
Nothing happens when the computer is turned on. The power indicator on the keyboard is not lit.	Verify that the computer is turned on. If you are operating on battery power, the battery may be discharged or faulty. Replace the battery or plug in the power adapter. If you are using the power adapter and it is plugged into a switched multiple outlet box, make sure the switch on the outlet box is turned on. Check the power adapter to be sure it is securely connected to the computer and to an AC outlet. If you are using a multiple outlet box, check its connections. Check the power cord of the power adapter for damage. If it needs to be replaced, have a qualified service representative replace it with a cord of the same type and rating. Make sure the AC outlet is working. Plug a different electrical device (such as a lamp) into the outlet and turn it on.

Problem	Probable Cause
The computer does not load the operating system when powered up or reset.	Make sure you are using a disc that has been formatted and has the operating system on it. Make sure that the disc is inserted properly and completely into the disc drive. Run the SETUP program and check the hard disc drive type and the startup selection. Refer to Appendix A for information on running the SETUP program.
The computer resets to the power-up point or the disc keeps rebooting.	If the power adapter is attached, check for a loose power cord connection. Try another flexible disc; the one you are using may be bad.
The low battery power indicators flash and beep when the battery is nearly full.	Save your work. If the indicators stay on for more than ten minutes, ignore them. Use Battery Watch to verify your battery's charge level.

Problem	Probable Cause
The video display has a blank screen, distorted display, insufficient brightness, or excessive brightness.	Adjust the brightness and contrast controls. Press the Fn+F10 key combination. If the display appears, run the SETUP program and check the Primary Display setting. Refer to Appendix A for information on running the SETUP program. Refer to Appendix C for information on video options.
The video display fades after a few hours of operation.	Adjust the contrast control. This problem is caused by an increase in the temperature of the LCD screen; it is normal.

Power-Up Tests and Messages

The Monitor program contains instructions that cause the computer to perform a series of self-tests whenever it is powered up or restarted. You will see the disc drive access and keyboard indicators light, and hear the computer beep while these tests are in progress.

Occasionally, a malfunction occurs that prevents anything, including an error message, from being displayed. If nothing is displayed and the computer does not appear to be functioning after it has been powered up or restarted, contact your dealer or HP service representative.

If the computer fails any of the self-tests, it attempts to display a message on the LCD screen. These messages are generated by the Monitor program. Some of the more common power-up messages are listed below. Explanations are included with each message to help you identify and correct the problem.

Message	Explanation

`+++ ERROR: Please replace the back-up battery! +++`
 	
`+++ ERROR: Bad configuration information found in [auxiliary] CMOS! +++`
 	
`--- Errors found! Please press <Esc> to continue ---`
	These messages mean that the computer has detected a difference between the hardware actually installed and the information about the hardware that is stored in the computer's memory. To correct the problem, run the SETUP program as described in Appendix A. Use Option 1 to correct your system configuration information.
	
	Generally, once this information has been updated, your computer will operate properly. However, if this message appears each time you turn your computer on, you may need to replace your internal back-up battery. Contact your dealer or HP service representative.

`+++ ERROR: CPU failure! +++`
 	
`+++ ERROR: ROM checksum failure! +++`
	These messages indicate that the microprocessor or read-only memory circuits may not be functioning correctly. Try turning the computer off and leaving it off for 20 or 30 seconds while you check all connectors to be sure they are properly attached. If this does not correct the problem, contact your dealer or HP service representative.

Message	Explanation

`+++ ERROR: Overflow! +++`
 	
`+++ ERROR: RAM failure!`
`Address: XXXX:YYYY, Bit: N,`
`Chip: Uxxx +++`
 	
`+++ ERROR: Parity hardware failure!`
`Address: XXXX:YYYY, Bit: N,`
`Chip: Uxxx +++`
 	
`+++ ERROR: Parity failure! +++`
 	
`+++ ERROR: Memory Parity Failure! +++`
	If one of these messages appears, the power-up self-tests of the system memory or Monitor ROM were not successfully completed. When a chip number is displayed, it indicates the particular memory chip that is most likely to have failed. Contact your dealer or HP service representative.

`+++ ERROR: Timer interrupt failure! +++`	This message indicates that the interrupt control or timer logic may have failed. Contact your dealer or HP service representative.

`+++ ERROR: Base memory size error!`
`SETUP: XXXK ACTUAL: YYYK +++`
 	
`+++ ERROR: Expansion memory size error!`
`SETUP: XXXXXK ACTUAL: YYYYYK +++`
 	
`+++ Divide by zero! +++`
	These messages usually indicate that the SETUP program has stored incorrect information in the computer's memory. To correct the problem, run the SETUP program as described in Appendix A. Use Option 1 to correct your system configuration information. If this does not correct the problem, contact your dealer or HP service representative.

`+++ ERROR: Keyboard not responding or not connected! +++`
 	
`+++ ERROR: Invalid/No keyboard code received! +++`
	The keyboard normally sends a special code at power-up to tell the computer that it is functioning properly. The most common cause of these messages is a failed keyboard. Contact your dealer or HP service representative.

