HEWLETT PACKARD

Setting Up Your HP Vectra 486/25T and 486/33T

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Setting Up Your
HP Vectra 486/25T and 486/33T PC

HEWLETT
PACKARD

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Setting Up Your HP Vectra 486/25T PC and 486/33T PC

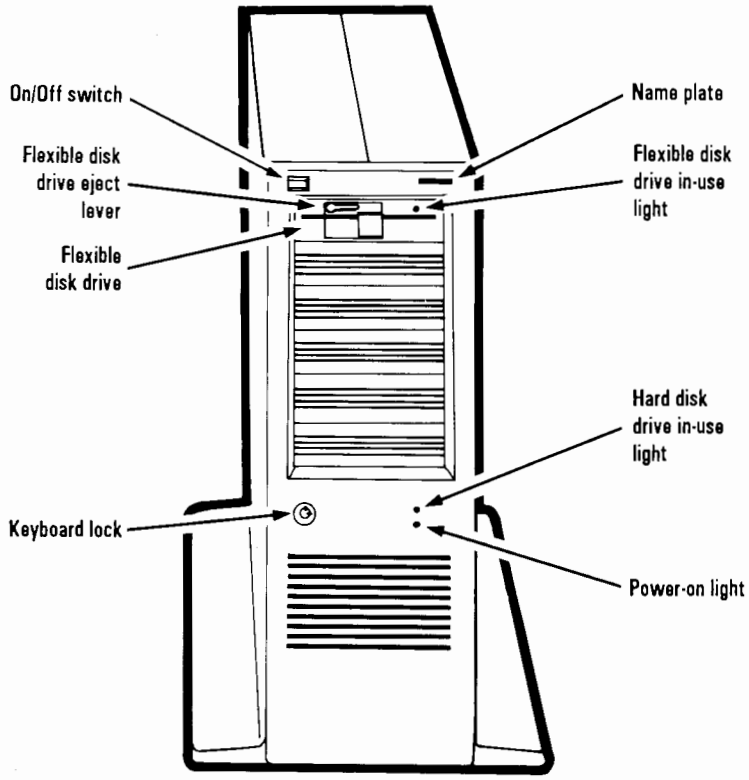
Welcome

Your HP Vectra 486/25T (formerly HP Vectra 486) and 486/33T PCs feature the new EISA (Extended Industry Standard Architecture) technology. EISA is an enhancement of an existing standard, ISA (Industry Standard Architecture) technology. EISA computers use a 32-bit EISA data bus. The EISA data bus is faster than the ISA data bus and allows you to install EISA boards as well as non-EISA (8- and 16-bit ISA) accessory boards.

With your computer you receive EASY CONFIG, an MS-DOS-based configuration utility. EASY CONFIG helps you configure your computer for both EISA and ISA accessory boards so that they function together without conflict. It also tells you how to set switches and jumpers on ISA boards that you install.

To use EASY CONFIG successfully, be sure to follow the order of the Setup Steps in this chapter.

Front View of Computer



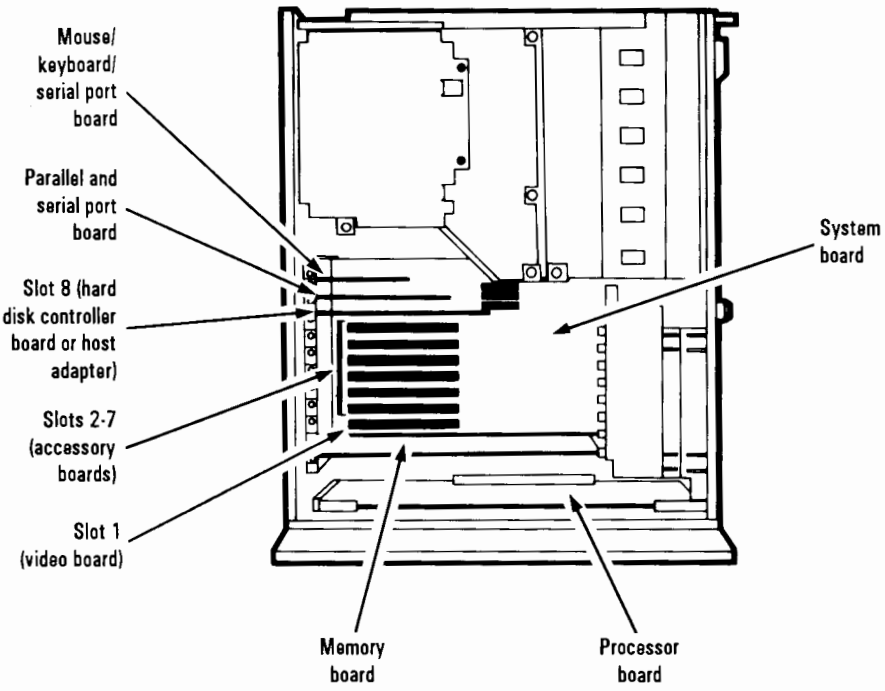
Handling Electronic Components Safely

Electronic components can be easily damaged with improper handling. *Handle components as little as possible.* Handle components only by the edges or by the metal mounting panels and green plastic handles. *Avoid* touching any gold edge connectors.

All accessory boards, such as the memory board, are sensitive to static electricity. Handle all boards carefully. Leave static sensitive components in their anti-static bags until you install them.

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

Inside View of Computer

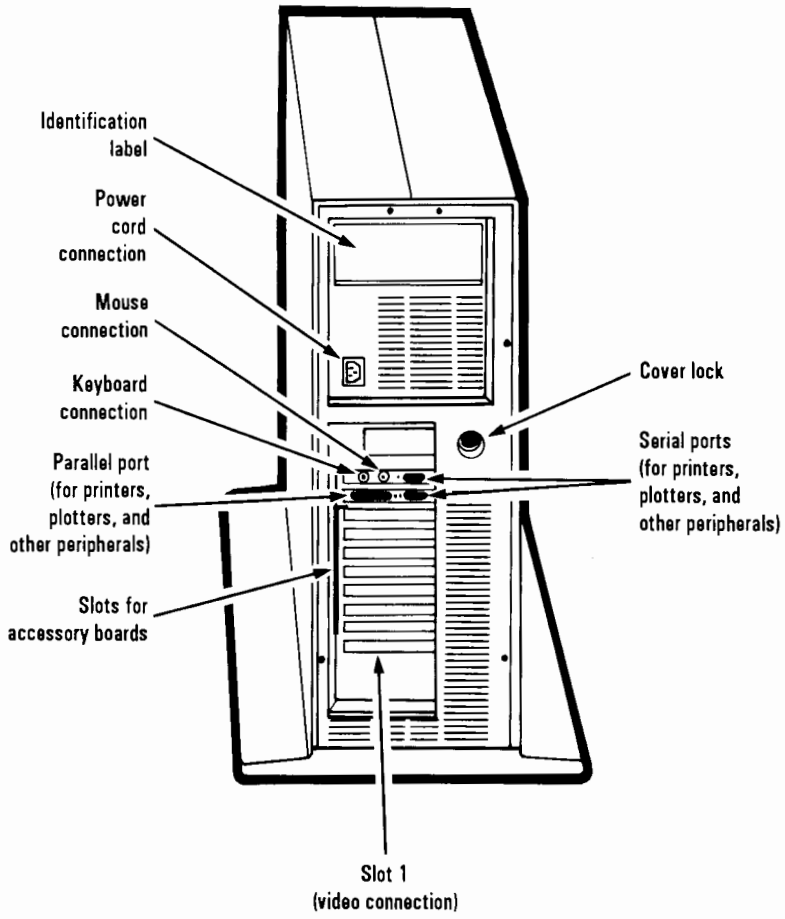


Setup Steps

It is important that you follow the Setup Steps in the exact order in which they are listed below. Skip steps that do not apply to you.

1. **Locate the keys for your computer and record the key serial number in the "Security Lock Key Serial Number" section of this chapter.** (If you misplace your keys, you will need this number to get replacement keys.)
2. **Install your video board.** (Refer to Chapter 3.)
3. **Install the Weitek 4167 coprocessor on the processor board.** (HP Vectra 486/33T PC only). (Refer to Chapter 4.)
4. **Upgrade memory.** (Refer to Chapter 5.)
5. **Install remaining boards.** (Refer to Chapter 6.)
6. **Install disk drives and tape drives.** (Refer to Chapter 7.)
7. **Replace the metal plate and cover.** (Refer to Chapter 2.)
8. **Connect the video display, keyboard, mouse, and power cords.** (Refer to the figure "Rear View of Computer" on the following page.)
9. **Run EASY CONFIG to configure your computer for the boards and options you installed in steps 2 through 6.** (Refer to Chapter 8.)
10. **Install your operating system using the operating system manual.** (If you have two hard disk drives installed, remember to partition and format the second hard disk drive.)
11. **If MS-DOS is your operating system, install the HP Utilities that are on EASY CONFIG diskette #2.** (Refer to Chapter 9.)
12. **Install any utilities and drivers that come with your options and accessories.**
13. **Connect printers, plotters, or other devices to the appropriate serial or parallel port.** (Refer to the figure "Rear View of Computer" on the following page.)

Rear View of Computer



Factory-Installed Items

The rear of your computer has an identification label that lists the equipment supplied in the computer. The label gives you information that you need to configure your computer using the EASY CONFIG program.

Here is an explanation of the factory-installed items on the label:

Drive A:	Flexible disk drive size and capacity
Drive C:	Hard disk drive capacity and type or SCSI address
Controller:	Hard disk drive controller type
Host Adapter:	SCSI host adapter type
Base Memory:	Random-access memory (RAM)
Extended Memory:	Additional RAM above 1 MB

The label shows only the factory-installed memory on your computer. For information on installing additional memory, refer to Chapter 5, "Upgrading Memory." For definitions of different types of memory, refer to the Glossary.

Security Lock Key Serial Number

Record the number of the key to your cover and keyboard here: 30565

Additional Items Installed

If you have installed any additional items in your computer, use this section to record what you have installed, where it is installed, and how it is configured.

Slot #	Board Description	Configuration or Switch Settings
1		
2		
3		
4		
5		
6		
7		
8		

Shelf	Drive	Capacity, Drive Type or SCSI Address, Interface Type
top		
bottom		

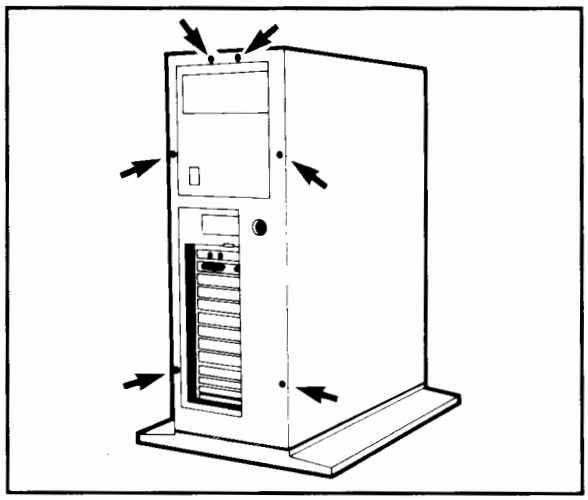
Coprocessor: _____ **Total Memory (MB):** _____

2

Removing and Replacing the Cover and Metal Plate

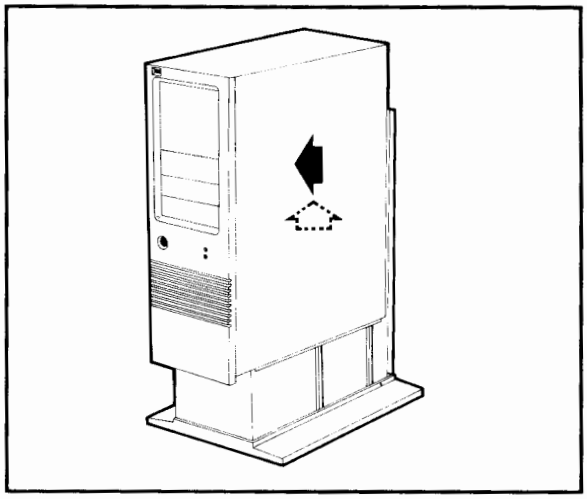
Removing the Cover and Metal Plate

1. If your computer is turned on, turn off the computer and display. Disconnect all cables and power cords.
2. Unlock the cover lock on the back of the computer.
3. Loosen the cover mounting screws.

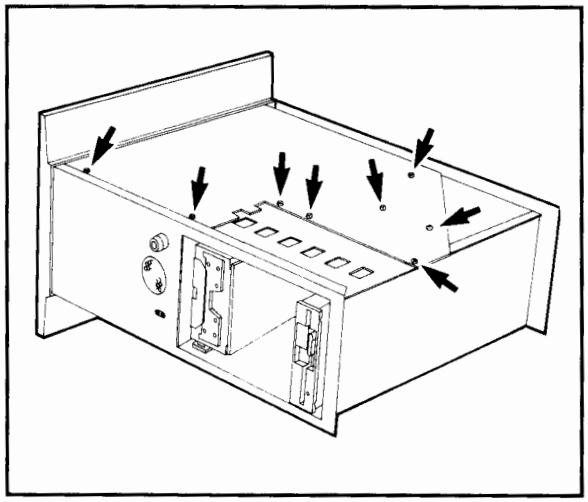


4. **Slide the cover forward until it stops. Then lift the cover straight up.**

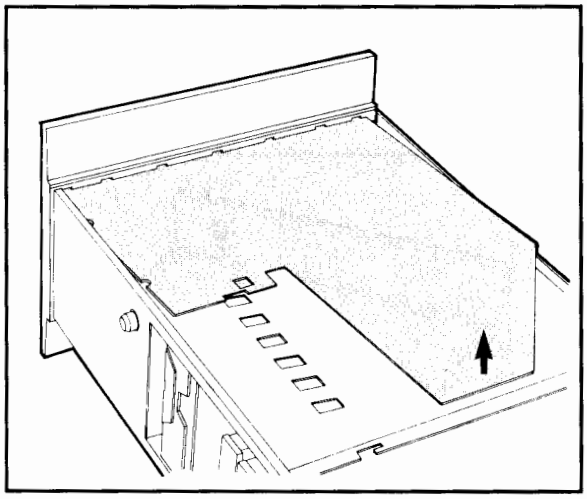
   If the cover will not slide forward, make sure you have unlocked it and completely loosened the cover mounting screws.



5. **Gently lay the computer on its side with the metal plate up.**
6. **Loosen the fasteners on the metal plate by turning each one-quarter turn counter-clockwise.**

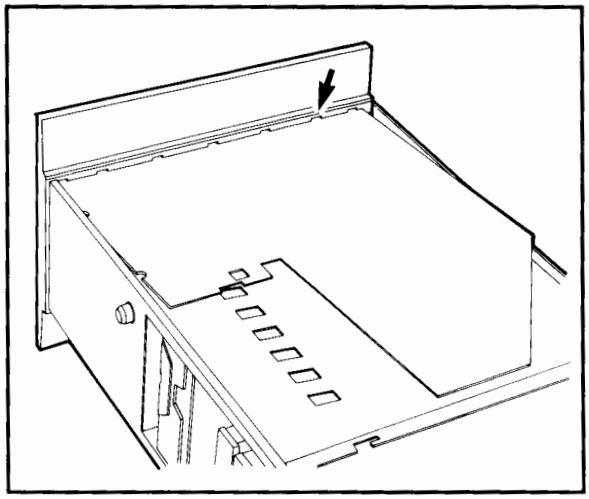


7. **Lift the metal plate up and off.**

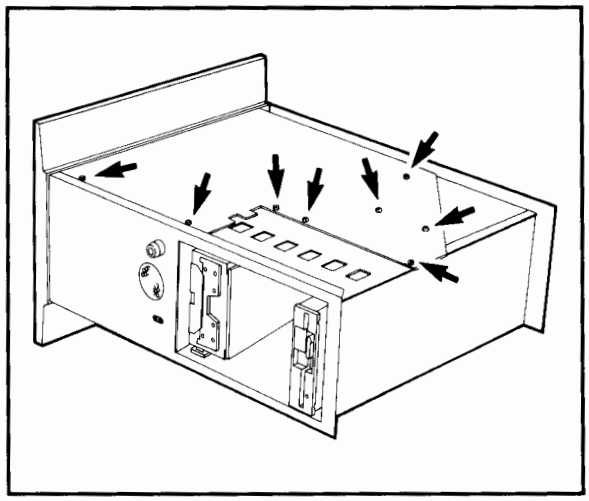


Replacing the Metal Plate and Cover

1. **Lay the computer on its side.**
2. **Slide the bottom tabs of the metal plate into the notches near the base of the computer.**

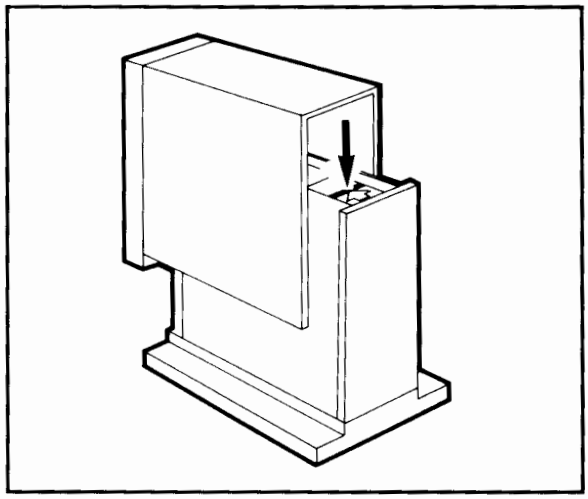


3. **Tighten the fasteners by pressing down and turning each one-quarter turn clockwise.**

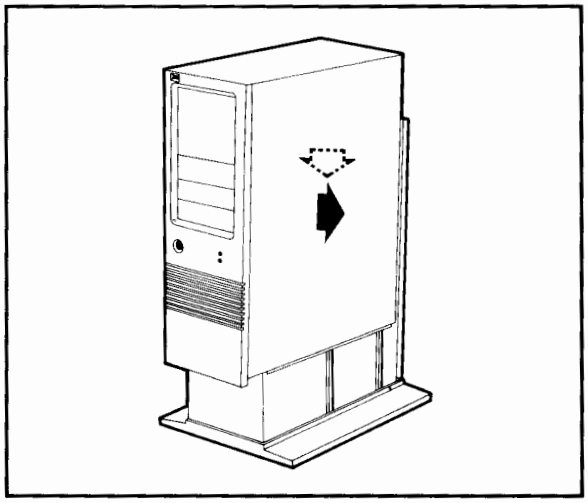


4. **Stand the computer upright.**

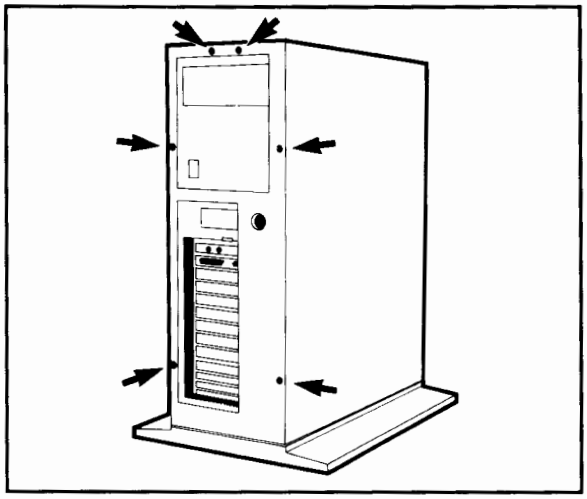
5. Align the back of the cover with the alignment mark on top of the computer.



6. Lower the cover straight over the computer. Then slide the cover to its closed position.



7. Tighten the cover mounting screws and lock the cover.



8. Return to the Setup Steps in Chapter 1 if you are setting up your computer for the first time.
9. Connect all cables and power cords.

3

Installing a Video Board

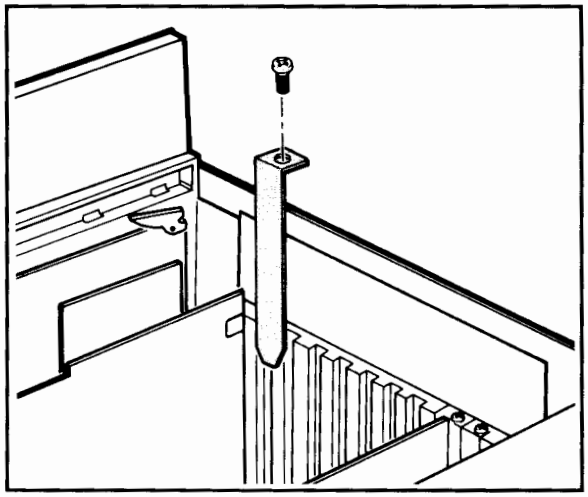
You must install a video board in your computer *before* you install any other boards and options. Use the installation instructions in this chapter to:

- Install a video board
- Replace the existing video board
- Add an additional video board

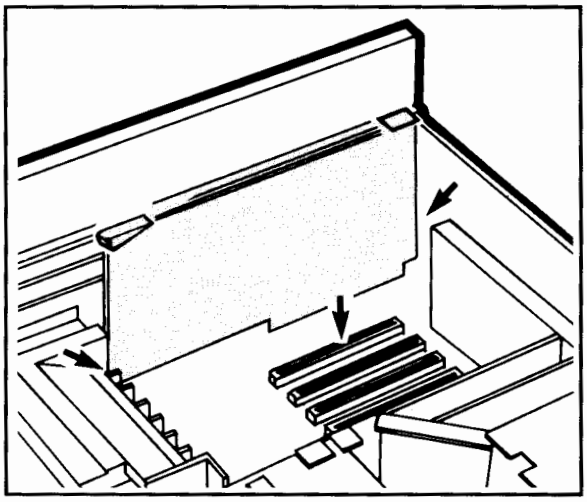
Installing Your Computer's First Video Board

1. **Check that the switch and jumper settings on the video board are correct.** (Refer to the documentation that came with your video board.)
2. **Remove the cover and metal plate from your computer.** (Refer to Chapter 2.)

3. **Remove the screw and slot cover in slot 1.** The slots are labeled on the outside of the computer. Save the screw to secure the video board after the installation.



4. **Slide the video board into slot 1. Press down firmly so that all gold edges completely engage in the slot.**



5. **Reinstall the screw to secure the video board in the slot.**
6. **Record the type of video board on the line provided in the "Additional Items Installed" section in Chapter 1.** You will need this information later when you run EASY CONFIG to configure your computer.
7. **Return to the Setup Steps in Chapter 1.**

Replacing a Video Board or Adding a Second Video Board

1. **If you are adding a second video board, check the video board's manual to see if it needs to be installed next to the first video board.**
2. **Start your computer with your EASY CONFIG diskette #1 in drive A.**
3. **If you are replacing a video board, run EASY CONFIG to remove the CFG file for the old video board, unless it is identical to the new board you are installing.** (Refer to the "Removing Boards and Options From Your Configuration" section in Chapter 8.)
4. **Copy the configuration (CFG) file for the new video board to your EASY CONFIG diskette #1.** (Refer to the section "About Configuration (CFG) Files" in Chapter 8.)
5. **Add the new video board to your computer's configuration using EASY CONFIG.** (Refer to the "Adding a Board or Option to Your Configuration" section in Chapter 8.)
6. **Check that the switch and jumper settings on the video board are correct.** With the board in front of you, use EASY CONFIG to view the jumpers and switches for the board. (Refer to the "Getting Detailed Information About Your Configuration" section in Chapter 8.)
7. **Record the type of video board and the slot in which you installed it in the "Additional Items Installed" section of Chapter 1.**
8. **If your computer is turned on, turn off the computer and display. Disconnect all cables and power cords.**
9. **Remove the cover and metal plate.** (Refer to Chapter 2.)

4

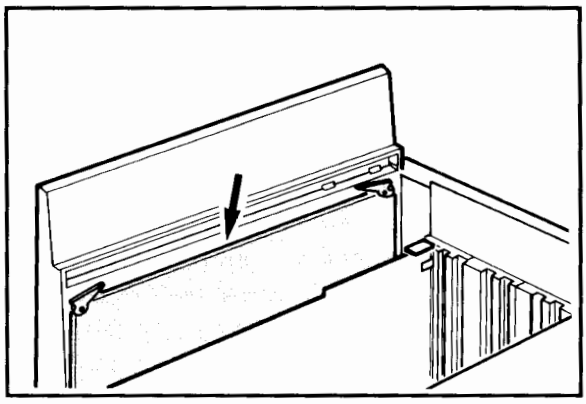
Installing the Weitek 4167 Coprocessor

You can install the Weitek 4167 coprocessor on the processor board (HP Vectra 486/33T PC only) to extend the power of the main processor. The coprocessor is devoted to mathematical operations and enhances the performance of applications that do floating point calculations. These applications include various computer-aided design (CAD) and spreadsheet programs.

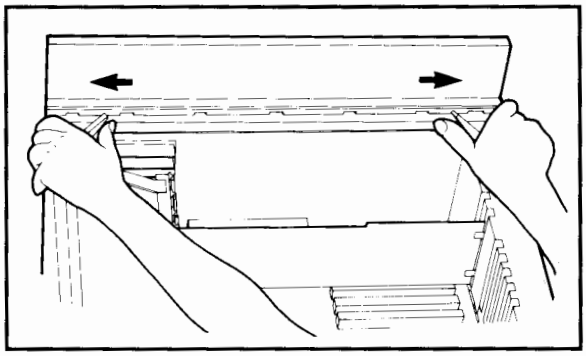
When you run EASY CONFIG after you install the coprocessor, EASY CONFIG automatically detects and configures the Weitek 4167 coprocessor.

1. **If your computer is turned on, turn off the computer and display. Disconnect all cables and power cords.**
2. **Remove the cover and metal plate.** (Refer to Chapter 2.)

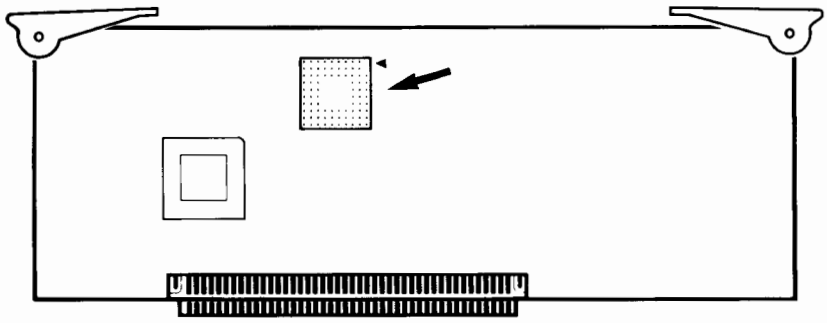
3. **Locate the processor board.**



4. **Release the two board levers with your thumbs, and gently lift the processor board out of the computer.** Place it on a clean flat surface.



5. **Locate the socket for the coprocessor on the processor board.** Notice that there is a pointer on the board at one corner of the socket.



Caution

Before you remove the Weitek 4167 coprocessor from the package or handle it in any way, discharge any static electricity by touching an unpainted metal surface.

6. **Remove the coprocessor from the package.**

11. **Record the Weitek 4167 coprocessor in the "Additional Items Installed" section in Chapter 1.**
12. **Return to the Setup Steps in Chapter 1 if you are setting up your computer for the first time; if not, go to the next step.**
13. **Replace the metal plate and cover.** (Refer to Chapter 2.)
14. **Connect all cables and power cords.**
15. **Run EASY CONFIG to update your configuration for the Weitek 4167 coprocessor.** Refer to the "Adding a Coprocessor to Your Configuration" section in Chapter 8.

5

Upgrading Memory

Determining How to Add Memory

To determine how to upgrade your computer's memory you need to know how much factory-installed memory your computer has. If you are not setting up your computer for the first time, you also need to know whether additional memory modules were installed after purchasing the computer.

- **To find out how much factory-installed memory your computer has, check the amount of "Extended Memory" on the identification label on the rear of your computer.** For total memory, add 1 MB to the amount of extended memory shown on the label. For example, if your label says "Ext. Memory: 3 MB," you have a total of 4 MB of memory installed.
- **To find out if the memory in your computer was upgraded after purchase, check the "Additional Items Installed" section in Chapter 1.** The amount of additional memory installed will be recorded there.

You also need to determine:

- the type and capacity in megabytes of the memory modules you are adding (the capacity is printed on HP memory modules)
- the total amount of memory your computer will have after you have added the new modules

Memory Modules

There are two types of memory modules supported by your computer: single-density (1 MB and 4 MB) and double-density (2 MB and 8 MB).

The memory module size (MB) is printed on the module. (Non-HP memory modules may not always have the size printed on them.)

You can mix 2 MB and 8 MB memory modules; however, you must put the 8 MB modules in the first slots. You can mix 1 MB and 4 MB memory modules; however, you must put the 4 MB modules in the first slots. *You cannot mix 1 MB and 4 MB memory modules with 2 MB and 8 MB memory modules.*

Use the charts on the next two pages to determine which memory modules to add and where to add them. *Then use the instructions following the charts to install the memory modules.*

You must add memory modules in the order presented in the charts.

2 MB and 8 MB Double-Density Memory Configuration

For total memory to equal	Put these memory modules	In these module slots
4 MB	Two 2 MB modules	1, 2
8 MB	Four 2 MB modules	1, 2, 3, 4
12 MB	Six 2 MB modules	1, 2, 3, 4, 5, 6
16 MB	Eight 2 MB modules *or* two 8 MB modules	1, 2, 3, 4, 5, 6, 7, 8 1, 2
20 MB	Two 8 MB modules *and* two 2 MB modules	1, 2 3, 4
24 MB	Two 8 MB modules *and* four 2 MB modules	1, 2 3, 4, 5, 6
28 MB	Two 8 MB modules *and* six 2 MB modules	1, 2 3, 4, 5, 6, 7, 8
32 MB	Four 8 MB modules	1, 2, 3, 4
36 MB	Four 8 MB modules *and* two 2 MB modules	1, 2, 3, 4 5, 6
40 MB	Four 8 MB modules *and* four 2 MB modules	1, 2, 3, 4 5, 6, 7, 8
48 MB	Six 8 MB modules	1, 2, 3, 4, 5, 6
52 MB	Six 8 MB modules *and* two 2 MB modules	1, 2, 3, 4, 5, 6 7, 8
64 MB	Eight 8 MB modules	1, 2, 3, 4, 5, 6, 7, 8

1 MB and 4 MB Single-Density Memory Configuration

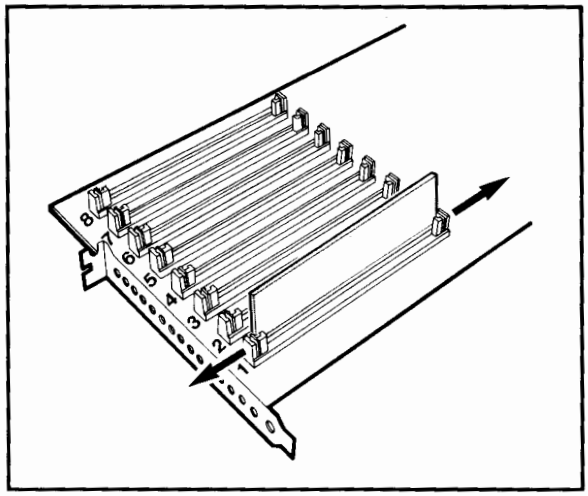
For total memory to equal	Put these memory modules	In these module slots
2 MB	Two 1 MB modules	1, 2
4 MB	Four 1 MB modules	1, 2, 3, 4
6 MB	Six 1 MB modules	1, 2, 3, 4, 5, 6
8 MB	Eight 1 MB modules *or* two 4 MB modules	1, 2, 3, 4, 5, 6, 7, 8 1, 2
10 MB	Two 4 MB modules *and* two 1 MB modules	1, 2 3, 4
12 MB	Two 4 MB modules *and* four 1 MB modules	1, 2 3, 4, 5, 6
14 MB	Two 4 MB modules *and* six 1 MB modules	1, 2 3, 4, 5, 6, 7, 8
16 MB	Four 4 MB modules	1, 2, 3, 4
18 MB	Four 4 MB modules *and* two 1 MB modules	1, 2, 3, 4 5, 6
20 MB	Four 4 MB modules *and* four 1 MB modules	1, 2, 3, 4 5, 6, 7, 8
24 MB	Six 4 MB modules	1, 2, 3, 4, 5, 6
26 MB	Six 4 MB modules *and* two 1 MB modules	1, 2, 3, 4, 5, 6 7, 8
32 MB	Eight 4 MB modules	1, 2, 3, 4, 5, 6, 7, 8

Configuration Examples

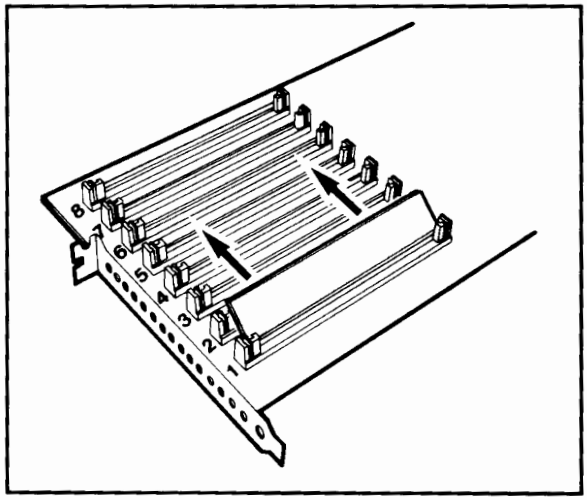
To upgrade the memory in your HP Vectra PC from 4 MB to 20 MB of memory, you must first remove the two 2 MB memory modules from slots 1 and 2. Next, install two 8 MB memory modules in slots 1 and 2. Then reinstall the two 2 MB memory modules in slots 3 and 4.