Message	Explanation

`+++ DISK ERROR: Drive not ready! +++`
 	
`+++ DISK ERROR: Bad disk controller! +++`
	If incorrect flexible or hard disc drive information has been stored in the computer's memory, one of these messages will be displayed. Refer to Appendix A and run the SETUP program to verify that it contains the correct drive information.
	
	Attempting to start your computer from a flexible disc drive with no disc in the drive or not completely inserted can also cause these messages. Make sure a disc is completely inserted in the flexible disc drive and then try starting your computer again.

`+++ DISK ERROR: DMA overrun! +++`	A faulty disc controller circuit may cause this message. It may also appear if an optional accessory card malfunctions. If any optional cards have been installed in the expansion chassis, such as a parallel/serial card, remove them and run the power-up tests again. If the problem no longer occurs, replace the cards one at a time and repeat the power-up tests after installing each card. When the computer no longer functions or the error message reappears, the card you last installed is likely to be defective.

`+++ DISK ERROR: Disk not bootable! +++`
 	
`No system`
 	
`Not a bootable partition`
	Any of these messages may occur when the computer attempts to start from a disc that does not contain the operating system. Most often, you can correct this by using a disc that has the operating system on it. You may need to format the hard disc drive and load the operating system onto it. If these messages occur often, have your dealer or HP service representative check the disc drive alignment and disc drive controller circuitry.

Message	Explanation

`+++ DISK ERROR: Sector not found! +++`
 	
`+++ DISK ERROR: CRC error! +++`
 	
`+++ DISK ERROR: Invalid address mark detected! +++`
 	
`+++ DISK ERROR: Seek failure! +++`
 	
`+++ DISK ERROR: Invalid data read! +++`
	Any of these messages may occur when the computer attempts to load the operating system, an application, or data from a flexible disc. The most common cause of these messages is a faulty flexible disc. Try using the backup copy of your disc.
	
	If these messages appear often, contact your dealer or HP service representative. Your disc drives may need adjustment or replacement.

`+++ Non-maskable interrupt! +++`	This message indicates a possible program execution error. It may also appear if power to your computer has been interrupted. When this occurs, any application in progress is suspended and the computer returns to the Monitor program for instructions.

`+++ ERROR: Wild Interrupt! +++`
 	
`+++ ERROR: Wild Hardware Interrupt! +++`
 	
`FATAL: Internal Stack Failure, System Halted`
	These messages occur when something happens that the computer was not expecting. As with a non-maskable interrupt, any application in progress is suspended and the computer returns to the Monitor program. However, the computer is probably locked up. Turn your computer off, leave it off for at least 30 seconds, and make sure that the keyboard, video monitor, and other peripherals are securely connected. Turn the computer back on. If this does not correct the problem, contact your dealer or HP service representative.

Using the Monitor Test Command

In addition to the self-tests that run automatically each time you power up your computer, there are a number of tests you can run manually from the keyboard. Like the power-up tests, these tests are part of the Monitor program. The main advantage of the keyboard selectable tests is that they run continuously until you stop them or a malfunction occurs. This is useful when a problem is intermittent, time dependent, or the result of heat buildup.

Start the keyboard selectable tests from the Monitor prompt. Hold down Ctrl and Alt, and press Ins at the same time to run the Monitor program.

1. At the Monitor prompt (->), type the word TEST and press the Enter key. The following menu will be displayed on your screen.


```
CHOOSE ONE OF THE FOLLOWING:

1.  DISK READ TEST
2.  KEYBOARD TEST
3.  BASE MEMORY TEST
4.  EXTENDED MEMORY TEST
5.  POWER-UP TEST
6.  EXIT

ENTER YOUR CHOICE:
```

2. Type the number (1-5) of the test you want to run.

   With the exception of the keyboard test, any test you select will continue to run until it detects an error. During each test, the computer displays a screen similar to this:

```
SAMPLE TEST


                                TEST COUNT = 1


TYPE <ESC> TO ABORT
```

3. Stop the test at any time by pressing the Esc key.
4. Press the Esc key a second time and the test menu will reappear. You may now run a different test by typing its number, or exit the test program by typing the 6.

Disk Read Test

Use the disc read test to check your disc drives if you suspect a problem with them. The test can check both flexible and hard disc drives. If you are experiencing disc errors, such as `+++ DISK ERROR: Sector not found! +++`, this test can help determine whether the disc or the disc drive is at fault.

This test checks the disc drive that your computer last attempted to start from. To select the drive you wish to test, use the BOOT command from the Monitor program to start from that drive. When you run the disc read test, it will check the drive you started from, even if the operation was not successful. Follow these steps to test a disc drive.

1. Attempt to start from the drive you wish to test.

   If you are testing a flexible disc drive, insert a blank, formatted disc in the drive to be tested. Do not use a valuable disc to test your drives! If the disc drive is defective, the disc could be damaged.

2. Run the Monitor program, type TEST and, when the test menu appears on the screen, press the 1 key.

   You will see the disc drive access indicator light. Each time the computer successfully reads the boot track of the disc, the test count increments. If an error is detected, the message DEVICE ERROR is displayed.