To upgrade the memory in your HP Vectra PC from 4 MB to 36 MB of memory, you must first remove the two 2 MB memory modules from slots 1 and 2. Install four 8 MB memory modules in slots 1, 2, 3, and 4. Then reinstall the two 2 MB memory modules in slots 5 and 6.

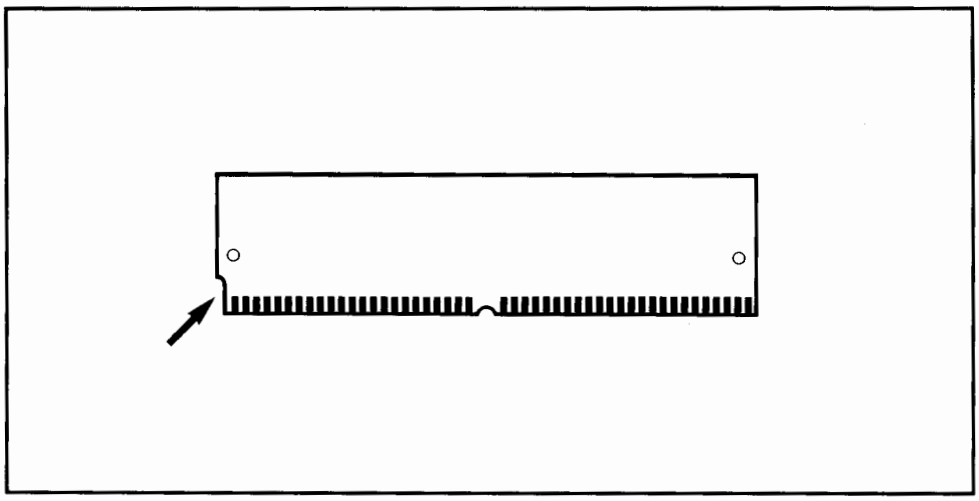
7. If necessary, remove any memory modules that you are going to replace by pulling the metal retaining clips slightly away from the module.



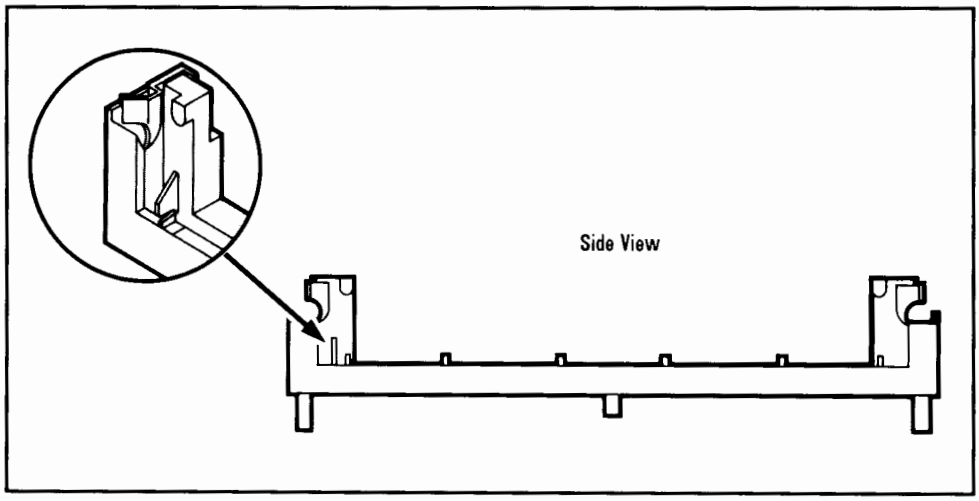
Then, rotate the memory module in its slot until it is at a 45 degree angle and lift the memory module out.



8. **Locate the notch on the memory module you wish to install.**



9. **Locate the key at one end of the slot where you are installing the memory module. Align the notch on the module with the key on the slot.** *The key on the slot may be at either end of the slot, depending on your computer.*



6

Installing and Replacing Accessory Boards

Accessory boards you might need to install or replace include:

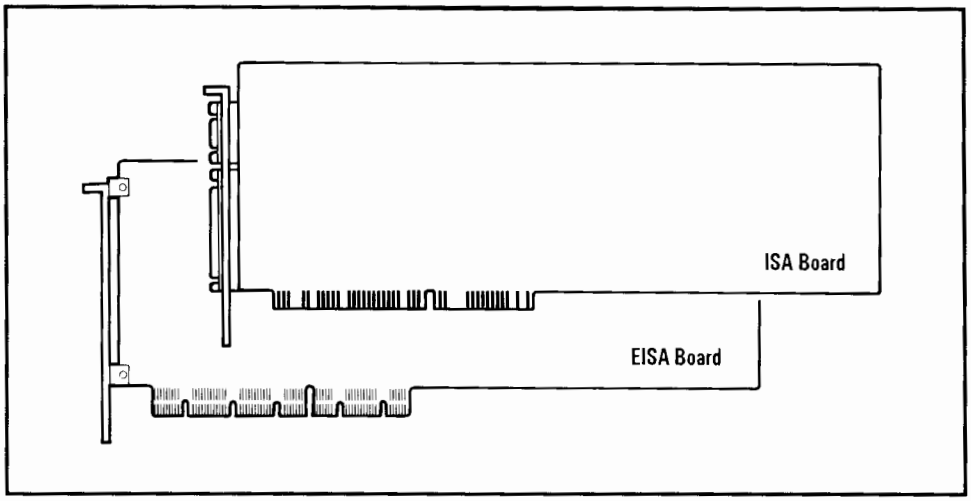
- network boards
- serial and parallel boards
- controller boards
- host adapter boards
- modem boards

Installing Accessory Boards

If you are removing or replacing an accessory board, go to the section "Removing and Replacing Accessory Boards" in this chapter.

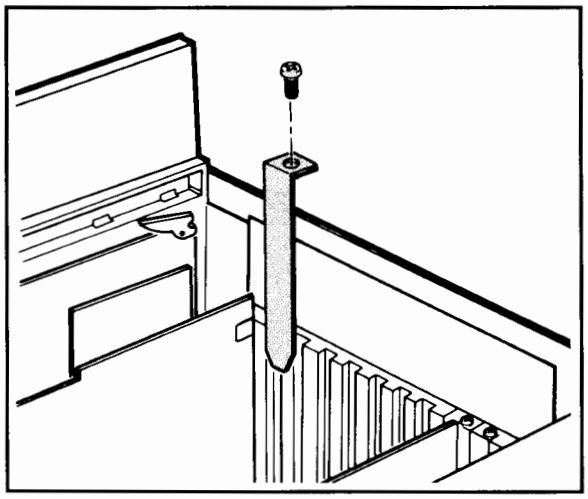
1. **Refer to the documentation that comes with your board for any special installation instructions.**
2. **Determine whether you are installing an EISA (32-bit) bus-master board, or an ISA (8- or 16-bit) board.** (You will need to know what type it is to install it in the correct slot.)

   There are several ways you can determine if you have an EISA or an ISA board. Often, the label on the package says "EISA" on it. The most reliable way to determine whether you have an EISA or an ISA board is to look at the connectors on the board, matching them to the illustration on the next page. Notice that the EISA board has a double row of connectors and that there are more notches on the EISA board connectors.



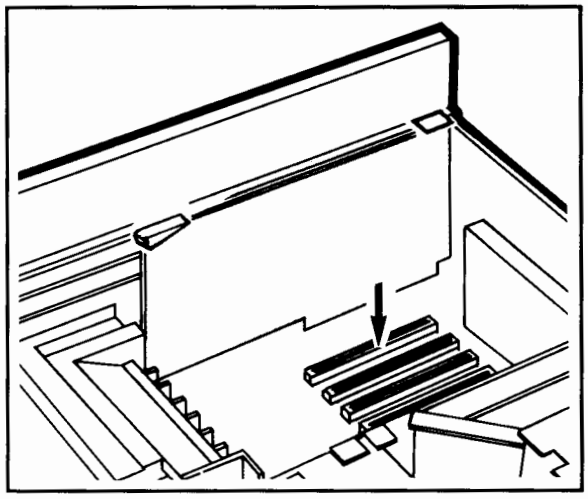
3. **Decide in which slot you are going to install the board.** EISA bus-master boards can be installed in slots number 1, 2, 4, 6, 7, and 8. If it is a hard disk controller board, we recommend that you install it in the slot nearest the hard disk drive shelves.
4. **Record the board on the line provided in the "Additional Items Installed" section in Chapter 1.**
5. **If your computer is turned on, turn off the computer and display. Disconnect all cables and power cords.**
6. **Remove the cover and metal plate.** (Refer to Chapter 2.)

7. **Remove the screw and the slot cover from the slot where you are installing the board.** Save the screw to secure the board after the installation.



8. **If you are installing an ISA board, make sure you know how the switches and jumpers are set.** If the switch and jumper settings are not shown in the manual that came with the board, record them on a piece of paper. This will save you a step later on— you will not have to reopen your computer to see if your switch and jumper settings match EASY CONFIG's recommendations.

9. **Slide the board into the slot. Press down firmly on the board so that all gold edges completely engage in the slot.**



10. **Reinstall the screw to secure the board in the slot.**
11. **Repeat steps 1 through 10 for each board you are installing.**
12. **Return to the Setup Steps in Chapter 1 if you are setting up your computer for the first time; if not, go to the next step.**
13. **Replace the metal plate and cover.** (Refer to Chapter 2.)
14. **Connect all cables and power cords.**
15. **Run EASY CONFIG to update your configuration for the new board.** (Refer to the "Adding a Board or Option to Your Configuration" in Chapter 8.)

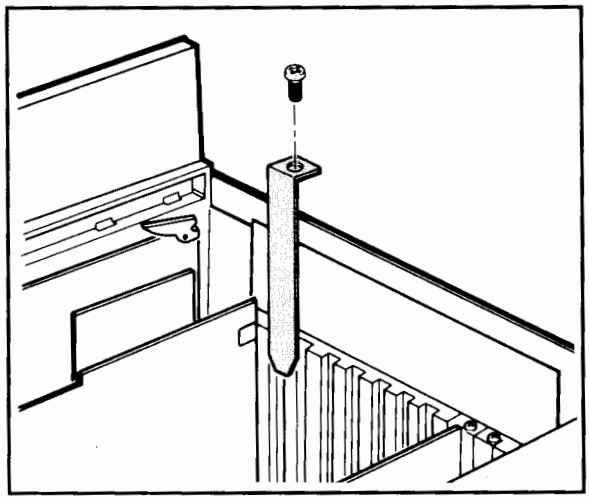
Removing and Replacing Accessory Boards

1. **Refer to the documentation that comes with your board for any special installation instructions.**
2. **Before you remove a board and install a new one, run EASY CONFIG to do the following:**
   a. Delete the board you are removing or replacing from the configuration.
   b. Copy the necessary configuration files for the new boards you are installing.
   c. Configure your computer for the boards you are installing. For ISA boards, EASY CONFIG tells you how to set your switches and jumpers.

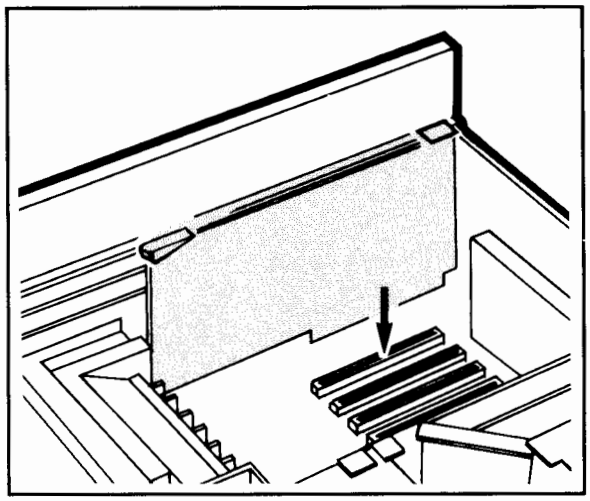
   (Refer to the "Boards and Options" and "About Configuration (CFG) Files" sections in Chapter 8.)
3. **Turn off the computer and display. Disconnect all cables and power cords.**
4. **Remove the cover and metal plate.** (Refer to Chapter 2.)

5. Do ONE of the following:

   - **If you are replacing a board, remove the screw for the board you are replacing; then remove the board.**
   - **Or, if you are adding a board, remove the screw and slot cover from the slot that you selected with EASY CONFIG.** Save the screw to secure the board after the installation.



6. **Slide the new board in the slot. Press down firmly so that all gold edges completely engage in the slot.**



7. **Reinstall the screw to secure the board in the slot.**
8. **Repeat steps 5 through 7 for each board you are removing or replacing.**
9. **Record any boards you have added or removed on the lines provided in the "Additional Items Installed" section in Chapter 1.**
10. **Replace the metal plate and cover.** (Refer to Chapter 2.)
11. **Connect all cables and power cords.**

7

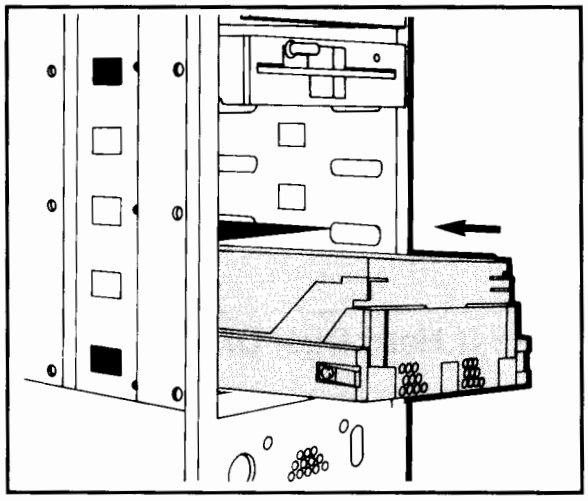
Installing and Removing Disk Drives and Tape Drives

If you are installing additional disk drives, go to the "Installing Additional Hard Disk Drives" section in this chapter.

Installing the First Hard Disk Drive

1. **Refer to the documentation that comes with your hard disk drive for any special installation and configuration instructions.**
2. **Ensure that the hard disk drive you are installing is either an embedded-AT drive or uses a controller board or host adapter board that is installed in your computer.** Look at the identification label on the rear of your computer for the factory-installed controller or host adapter board. (If you have an embedded-AT hard disk drive, you will not have a controller board for it. You will connect the drive to the system board.) If a controller or host adapter board was added to your computer after purchase, it should be listed in the "Additional Items Installed" section in Chapter 1.
3. **If your computer is turned on, turn off the computer and display. Disconnect all cables and power cords.**
4. **Remove the cover and metal plate.** (Refer to Chapter 2.)

5. **Insert the hard disk drive in the bottommost available shelf with the connectors on the bottom edge of the hard disk drive. Push the drive three-quarters of the way into the shelf.**

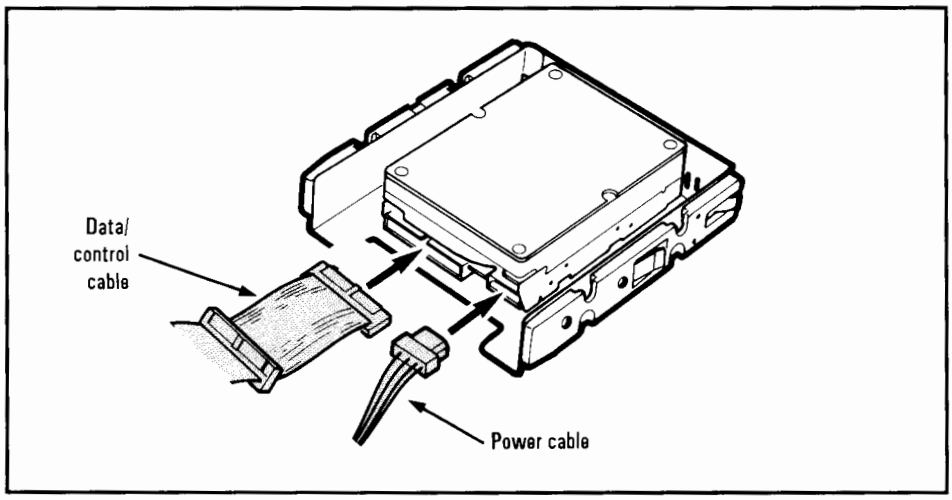


Note

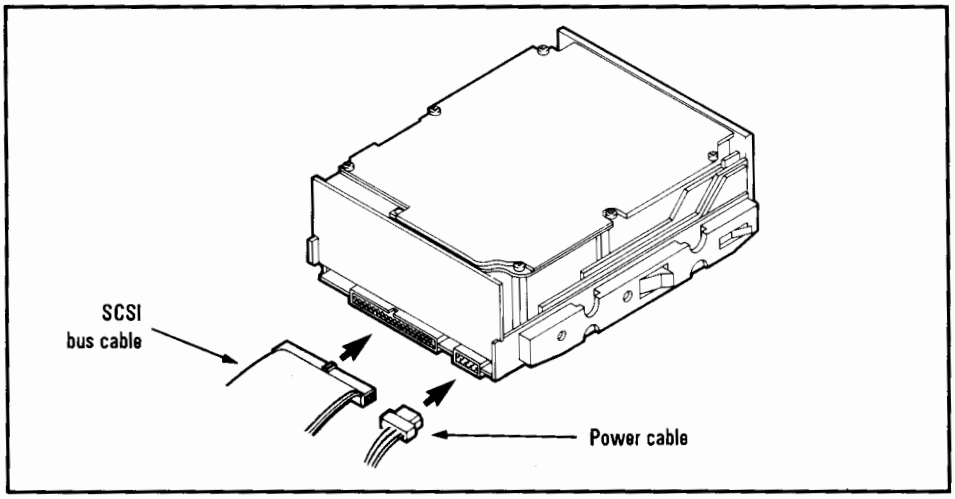
There is a metal support plate in the third drive shelf from the bottom. Do not remove this metal support plate to install the first hard disk drive.

6. **Do ONE of the following:**

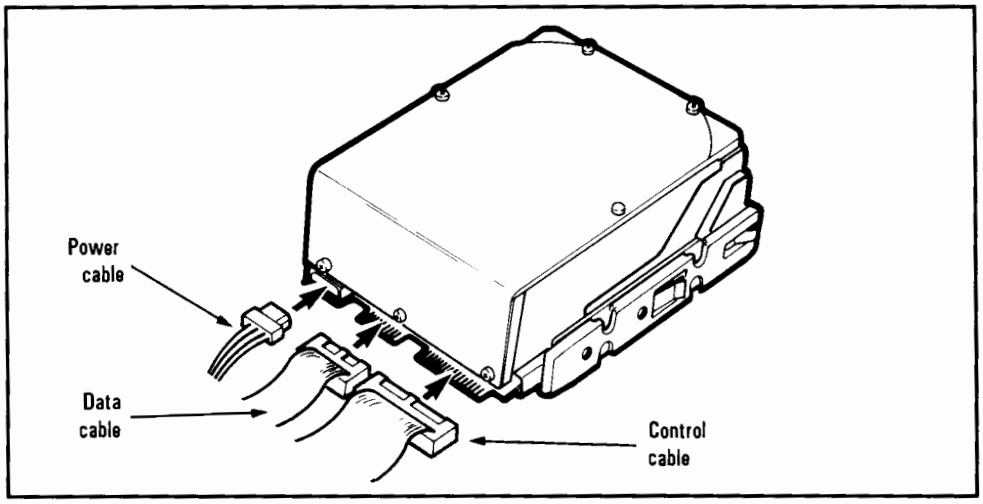
   - *Hard disk drives with an embedded-AT controller:* **Firmly connect the data/control cable and one of the unused power cables to the hard disk drive.**



- *SCSI hard disk drives:* **Firmly connect the SCSI bus cable and one of the unused power cables to the hard disk drive.**

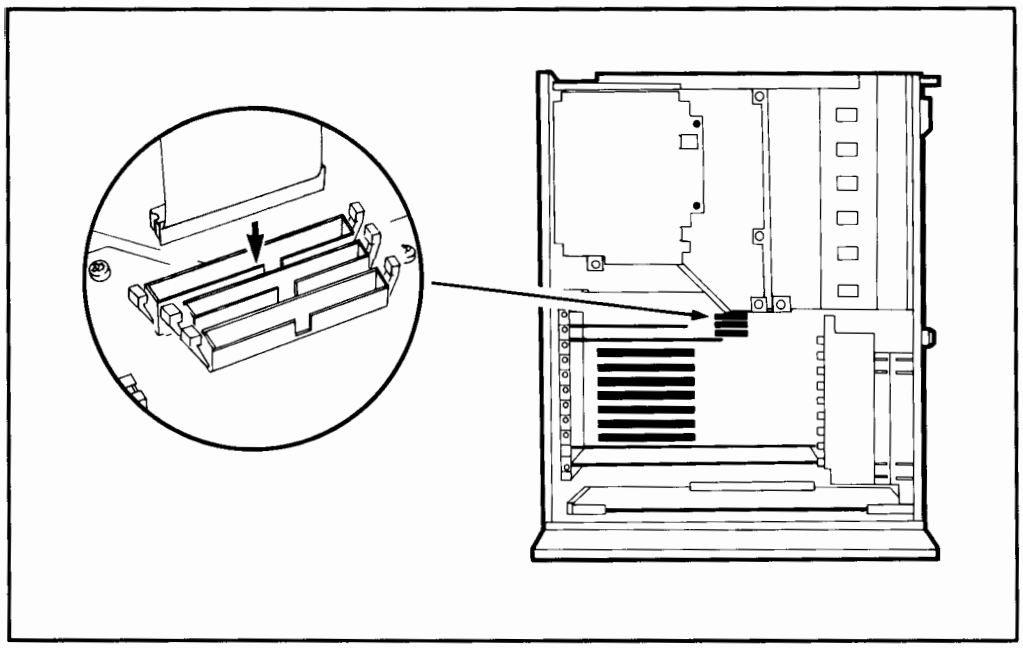


- *All other hard disk drives:* **Firmly connect one of the unused power cables, the data cable, and the control cable to the hard disk drive.**

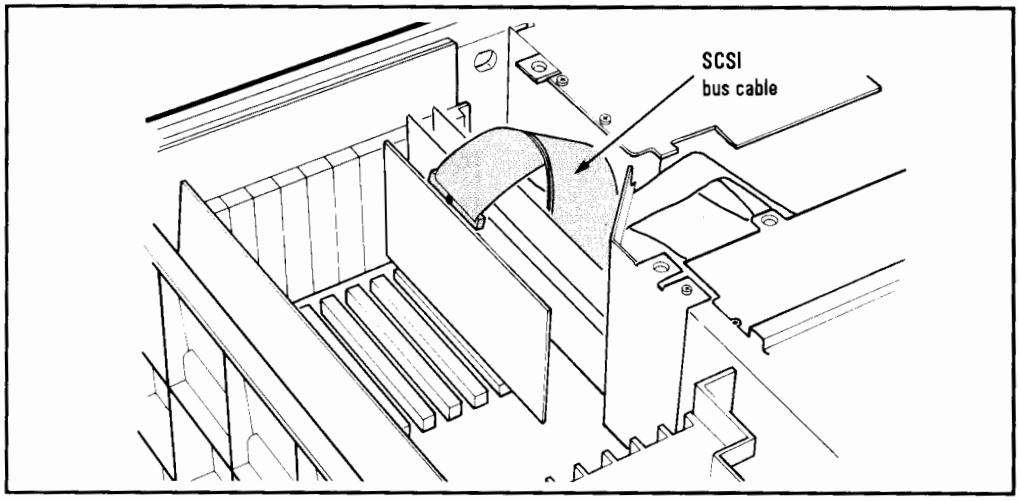


7. **Do ONE of the following:**

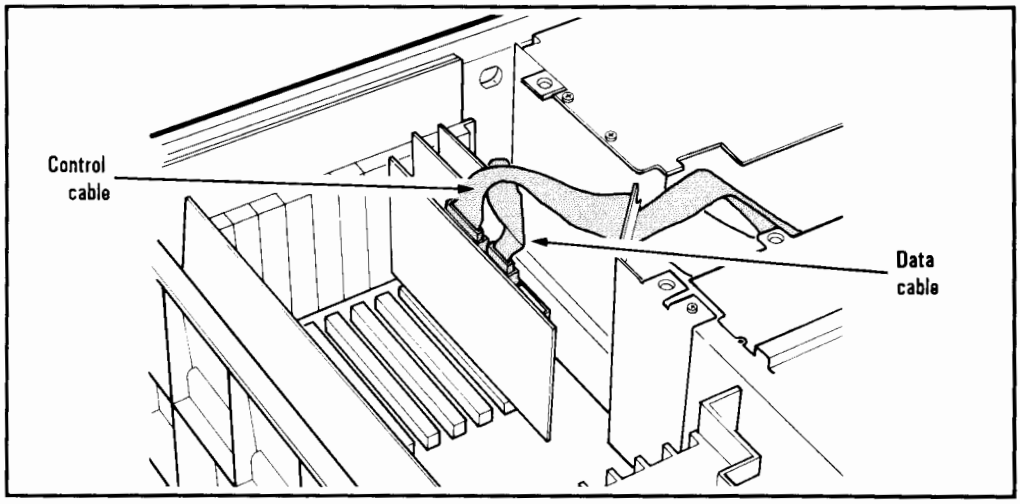
   - *Hard disk drives with an embedded-AT controller:* **Firmly connect the data/control cable to the system board. Press the connector into the socket until the levers snap up into place.**



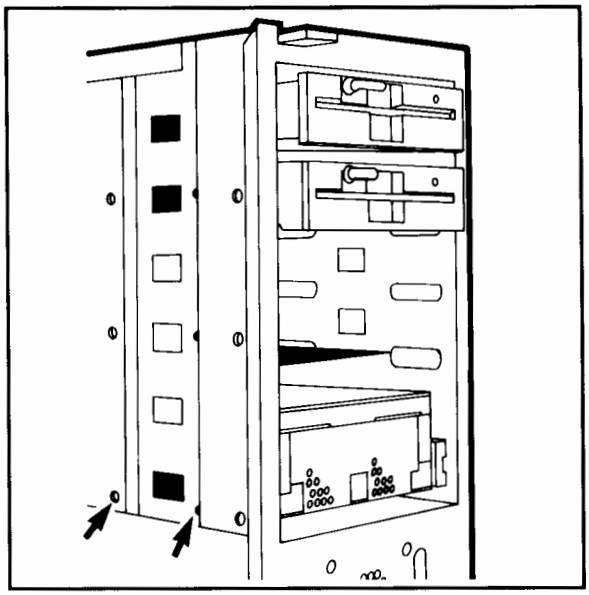
- *SCSI hard disk drives:* **Firmly connect the SCSI bus cable to the host adapter board.**



- *All other hard disk drives:* **Firmly connect the control cable and data cable to the connectors on the hard disk controller board.**



8. **Push the hard disk drive all the way into the shelf until you hear it click in place.**
9. **If two screws were provided with the hard disk drive, install and tighten them to secure the hard disk drive to the computer.**



10. **Turn to the "Additional Items Installed" section in Chapter 1. Record the hard disk drive type or SCSI address, size (MB), controller or host adapter type (such as ESDI or SCSI), and the location of the drive (the drive shelf) in the computer.**
11. **Install any flexible disk drives, tape drives, or additional hard disk drives.** (Refer to "Installing a Flexible Disk Drive or Tape Drive" and "Installing Additional Hard Disk Drives" in this chapter.)
12. **Return to the Setup Steps in Chapter 1 if you are setting up your computer for the first time; if not, go to the next step.**

13. **Replace the metal plate and cover.** (Refer to Chapter 2.)
14. **Connect all cables and power cords.**
15. **Run EASY CONFIG to configure your computer for the hard disk drive you have just installed.** Refer to the "Hard Disk Drives, Flexible Disk Drives, and Tape Drives" section in Chapter 8.

Installing Additional Hard Disk Drives

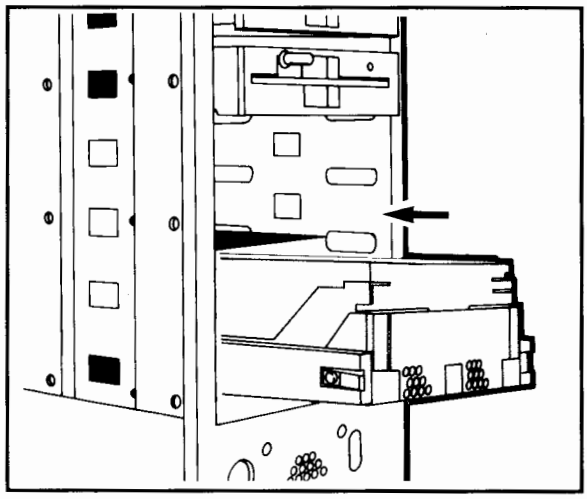
1. **Refer to the documentation that comes with your hard disk drive for any special installation and configuration instructions.**
2. **Ensure that the hard disk drive you are installing is either an embedded-AT drive or uses a controller board or host adapter board that is installed in your computer.** Look at the identification label on the rear of your computer for the factory-installed controller or host adapter board. (If you have an embedded-AT hard disk drive, you will not have a controller board for it. You will connect the drive to the system board.) If a controller or host adapter board was added to your computer after purchase, it should be listed in the "Additional Items Installed" section in Chapter 1.
3. **If your computer is turned on, turn off the computer and display. Disconnect all cables and power cords.**
4. **Remove the cover and metal plate.** (Refer to Chapter 2.)

Note

There is a metal support plate in the third drive shelf from the bottom. To install a *half height* disk drive on the third shelf from the bottom, you must remove the metal plate. If you plan to ship the computer, however, you *must* remove the half-height disk drive and replace the metal plate.

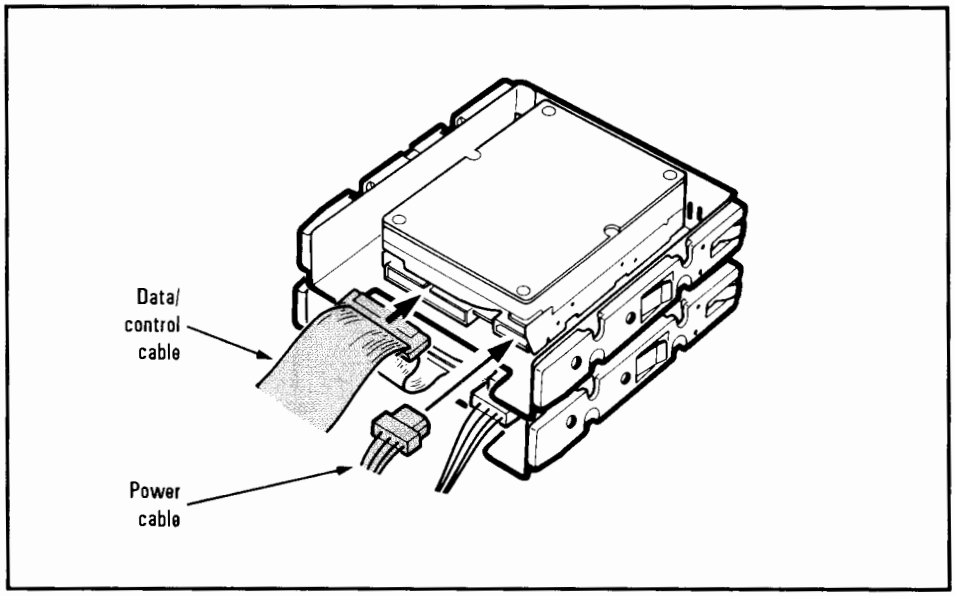
Note that you can install *full height* disk drives and tape drives on the third shelf *without* removing the metal plate.