3. Allow at least ten successful passes before you stop the test using the ESC key.

Keyboard Test

If you suspect a problem with your keyboard, use the keyboard test to check it. Run the Monitor program, type TEST and, when the test menu appears on the screen, press the 2 key. When the KEYBOARD TEST message appears on the screen, press any letter, number, or symbol key. The character you selected fills the screen and the character code for that key is displayed in the upper right corner of the display. The Fn key will not produce a change in the display when it is pressed. Its operation is not verified by this test.

Base Memory and Extended Memory Tests

Use the base memory test to verify that the first 640 KB of your computer's RAM is functioning properly. Run the Monitor program, type TEST and, when the test menu appears on the screen, press the 3 key. The message SYSTEM AND VIDEO MEMORY TEST is displayed and the computer beeps. The memory bank being tested is displayed in the upper right corner of the screen. After

about 5 minutes, you will see patterns appear on the screen as the computer tests the video memory.

If you have upgraded your computer so that it has more than 1 MB of RAM, use the extended memory test to verify that the memory above 1 MB is functioning. Press the 4 key to run this test. As with the base memory test, the computer will beep while the test runs and the memory bank being tested will be displayed. If you attempt to run this test on a computer that has not been upgraded to more than 1 MB, the message **NO EXTENDED MEMORY INSTALLED** will be displayed.

These tests are more extensive than the power-up memory tests and take 5 to 10 minutes to run. If a fault is found, the same error messages used by the power-up memory tests are used to notify you of the problem.

Power-Up Test

When you select this test, the computer continuously runs the self-tests that are run when you power up or restart your computer. The test count increments each time the computer successfully completes these tests.

Cleaning and Maintenance

Your computer is designed for years of trouble-free operation. The only maintenance required is cleaning the cabinet and having the internal back-up battery replaced every three to five years.

The most common problem experienced with electronic equipment of any kind is dust that builds up over a long period of time. Keep your computer closed when it is not in use. Occasionally, you may want to wipe dust and fingerprints off the cabinet and display screen. Use the following suggestions to clean your computer. Any cleaning that cannot be done following these

suggestions should be left to your dealer or HP service representative.

- Before cleaning the computer, make sure the power is off and the power adapter is disconnected.
- Use a cloth that has been only slightly dampened with water or a non-detergent cleaning solution.
- Do not use spray liquids or a soaking-wet cloth.
- After cleaning the computer, make sure everything is dry before turning it back on.
- Do not attempt to clean flexible discs.

Internal Back-up Battery

A 3.6-volt, AA-size, lithium battery inside the computer provides power to the clock and calendar when the computer is turned off. This battery also allows the system configuration information from the SETUP program to be retained when power is turned off.

Every three to five years, this battery must be replaced. A message will be displayed on the screen when your battery needs replacing. A new battery must be installed by your dealer or HP service representative.

Service Support

When you are unable to resolve a problem or need additional information, contact your dealer or HP service representative. The computer's built-in tests, described earlier in this chapter, may assist the service representative in correcting any malfunctions, so be sure to record the test results.

If service is required, provide the following information about your computer. It will save time and help your service representative diagnose and repair your computer.

- The name, model number, drive type (and any other numbers listed on the System Checklist). Also, the serial number of your computer which is usually found on the bottom of your computer.
- The computer system configuration, including all peripheral devices connected to your computer. If you are using an external monitor, note the make and model.
- The BIOS version and amount of memory in your computer. You can obtain this information by starting your computer and pressing Ctrl and S after the information is displayed to stop it from scrolling by too quickly. Press Ctrl and Q to restart the display.
- The operating system version you are using. In MS-DOS, this information can be obtained by loading the operating system into your computer's memory. At the operating system prompt (such as A> or C>), type VER and press the Enter key.
- The application, if any, you were using when the problem occurred.
- The specific problem you are experiencing.
- The error message displayed by the computer and the operation you were attempting at the time the message appeared.

E

Advanced Key Combinations

The following table lists key combinations intended for advanced users of U.S. keyboards.

Advanced Key Combinations

Key Sequence	Description
Ctrl+Alt+Enter	Runs the Monitor program without restarting the computer. To exit the Monitor program without restarting the computer, type G.
Ctrl+Alt+1 Ctrl+Alt+2 Ctrl+Alt+3 Ctrl+Alt+4	Scrolls between four alphanumeric video display pages. Note that when an unused page is displayed, the screen is cleared and no cursor is displayed. This is because nothing has been written to the page. When two or more pages have been written to, switch between them by pressing Ctrl+Alt+page number (1, 2, 3, or 4).
Ctrl+Alt+ Fn+Scroll Lock	Flushes the keyboard type ahead buffer.

Advanced Key Combinations
Continued

Key Sequence	Description
Ctrl+Alt+I	Turns on interlace mode and clears video page 2. Interlace mode displays 50 lines of 8 x 8 characters on video page 1. You cannot toggle the video output with the Fn+F10 key combination while interlace mode is on.
Ctrl+Alt+F or Ctrl+Alt+N	Returns to video page 1 and resets interlace mode.

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Reader Comment Card
Setting Up Your Vectra LS/12 Laptop PC
D1024-90001

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