5. **Insert the hard disk drive in the bottommost available shelf with the connectors on the bottom edge of the hard disk drive. Push the drive three-quarters of the way into the shelf.**

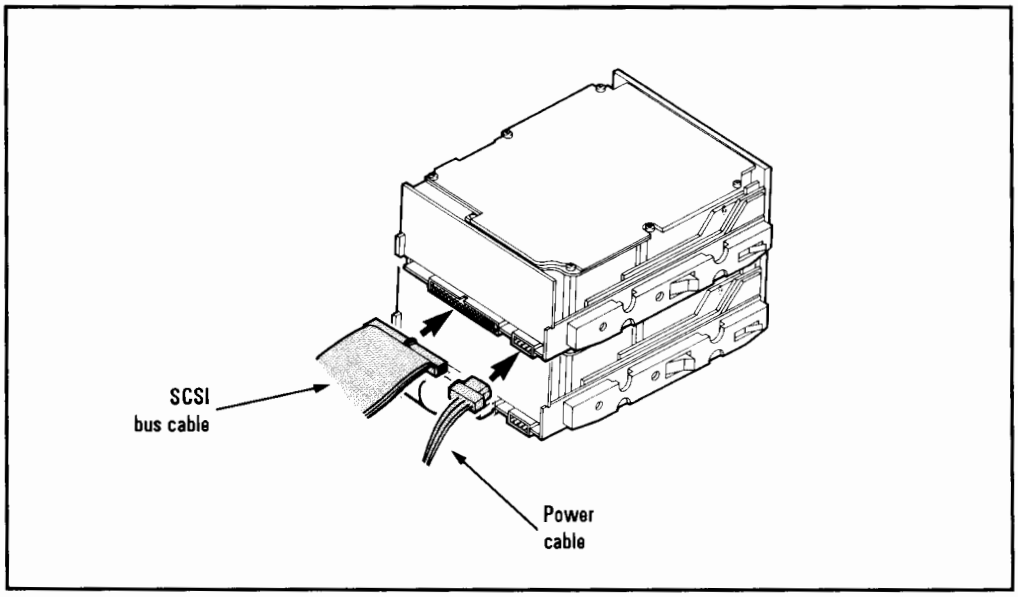


6. **Do ONE of the following:**

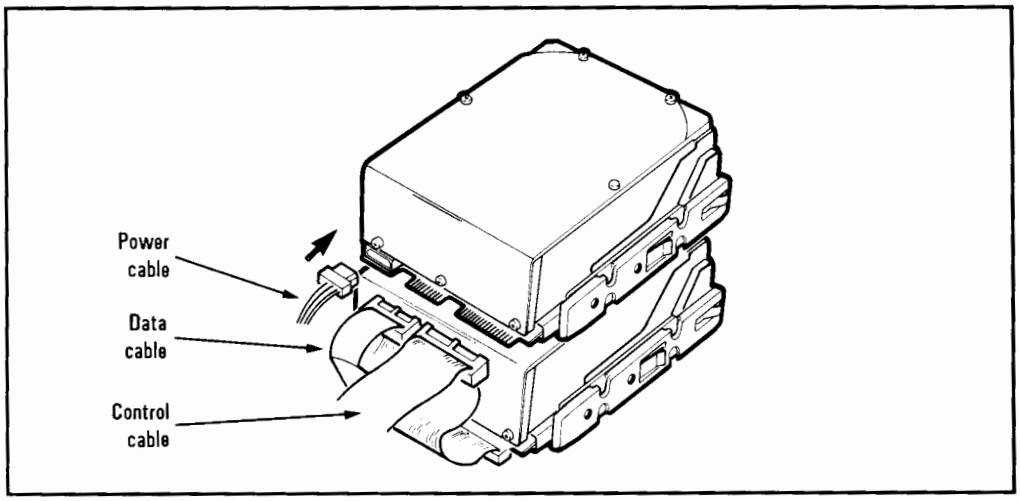
   - *Hard disk drives with an embedded-AT controller:* **Firmly connect the middle connector of the data/control cable and one of the unused power cables to the rear of the hard disk drive.** One end of the data/control cable is already connected to the system board; the other end is connected to the first hard disk drive.



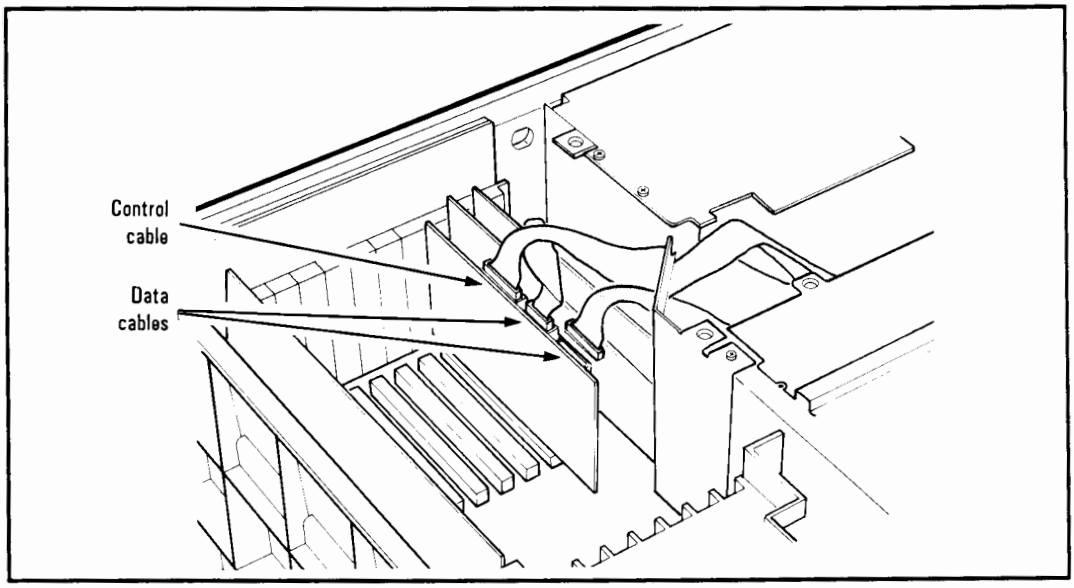
- *SCSI hard disk drives:* **Firmly connect the unused SCSI bus cable connector closest to the installed hard disk drive and one of the unused power cables to the rear of the hard disk drive you are installing.** One end of the SCSI bus cable is connected to the SCSI host adapter; the other end is connected to the hard disk drive already installed.



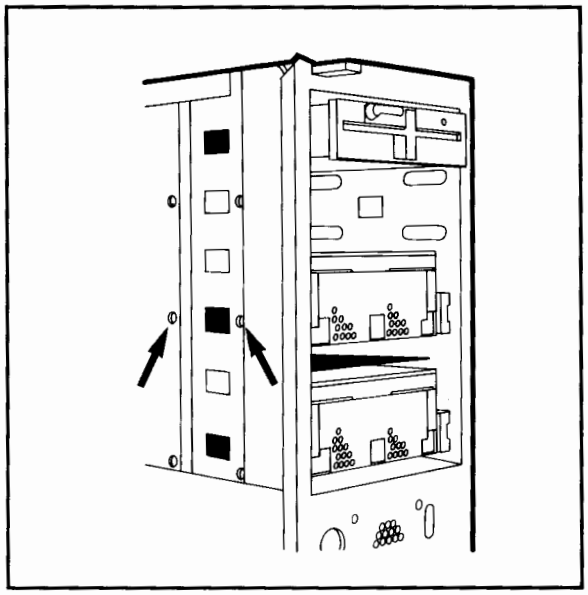
- *All other hard disk drives:*
  - **Connect one of the unused power cables, the data cable, and the middle connector of the control cable to the hard disk drive.** One end of the control cable is already connected to the controller board; the other end is connected to the first hard disk drive.



□ **Connect the data cable to the controller board.**



7. **Push the hard disk drive all the way into the shelf until you hear it click in place.**
8. **If two screws were provided with the hard disk drive, and there are holes in the shelf you have selected, install and tighten them to secure the hard disk drive to the computer.**



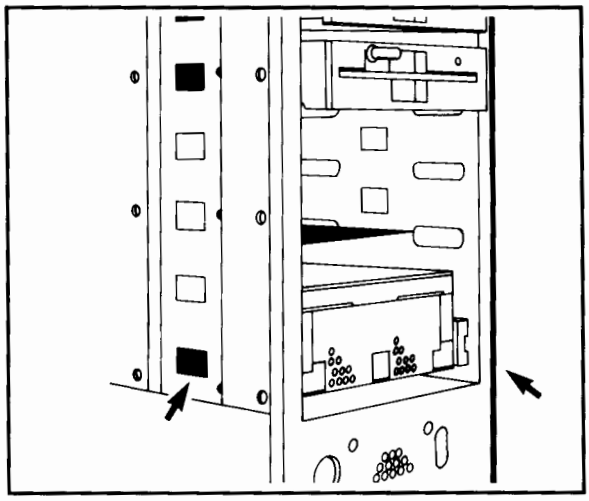
9. **Turn to the "Additional Items Installed" section in Chapter 1. Record the hard disk drive type or SCSI address, size (MB), controller or host adapter type (such as ESDI or SCSI), and the location of the drive in the computer (the drive shelf).**
10. **Install any flexible disk drives and tape drives.** (Refer to "Installing a Flexible Disk Drive or Tape Drive" in this chapter.)
11. **Return to the Setup Steps in Chapter 1 if you are setting up your computer for the first time; if not, go to the next step.**
12. **Replace the metal plate and cover.** (Refer to Chapter 2.)

13. **Connect all cables and power cords.**
14. **Run EASY CONFIG to configure your computer for the hard disk drive you have just installed.** Refer to the "Hard Disk Drives, Flexible Disk Drives, and Tape Drives" section in Chapter 8.

Removing a Hard Disk Drive

1. **Start your computer with your EASY CONFIG diskette #1 in drive A.**
2. **Use EASY CONFIG to remove the hard disk drive from the computer's configuration.** (Refer to the section "Removing Hard Disk Drives, Flexible Disk Drives, and Tape Drives from Your Configuration" in Chapter 8.)
3. **Turn off your computer and display. Disconnect all cables and power cords.**
4. **Remove the cover and metal plate.** (Refer to Chapter 2.)
5. **Disconnect all cables from the hard disk drive and from the controller, host adapter, or system board.**
6. **If necessary, remove the controller or host adapter board.**
7. **If necessary, remove the two screws that secure the drive in place.**

8. **Press in the latches on both sides of the hard disk drive and slide the hard disk drive out of the computer.**



9. **If you are replacing the drive, install the new drive.**
10. **Turn to the "Additional Items Installed" section in Chapter 1. Change your records appropriately for the hard disk drive you removed.**
11. **Replace the cover and metal plate.** (Refer to Chapter 2.)
12. **Connect all cables and power cords.**

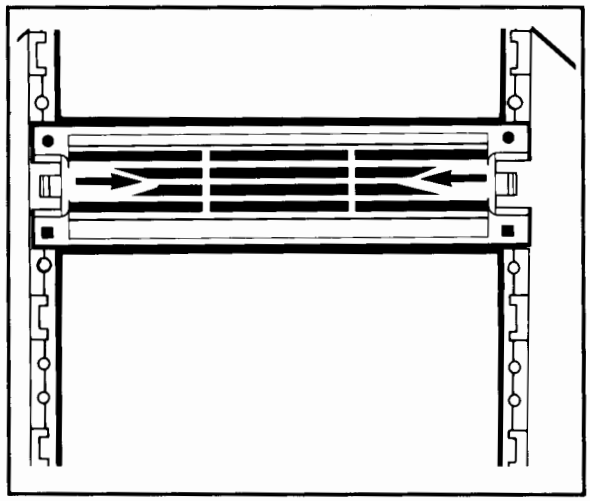
Installing Flexible Disk Drives and Tape Drives

Note

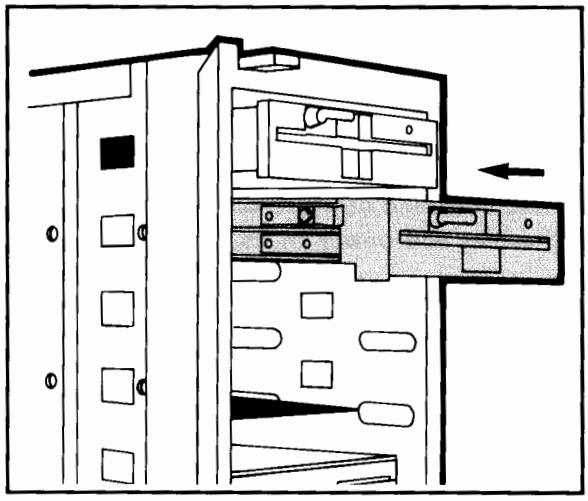
To connect more than two non-SCSI flexible disk drives or tape drives, you need the Flexible Disk Data Cable, HP D2153A.

1. **Refer to the documentation that comes with your flexible disk drive or tape drive for any special installation and configuration instructions.**
2. **If your computer is turned on, turn off your computer and display. Disconnect all cables and power cords.**
3. **Remove the cover and metal plate.** (Refer to Chapter 2.)
4. **Turn the cover upside down and remove the panel that covers the drive shelf in which you are installing the drive.**

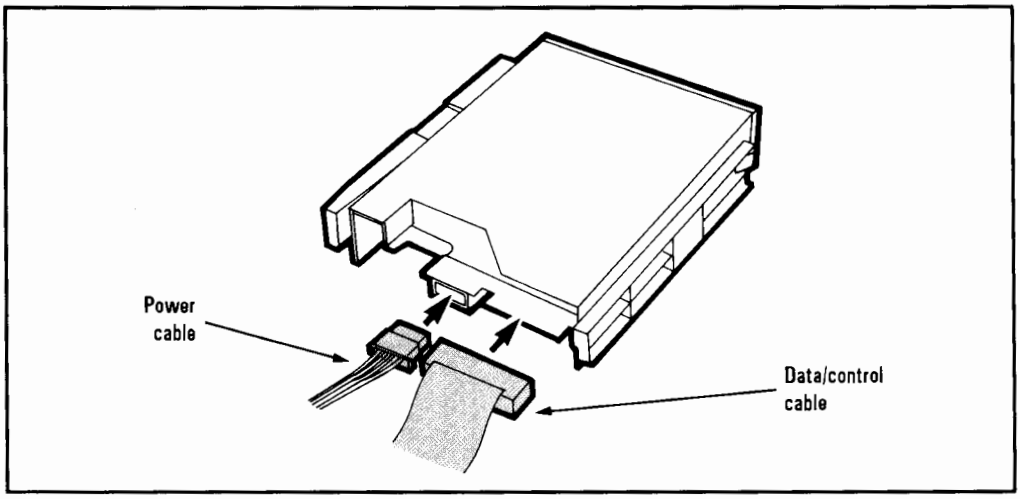
   From inside the cover, press the latch on one side of the panel with one hand, while pushing in the panel from outside the cover with the other hand. Keep the panel and replace it if you remove the drive from the computer.



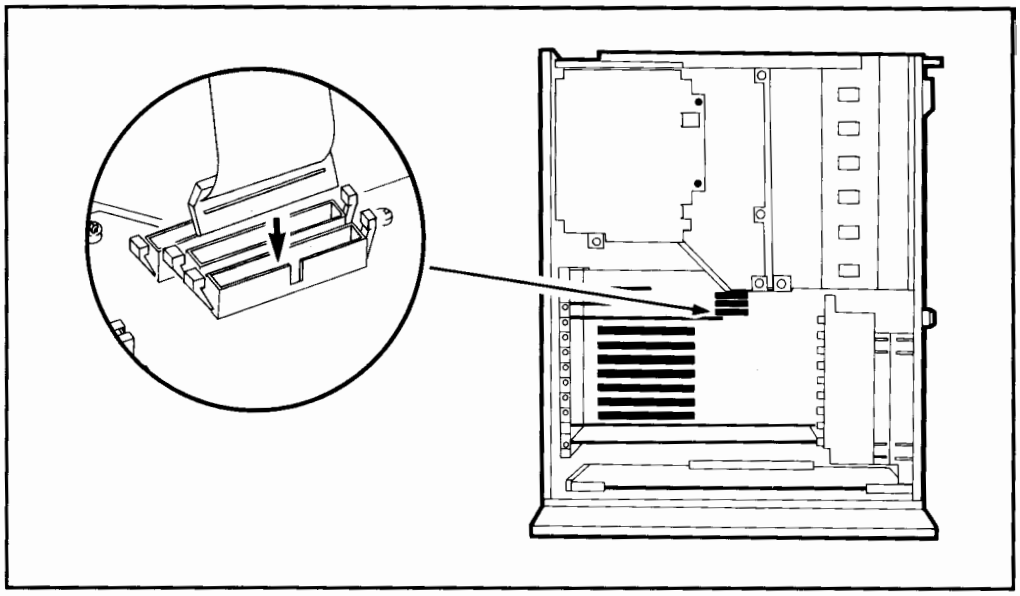
5. **Insert the flexible disk drive or tape drive in the uppermost available shelf. Slide the drive three-quarters of the way into the shelf until you hear it click in place.**



6. **Connect one of the unused power cables and the appropriate data/control cable to the flexible disk drive or tape drive.** (Connect SCSI drives to the SCSI bus cable.)



7. **If you are installing MORE THAN TWO NON-SCSI flexible disk drives or tape drives, connect the extra data/control cable to the system board.** Press the connector into the socket until the levers snap up into place.

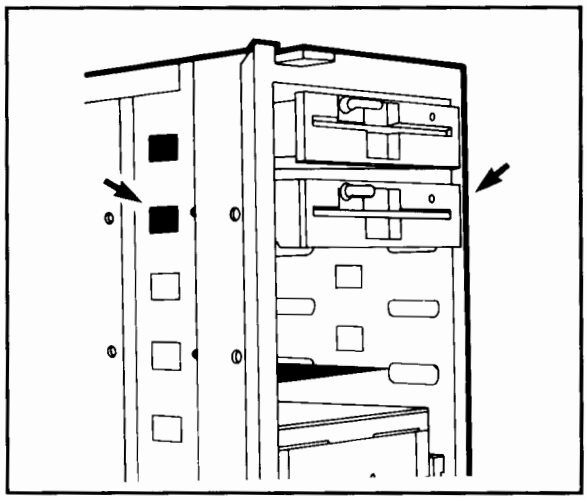


8. **Push the flexible disk or tape drive all the way into the shelf until you hear it click in place.**
9. **Turn to the "Additional Items Installed" in Chapter 1. Record the size (MB), location (the drive shelf), and if applicable, the SCSI address of the drive.**
10. **Install any other hard disk drives, flexible disk drives, and tape drives.**
11. **Return to the Setup Steps in Chapter 1 if you are setting up your computer for the first time; if not, go to the next step.**
12. **Replace the metal plate and cover.** (Refer to Chapter 2.)
13. **Connect all cables and power cords.**

14. **Run EASY CONFIG to configure your computer for the flexible disk or tape drive you installed.** Refer to the "Hard Disk Drives, Flexible Disk Drives, and Tape Drives" section in Chapter 8.

Removing a Flexible Disk Drive or Tape Drive

1. **Start your computer with your EASY CONFIG diskette #1 in drive A.**
2. **Use EASY CONFIG to remove the flexible disk drive from the computer's configuration.** (Refer to the "Removing Hard Disk Drives, Flexible Disk Drives, and Tape Drives from Your Configuration" section in Chapter 8.)
3. **Turn off your computer and display. Disconnect all cables and power cords.**
4. **Remove the cover and metal plate.** (Refer to Chapter 2.)
5. **Disconnect all cables from the drive and, if necessary, from the system board.**
6. **Press the latches on both sides of the drive and slide the drive out.**



7. **If you are replacing the drive, install the new drive. Or replace the panel in the computer cover to cover the opening for the drive shelf.**
8. **Turn to the "Additional Items Installed" section in Chapter 1. Change your records appropriately for the drive you removed and replaced.**
9. **Replace the cover and metal plate.** (Refer to Chapter 2.)
10. **Connect all cables and power cords.**

8

Configuring Your Computer with EASY CONFIG

How to Use This Chapter

If you are a first time user of EASY CONFIG, read the information in "About EASY CONFIG" before you start configuring your computer. Then, follow the instructions in "Configuring Your Computer for the First Time." The sections that come later in the chapter, such as "Boards and Options," "Getting Detailed Information about Your Configuration," and "Memory" are topics that you may be interested in later, but are not necessary for initial configuration.

If you are not configuring for the first time, you can bypass the information in "About EASY CONFIG" and "Configuring Your Computer for the First Time" and go to the section that describes what you want to do.

About EASY CONFIG

Your computer comes with **boards** and **options**. **Options** are devices that connect to a board, such as a hard disk drive, a coprocessor, or memory modules.

EASY CONFIG helps you configure your computer so that the boards and options you install do not try to use the same resources (such as memory addresses and I/O ports) and create a conflict. EASY CONFIG uses a configuration file (CFG file) for each board that you install. Each board's CFG file contains a list of the options that the board supports and the resources used by each option. EASY CONFIG allows you to view and select choices for each option. Then it verifies that your choices result in a conflict-free configuration.

When you configure your computer with EASY CONFIG, a record of your configuration is saved in a System Configuration Information, or SCI file, and in CMOS (nonvolatile memory). You can recover your computer's configuration, if it should become damaged, from the SCI file.

You use EASY CONFIG when you first set up your computer and each time you change its configuration. You can also use EASY CONFIG to do such things as:

- create a backup copy of EASY CONFIG diskette #1
- set the computer's date and time
- install an operating system
- set your power-on password
- initialize a hard disk
- create System Configuration Information files (SCI Files) for other computers
- protect your computer from unauthorized use while it is running as a file server

About Different Methods of Configuration

EASY CONFIG provides two ways of configuring your computer: **basic method** and **advanced method**. **Basic method** only allows you to add or remove boards *other than* controller or host adapter boards.

The **advanced method** allows you to add, remove, or move all types of boards, to change the functions and resources on these boards, and to look at more detailed information about them. *To give you the most functionality, this chapter describes procedures in the advanced method.*

Experienced users can start EASY CONFIG from the MS-DOS prompt. (Refer to "Starting EASY CONFIG from the MS-DOS Prompt" in this chapter.)

Requirements

You need a minimum of 640 KB of memory in order to use EASY CONFIG. If you want to install EASY CONFIG on your hard disk drive, you must have MS-DOS version 4.0 or later. Although it is not required, we recommend that for ease of use, you install and use a mouse with EASY CONFIG.

Caution

Do not install EASY CONFIG in your root directory (C:\) because your CONFIG.SYS file will be replaced with the one on EASY CONFIG diskette #1.

Getting around in EASY CONFIG

If you have a mouse attached to your computer, getting around in EASY CONFIG is simply a matter of pointing and clicking at commands and other choices. However, if you do not have a mouse, the list below will help you get around in EASY CONFIG more easily using your keyboard.

Moving among fields	Tab allows you to move among the commands listed at the bottom of your screen and among other selectable items on your screen.
Moving through lists of choices	Pressing an arrow key (▲ ▼ ◀ ▶) allows you to move the cursor in the direction the arrow is pointing. Use the arrow keys to move through lists of choices. For mouse users, the **scroll bar** on the right- hand side of the screen has the same function. Simply click the mouse on the scroll bar to move the indicator box along the bar—this moves you in the same direction through the information on your screen.
Paging through screens	Page Down allows you to move down through lists of choices one screenful at a time. Page Up allows you to move up through lists of choices one screenful at a time. Again, if you have a mouse, the scroll bar on the right-hand side of your screen has the same function—click the mouse on the scroll bar to move through the information.
Selecting your current choice	Enter selects whatever choice you currently have highlighted.
Canceling a choice	Esc cancels whatever choice you have just made.
Getting a detailed view of configuration	When the System Configuration Overview screen is displayed, pressing Enter brings up a detailed view of the boards and options in your configuration, showing board functions and the resources being used.

Activating the menu bar	(F10) activates the menu bar at the top of the screen. When the menu bar is activated, you may select a pull-down menu using the arrow keys and then press (Enter) to display the menu choices. (advanced method only)
Looking at navigation keys	(F9) displays a list of keys used to select pull-down menu items and to move the cursor. (advanced method only)

Getting Help

On the Main Menu and second-level menus, help information about each choice is displayed automatically (you do not need to press any keys). On other screens, you can request help by positioning your cursor on the item you want information about and pressing (F1). You may also get help by positioning your cursor on an item and selecting `Help` from the Help menu.

Displaying Help Automatically

You can display the help information automatically on any screen. To do this, first activate help by pressing (F1), then hold down (Alt) and press (F6). To go back to help that is only displayed when you request it, hold down (Alt) and press (F6) again.

Getting Help on Keystrokes

Press (F9) at any time to display help on navigation keys and shortcut keystrokes you can use in EASY CONFIG.

Getting an Index of Help Topics

Holding down (Shift) and pressing (F1) or selecting `Help Topics` from the Help menu gives you an index of available help topics. Some help topics are available only through this index.

About Configuration (CFG) Files

EASY CONFIG uses CFG files to configure the boards and options that you install in your computer. The CFG file helps EASY CONFIG to determine what computer resources the board will use, the best placement of the board in your computer, and how to set any jumpers or switches on the board.

To help you locate the CFG files for your boards and options, it is useful to understand the difference between Extended Industry Standard Architecture (EISA) boards and Industry Standard Architecture (ISA) boards. (The type of board you have determines where you may find your CFG file.) Often, you can determine if you have an EISA board by looking at the label on the package—it probably says "EISA" on it. The most reliable way to determine whether you have an EISA or an ISA board is to look at the connectors on the board, matching them to the illustration of EISA and ISA boards in Chapter 6.

You *must* use EASY CONFIG to add EISA boards to your configuration. To ensure a conflict-free configuration, we also recommend that you use EASY CONFIG to add *ISA* boards to your configuration.

You must have the board's CFG file in order to use EASY CONFIG to add it to your configuration. However, it is possible to configure and install an ISA board without a CFG file by following the board manufacturer's instructions. Be aware that if you install your board without using EASY CONFIG, EASY CONFIG will have no record of where the board was installed or what resources it uses—this information will not show up when EASY CONFIG displays or prints your current configuration information. As a result, EASY CONFIG may try to tell you to install boards in a slot that is already being used.

The CFG files for both EISA and ISA boards and options may be found in a variety of places. (Remember that some options such as hard disk drives do not usually have their own CFG files since they are attached to controller boards or host adapter boards which have CFG files.)

Here are some tips to help you find your CFG files quickly:

- The CFG files for most supported Hewlett-Packard boards (both EISA and ISA) are on EASY CONFIG diskette #1. You do not need to copy them.
- Other EISA boards usually come packaged with a diskette that contains their CFG files.

- EASY CONFIG diskette #2 has a library of CFG files for popular ISA boards not manufactured by Hewlett-Packard. They are stored in the directory named ISACFG. ISACFG may also contain CFG files for supported Hewlett-Packard boards that were added at a later date.

If you are unable to find a CFG file for your board or option, you have several alternatives:

- Contact the manufacturer of the board or option who may be able to provide the CFG file you need.
- Contact your HP dealer who may be able to obtain the CFG file you need.
- If you are connected to an electronic information service such as CompuServe, you may be able to find the CFG file you need on an electronic bulletin board.
- Install and configure the board according to the instructions that were provided with it. (Remember, only ISA boards may be configured this way.) EASY CONFIG will not have a record of the presence of this board—you will need to remember what slot and computer resources it uses.

Note

If you are trying to install and manually configure (without using EASY CONFIG) an ISA board that should NOT be cached, you may experience problems. Since all memory addresses in the HP Vectra 486 PCs are cached by default, you need to use EASY CONFIG to disable memory cache in the memory block used by the board in order to achieve a conflict-free configuration.

- Create your own CFG file. The *Dealer Configuration File Creation Guide*, included with the documentation you received with your computer, will assist you in writing your own CFG files.

Copying your CFG files is the first part of a two-step process. During the configuration procedure you must first copy the CFG files for the boards and options you have installed to EASY CONFIG diskette #1. (Remember, you do not need to copy CFG files for those HP boards and options whose CFG files are already contained on the diskette.) Then, when you add boards and options to your computer's configuration, you will be asked to select the CFG

files you want to add to your configuration from the CFG files you copied onto EASY CONFIG diskette #1.

Configuring Your Computer for the First Time

Step 1: Making a Backup Diskette

EASY CONFIG gives you the option of making a backup or working copy of your EASY CONFIG diskette #1. We *strongly recommend* that you make a backup diskette—if anything should happen to your original EASY CONFIG diskette, you will still have a working copy of the utility.

1. **Make sure you have a blank, 5.25-inch 1.2 MB or 3.5-inch 1.44 MB diskette (either formatted or unformatted).**
2. **Start EASY CONFIG by inserting EASY CONFIG diskette #1 in drive A and then turning on your computer.** At this point, you may see a variety of error messages followed by the message `Strike F1 to continue.` Simply press (F1) and continue with the next step.
3. **Select `Backup EASY CONFIG diskette #1` from the Main Menu.**
4. **Follow the onscreen instructions for making the backup diskette.**

Step 2: Learning about Configuring Your Computer

EASY CONFIG provides a brief overview of configuration and the EASY CONFIG utility. To see this information:

1. **If you have not already done so, start EASY CONFIG by inserting EASY CONFIG diskette #1 in drive A and then turning on your computer.** At this point, you may see a variety of error messages followed by the message `Strike F1 to continue.` Simply press (F1) and continue with the next step.
2. **Select `Learn about configuring your computer` from the Main Menu.**
3. **Read the information that is displayed and press (Enter) when you have finished.**

Step 3: Installing and Using a Mouse with EASY CONFIG (Optional)

The hand-held pointing device called a **mouse** is the most convenient way of working with EASY CONFIG. Instead of using the cursor control keys on your keyboard, you use the mouse to move your cursor, and to point and click on commands and other items on your screen.

The procedure below allows your mouse to work within the EASY CONFIG utility. In order for your mouse to function with other software, you must still install the mouse driver as described in the mouse documentation.

1. **If you have not already done so, start EASY CONFIG by inserting EASY CONFIG diskette #1 in drive A and then turning on your computer.** At this point, you may see a variety of error messages followed by the message `Strike F1 to continue.` Simply press (F1) and continue with the next step.
2. **Select `Access other system utilities` from the Main Menu.**
3. **Select `Install mouse driver` from the System Utilities menu and follow the onscreen instructions for installing your mouse to work with EASY CONFIG.**

Step 4: Setting up Your Printer to Work with EASY CONFIG (Optional)

EASY CONFIG allows you to select either a parallel port or serial port for printing out your computer's configuration information before you have installed your operating system.

1. **Connect your printer to either the factory-installed parallel port or the factory-installed serial port of your computer.** (Refer to the illustration "Rear View of the Computer" in Chapter 1 for the location of the parallel and serial ports.) You may move the printer connector to another port after you use EASY CONFIG to print your configuration information, if you wish.
2. **If you have not already done so, start EASY CONFIG by inserting EASY CONFIG diskette #1 in drive A and then turning on your computer.** At this point, you may see a variety of error messages followed by the message `Strike F1 to continue.` Simply press (F1) and continue with the next step.
3. **Select `Access other system utilities` from the Main Menu.**

4. **Select `Set printer options` from the System Utilities menu.**
5. **Select either `COM1` or `COM2` for a serial port or `LPT1`, `LPT2`, or `LPT3` for a parallel port. Then select `<OK>`.** Note that you may not see all of these choices since they depend on what interface boards you have installed in your computer.
6. **Select `Return to the last menu` and continue with your configuration or exit from the utility.**

Step 5: Setting the Date and Time

Once you set your computer's date and time, it will keep track of it, even when you turn off the power.

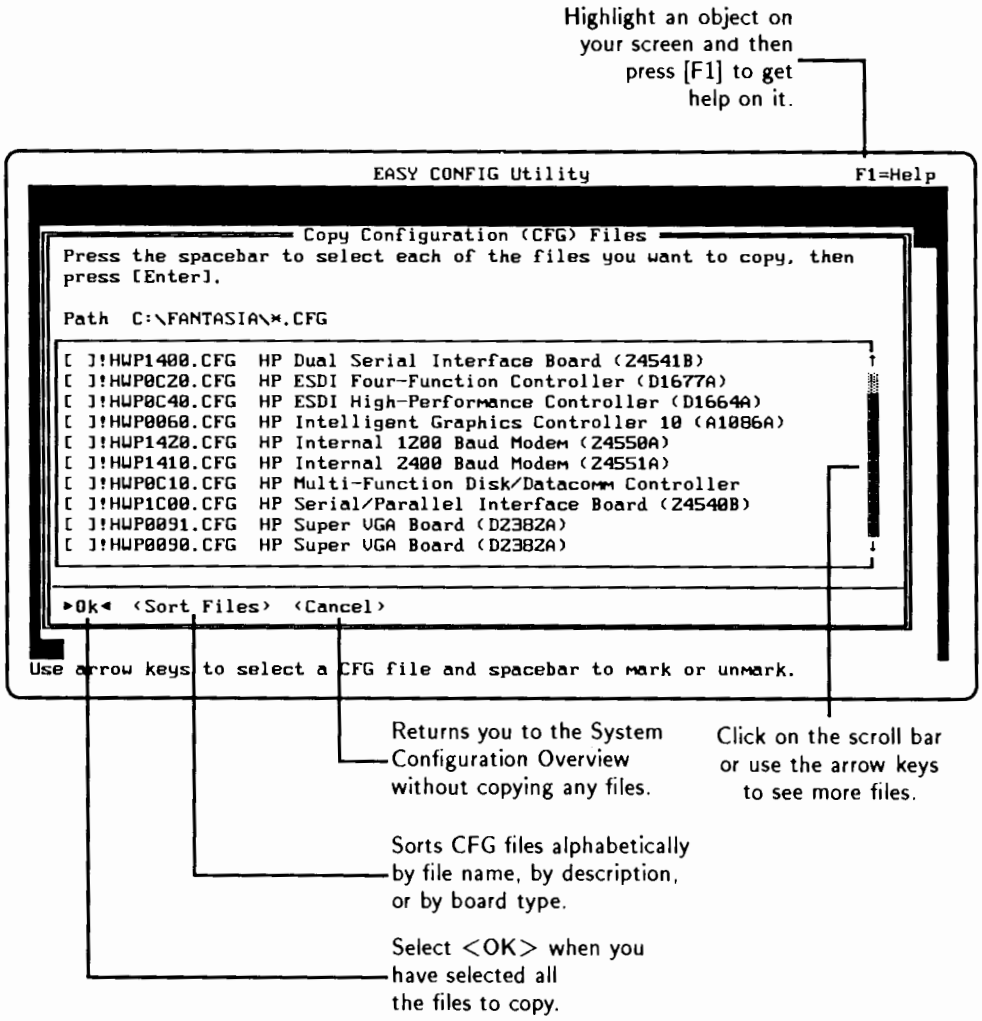
1. **If you have not already done so, start EASY CONFIG by inserting EASY CONFIG diskette #1 in drive A and then turning on your computer.** At this point, you may see a variety of error messages followed by the message `Strike F1 to continue`. Simply press (F1) and continue with the next step.
2. **Select `Set Date and Time` from the Main Menu.**
3. **Change the date and time and press (Enter).**

Step 6: Configuring Your Computer

1. **Set up your computer as described in Setup Steps 1 through 8 in Chapter 1.**
2. **If you have not already done so, start EASY CONFIG by inserting EASY CONFIG diskette #1 in drive A and then turning on your computer.** At this point, you may see a variety of error messages followed by the message `Strike F1 to continue.` Simply press (F1) and continue with the next step.
3. **Select `Configure computer` from the Main Menu.**
4. **Select `Configure computer - advanced method` from the Configure Computer menu.** At this time, the **auto- added** boards you have installed in your computer will be automatically added to your configuration. Depending on the type of board, you may see manufacturer's comments about the board and you may be asked to select the slot in which you have installed the board. The HP Vectra system board and Hewlett-Packard video boards are some examples of auto-added boards.

   When the System Configuration Overview is displayed, you will see all the auto-added boards listed in the configuration and labeled "Added."
5. **When the System Configuration Overview is displayed, make a note of the boards that have already been auto-added to your configuration.** You do not need to copy CFG files for these boards.

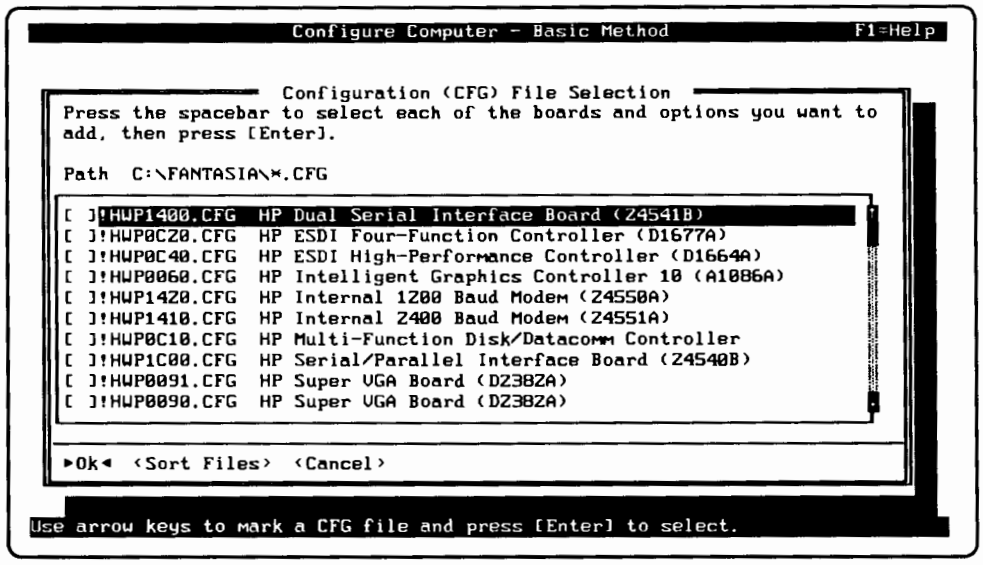
6. **If you need to copy CFG files for boards you have installed, select Copy selected configuration files from option diskette from the Configure Computer menu.** Note that the CFG files for some Hewlett-Packard boards are already contained on EASY CONFIG diskette #1; you do not need to copy them. Also, remember that you do not need to copy CFG files for boards that were auto-added.



The Copy CFG Files screen allows you to copy CFG files to your diskette.

If you cannot find the CFG file for a board or option, see "About Configuration (CFG) Files" earlier in this chapter.

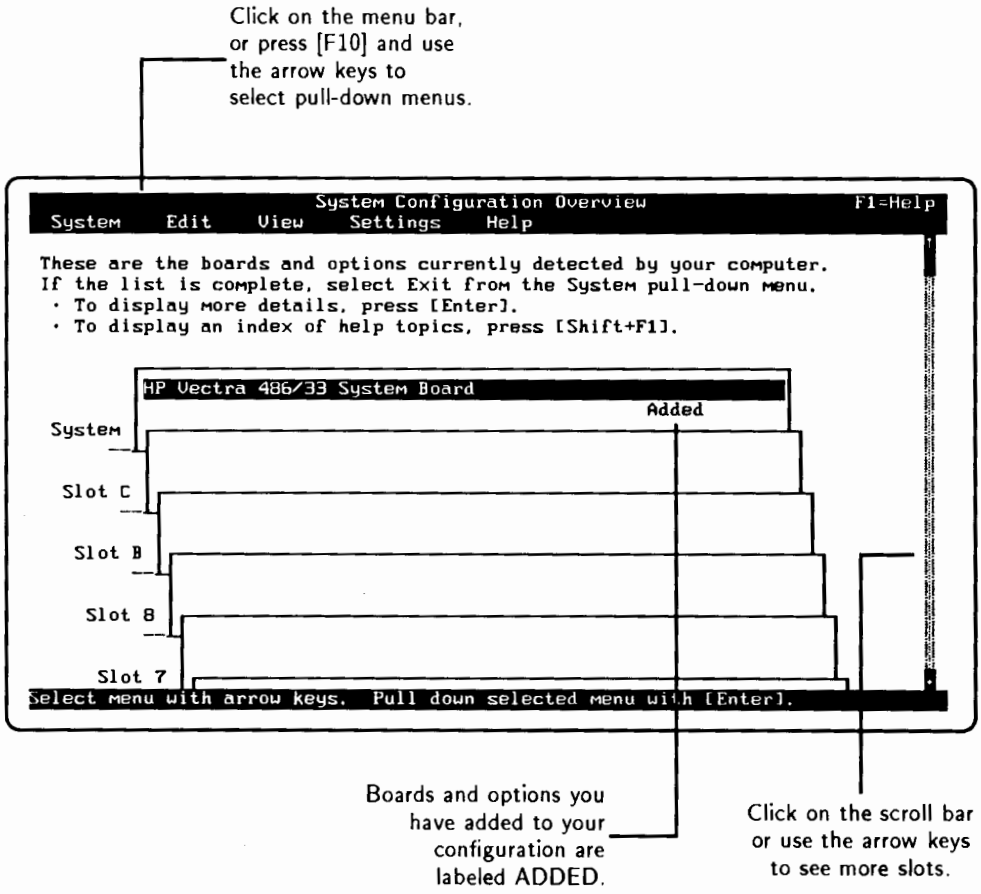
7. **Select `Configure computer - advanced method` from the Configure Computer menu.**
8. **When the System Configuration Overview screen is displayed, select `Add` from the Edit menu to add boards to your configuration.** If you are not adding boards, skip to step 12.
9. **Select a CFG file for every board or option that you are adding to your configuration.** Press Enter when you have selected all the CFG files you need. Remember, you do not need to add CFG files for the boards that were auto-added.



The CFG File Selection screen allows you to specify which CFG files should be added to your configuration.

10. **When prompted, select the slot in which you have installed your board.** The list of suggested slots is given in order of preference, with the most preferred slot at the top of the list. No slot will be listed for options with embedded-AT controllers: It will just list "embedded."

    When all the boards and options have been added to your configuration EASY CONFIG displays the System Configuration Overview with the new boards and options labeled "Added."



11. **Verify that everything you have installed in your computer and added to your configuration has been correctly identified by EASY CONFIG.** For example, if you installed a hard disk drive and added its controller board or host adapter board to your configuration, verify that EASY CONFIG displays the correct drive information by doing the following:

    a. Move the cursor to the controller board or host adapter board you want to look at. (The HP Vectra system board is the controller board for Hewlett-Packard non-SCSI flexible disk drives and tape drives.)

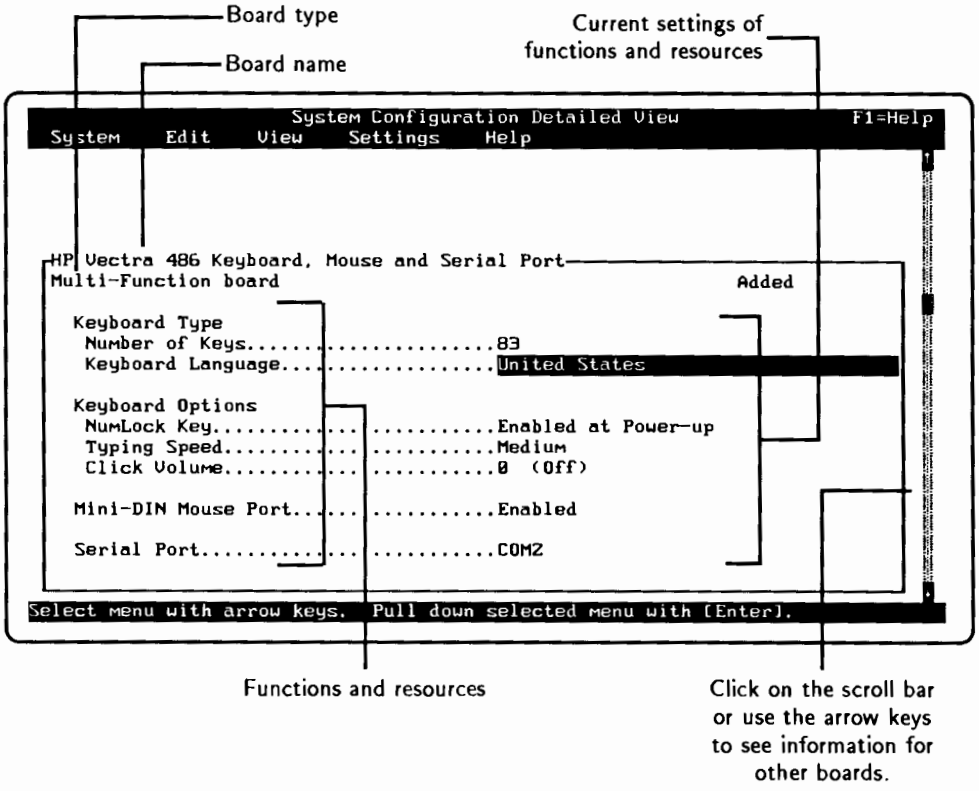
    b. Select `Detailed by Slot` from the View menu.

    c. Scroll through the list given for each controller board or host adapter board you added to your configuration, verifying that the correct information is listed for all the drives you installed. If a drive you installed is not listed, or the wrong information is listed, highlight the drive information and press Enter. When the Change Function window is displayed, select the correct information type and press Enter.

    Check your memory modules, coprocessor, and any other options you may have installed in a similar manner.

12. **If you want to change any of the functions or resources on your boards, highlight the board you want to change and press Enter.** Otherwise, skip to the next step.

    The System Configuration Detailed View is displayed.



a. **Highlight the function or resource that you want to change.**

b. **Select `Change Function` or `Change Resource` on the Edit menu.**

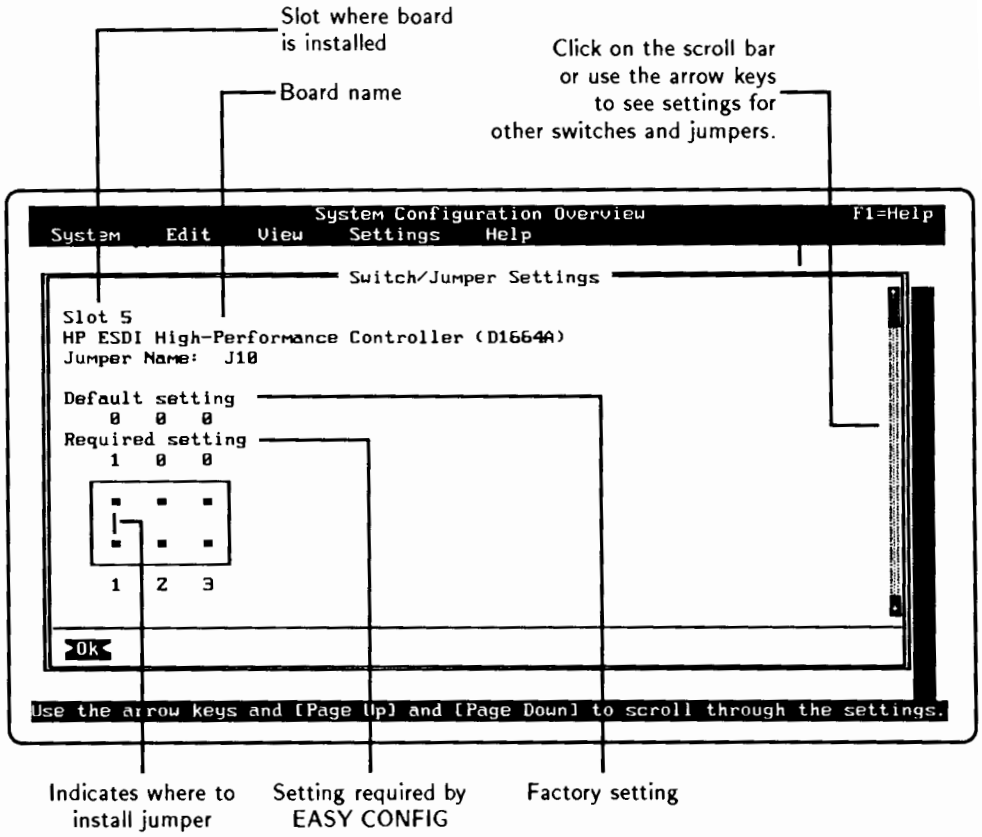
c. **Follow the onscreen instructions for changing the particular function or resource.**

13. **If you have a parallel printer or a printer configured as PRN connected to your computer, select `Print` from the System menu.** This prints configuration information such as slot numbers and switch and jumper settings.

14. **Select `Exit` from the System menu.**

15. **When the Exit window is displayed, select `View switch, jumper, and software settings`.** Scroll down through the list of boards and options you have added to your configuration. If you do not have a printer connected to your computer, record any switch or jumper changes you need to make to your boards in the "Additional Items Installed" section of Chapter 1. Press (Enter) when you have finished.

    For example, the J10 jumper block on this controller board comes with no jumpers installed. For this configuration, EASY CONFIG requires a jumper to be installed on the first pair of pins.



16. **Select `Save configuration and exit` to save your configuration information in CMOS and to a System Configuration Information (SCI) file.** (If you do *not* want to save your configuration information at this time, select `Exit` to quit EASY CONFIG without saving any of your changes.) Your computer restarts.
17. **If you are finished using EASY CONFIG, be sure to remove your EASY CONFIG diskette from drive A before your computer starts up, or it will read the EASY CONFIG diskette and start the utility again.**
18. **If it is necessary to set switches and jumpers on boards you have already installed in your computer, set the switches on your boards and options as recommended by EASY CONFIG. Then reinstall them in your computer in the locations you selected.**
19. **Return to the Setup Steps in Chapter 1 and continue setting up your computer.**

Boards and Options

Adding a Board or Option to Your Configuration

To add boards and options to your configuration, follow the instructions in "Configuring Your Computer for the First Time" earlier in this chapter.

Adding a Coprocessor to Your Configuration

If you have an HP Vectra 486/33T PC, you can install the Weitek 4167 coprocessor. EASY CONFIG automatically detects and configures your coprocessor with no CFG file. All you need to do is start EASY CONFIG, verify that your coprocessor has been detected, then exit and save your configuration.

1. **Install your coprocessor on the processor board as described in Chapter 4 of this manual.**
2. **Insert EASY CONFIG diskette #1 in drive A and then turn on your computer.**

3. **Select `Configure Computer` on the Main Menu.**
4. **Select `Configure computer - advanced method` from the Configure Computer menu.** The System Configuration Overview is displayed.
5. **Highlight your processor board and press (Enter) to continue.** The System Configuration Detailed View is displayed.
6. **Verify that the coprocessor is listed as "Installed."** If it is not, exit EASY CONFIG without saving your configuration. Remove the processor board and check to be sure that your coprocessor is properly seated in its socket. Otherwise, continue with the next step.
7. **Select `Exit` from the System menu.** The Exit window is displayed.
8. **Select `Save configuration and exit` to save your configuration and quit EASY CONFIG.**

Removing Boards and Options from Your Configuration

1. **Insert EASY CONFIG diskette #1 in drive A and then turn on your computer.**
2. **Select `Configure computer` from the Main Menu.**
3. **Select `Configure computer - advanced method` from the Configure Computer menu.** The System Configuration Overview is displayed.
4. **Move the highlight to the board or option that you want to remove from your computer.**
5. **Select `Remove ...` from the Edit menu and follow the prompts for removing the board from your configuration.**
6. **Select `Exit` from the System menu.** The Exit window is displayed.
7. **Select `Save configuration and exit` to save your configuration and quit EASY CONFIG.**
8. **Remove the boards from your computer.**

Moving Boards to Other Slots in Your Configuration

1. **Insert EASY CONFIG diskette #1 in drive A and then turn on your computer.**
2. **Select** `Configure Computer` **from the Main Menu.**
3. **Select** `Configure computer - advanced method` **from the Configure Computer menu.** The System Configuration Overview is displayed.
4. **Highlight the board you want to move and select** `Move` **from the Edit menu.** Manufacturer Comments about the board you are moving are displayed.
5. **Read the Manufacturer Comments and select <OK> to continue.** The Move window is then displayed.
6. **Select the new slot for your board from the list of recommended slots.**
7. **Select** `Exit` **from the System menu.** The Exit window is displayed.
8. **Select** `Save configuration and exit` **to save your configuration and quit EASY CONFIG.**
9. **Move the boards to their new slots in your computer.** (Refer to Chapter 6 of this manual for more information about installing and removing boards.)

Changing the Ports, Memory Address, IRQ Lines, DMA Channels or Caching Status of Boards

Computer resources such as memory addresses, ports, IRQ lines, and DMA channels are used by your boards to carry out their functions. You can change the resources available to your boards using EASY CONFIG.

1. **Insert EASY CONFIG diskette #1 in drive A and then turn on your computer.**
2. **Select** `Configure computer` **from the Main Menu.**
3. **Select** `Configure computer - advanced method` **from the Configure Computer menu.**
4. **Highlight the board whose resources you want to change.**
5. **From the View menu, select either** `Detailed by slot` **or** `Detailed by type`. Information for the board you want to modify is displayed.

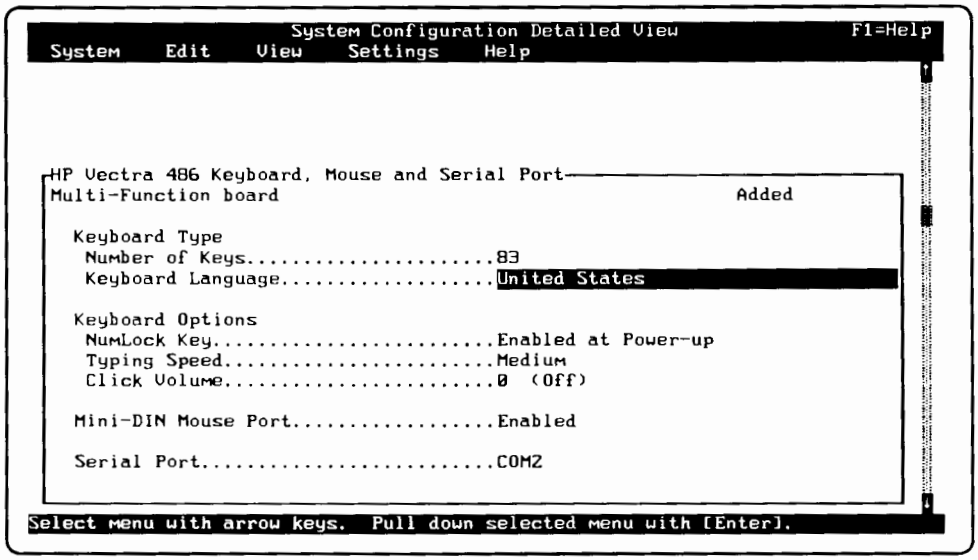
6. **Highlight the resource you want to change.**
7. **Select** `Change Resource` **on the Edit menu.**
8. **Follow the instructions on your screen for changing the resource.** Select `<OK>` when you have finished making your changes.
9. **Select** `Exit` **from the System menu.** The Exit window is displayed.
10. **Select** `View switch, jumper, and software settings.`
11. **Look at the settings of the board whose resource you just changed, noting any jumpers and switches that need to be moved.**
12. **Select** `Save configuration and exit` **to quit EASY CONFIG and save the changes you have made to board resources.**
13. **Make physical jumper and switch settings changes if necessary.**

Changing a Function on a Board

The boards you installed in your computer have certain functions. For example, one function of the HP Vectra system Board is specifying the power-on speed of your computer. Using EASY CONFIG, you can change what power-on speed the system board specifies (this is called *changing a function*). EASY CONFIG also lets you change the computer resources, like memory addresses and IRQ lines, that the system board uses to complete a function (this is called *changing a resource*).

1. **Insert EASY CONFIG diskette #1 in drive A and then turn on your computer.**
2. **Select** `Configure computer` **from the Main Menu.**
3. **Select** `Configure computer - advanced method` **from the Configure Computer menu.**
4. **Highlight the board whose function you want to change.**

5. **Select either** `Detailed by slot` **or** `Detailed by type` **from the View menu.** Information for the board you want to modify is displayed.



When in Detailed View, you may change the functions on a board.

6. **Highlight the function you want to change.**
7. **Select** `Change Function` **on the Edit menu.**
8. **Follow the instructions given on your screen for changing the function.** Select `<OK>` when you have finished making your changes.
9. **Select** `Exit` **from the System menu.** The Exit window is displayed.
10. **Select** `View switch, jumper, and software settings.`
11. **Look at the settings of the board whose function you just changed, noting any jumpers or switches that need to be moved.**
12. **Select** `Save configuration and exit` **to quit EASY CONFIG and save the changes you have made to board functions.**
13. **Make physical jumper and switch settings changes if necessary.**

Memory

Adding Memory Modules to Your Configuration

EASY CONFIG automatically detects and configures your memory modules with no CFG file. All you need to do is start EASY CONFIG, verify that the memory modules have been detected, then exit and save the new configuration.

1. **Install your memory modules on the memory board as described in Chapter 5 of this manual.**
2. **Insert EASY CONFIG diskette #1 in drive A and then turn on your computer.**
3. **Select `Configure Computer` on the Main Menu.**
4. **Select `Configure computer - advanced method` from the Configure Computer menu.** The System Configuration Overview is displayed.
5. **Highlight your memory board and press Enter.** The System Configuration Detailed View is displayed.
6. **Verify that the amount of total memory shown on your memory board equals the amount of memory you should have after installing your memory modules.** If it does not, exit EASY CONFIG, turn off your computer, and remove the board and check to be sure that your memory modules are properly seated in their connectors. Otherwise, continue with the next step.
7. **Select `Exit` from the System menu.**
8. **Select `Save configuration and exit`.** EASY CONFIG automatically detects and configures your memory modules. No other steps are necessary.

Turning Memory Cache On and Off

Your computer comes with a built-in memory cache to increase its performance. There may be occasions, however, when you need to turn memory cache off. For example, you may need to turn off memory cache if you are using copy-protected applications or speed-sensitive applications running at High or AUTO speed.

(If you are an MS-DOS user, you may use the EXMODE command to change the state of the memory cache. Refer to Chapter 9.)

1. **Insert EASY CONFIG diskette #1 in drive A and then turn on your computer.**
2. **Select** Configure computer **from the Main Menu.**
3. **Select** Configure computer - advanced method **from the Configure Computer menu.** The System Configuration Overview is displayed.
4. **Select** Detailed by Slot **on the View pull-down menu.**
5. **Highlight** Cache Memory **on your system board.**
6. **Select** Change Function **on the Edit pull-down menu.**
7. **Select either** Enable **or** Disable **and press** Enter
8. **Select** Exit **on the System pull-down menu.**
9. **Select** Save configuration and exit **to save your changes and quit EASY CONFIG.**

Checking the State of Memory Cache

1. **Insert EASY CONFIG diskette #1 in drive A and then turn on your computer.**
2. **Select** Configure computer **from the Main Menu.**
3. **Select** Configure computer - advanced method **from the Configure Computer menu.** The System Configuration Overview is displayed.
4. **Select** Detailed by Slot **on the View pull-down menu.** The state of memory cache (listed as Cache Memory) is displayed under System Board Options on your system board.
5. **Select** Exit **on the System pull-down menu.**
6. **Select** Exit **to quit EASY CONFIG.**

Using RAM to Shadow Your Video BIOS ROMs

Shadowing is a technique where you copy the contents of your video BIOS ROMs from the video board to your computer's RAM, or *reserved memory*. This creates a "shadow image" in RAM of your video BIOS ROMs. After the video BIOS is copied, the BIOS ROMs on the video board are turned off. Then when your computer executes a video function, it executes the function from your computer's RAM instead of from the BIOS ROMs on the video board.

When stored in RAM, your video BIOS can run at maximum processing speed instead of the slower speed used by your video board because:

- Your computer can gain access to RAM faster than it can gain access to BIOS ROMs on the video board. (Also, RAM may be cached, while ROM may not.)
- When stored in RAM, the shadow image of your video BIOS can be executed from a 32-bit bus rather than the 8- or 16-bit bus of your video card. (The wider the bus, the more information that can be transported.)

You have several choices for shadowing your video BIOS:

- You can shadow video BIOS in RAM at address E0000h or at address C0000h. Choosing E0000h results in a 256 KB contiguous block of *reserved memory* for remapping (refer to "Enabling Memory Remapping" for more information). Choosing C0000h restricts the amount of memory available for remapping to 128 KB. *Be aware, however, that you cannot choose to shadow your video BIOS at E0000h if you have option ROMs installed.*
- You can choose to shadow video BIOS either before or after the video BIOS is called to initialize during the computer's power-on sequence. For most video boards, it is best to shadow the video BIOS *after* it is called to initialize. However, some older boards not manufactured by Hewlett-Packard (IBM VGA and EGA boards, for example) only work when they are shadowed *before* they are called to initialize.

Note

Not all video boards can be shadowed. If you have problems with your video after you have shadowed the board, select `Leave Video BIOS in ROM` from the menu.

To shadow the video BIOS:

1. **Insert EASY CONFIG diskette #1 in drive A and then turn on your computer.**
2. **Select Configure computer from the Main Menu.**
3. **Select Configure computer - advanced method from the Configure Computer menu.**
4. **Select Detailed by slot from the View menu.**
5. **Move the cursor to Enhanced Video Performance on your system board.**
6. **Select Change Function on the Edit menu.**
7. **Select Copy video BIOS to RAM at E0000h after video initialization.**
8. **Select <OK> when you have finished making your changes.**
9. **Select Exit from the System menu.** The Exit window is displayed.
10. **Select Save configuration and exit to quit EASY CONFIG and save the changes you have made.**

Enabling Memory Remapping with EASY CONFIG

Memory remapping moves your computer's *reserved* memory (memory between 640 KB and 1 MB) to the first available address in the extended memory address space (above 1MB). Remapping memory provides memory management drivers like HPMM access to more extended memory.

To enable memory remapping:

1. **Insert EASY CONFIG diskette #1 in drive A and then turn on your computer.**
2. **Select Configure computer on the Main Menu.**
3. **Select Configure computer - advanced method on the configure computer menu.**
4. **Select Detailed by slot on the View pull-down menu.**
5. **Move the cursor to Reserved Memory on the memory board for your computer.**
6. **Select Change Function on the Edit pull-down menu.**

7. **Use the arrow keys to select the option that gives you the least amount of reserved memory (specified by the first number) and the most amount of remapped memory (specified by the second number in parentheses).** Note that if you have chosen to shadow your video BIOS in RAM at address E0000h, you should select the option that gives you 256 KB of reserved memory for remapping. If you have chosen to shadow your video BIOS at address C0000h, you should select the option that gives you 128 KB of reserved memory for remapping. Refer to "Using RAM to Shadow Your Video BIOS ROMs" earlier in this chapter for more information on the effects of shadowing.
8. **Press Enter to select <OK>.**
9. **Select Exit on the System pull-down menu to exit and save your changes.**

Hard Disk Drives, Flexible Disk Drives, and Tape Drives

Configuring Controller Boards and Host Adapter Boards

There are several scenarios for drive installation that affect what configuration steps are necessary:

- *If your computer model came from the factory with a hard disk drive or flexible disk drive already installed:* Your hard disk drive is automatically detected and configured when you run EASY CONFIG to configure your other boards and options and no other configuration steps are necessary.
- *If you are installing a Hewlett-Packard tape drive:* The tape drive is automatically detected and configured when you run EASY CONFIG and no other configuration steps are necessary.
- *If you are installing a Hewlett-Packard hard disk drive or flexible disk drive and you are connecting it to a controller board or host adapter board already installed and configured in your system:* You do not need to copy a CFG file for this controller board since it is already on EASY CONFIG diskette #1. You must verify that EASY CONFIG detects what type of drive you are installing.

- *If you are installing a hard disk drive or flexible disk drive AND installing and configuring its controller or host adapter board:* You must copy the CFG file for the controller or host adapter and add the controller or host adapter to your configuration with EASY CONFIG. Verify that EASY CONFIG detects the drive you are installing.

To configure a drive's controller or host adapter board:

1. **If you have not already done so, install your drive and its board.** (Refer to Chapter 7 for more installation instructions.)
2. **Insert EASY CONFIG diskette #1 in drive A and then turn on your computer.**
3. **Select `Configure Computer` on the Main Menu.**
4. **If you need to copy CFG files, select `Copy selected configuration files from option diskette` from the Configure Computer menu.** Select CFG files for the boards you are installing and press Enter. Otherwise, skip to the next step.
5. **Select `Configure computer - advanced method` from the Configure Computer menu.** The System Configuration Overview is displayed.
6. **Select `Add` from the Edit menu.**
7. **Select the CFG file for the board that you installed in your computer.**
8. **Read the Manufacturer Comments about the board you are adding to your configuration when they are displayed.**
9. **When prompted, select the slot in which you installed your board.**

   If your disk or tape drive has an embedded-AT controller board, you did not have to install the controller in a slot: The controller is embedded in the drive.

Verify that EASY CONFIG displays the correct configuration for the drive you installed:

1. **Move the cursor to board you want to look at.** (The HP Vectra system board is the controller board for Hewlett-Packard non-SCSI flexible disk drives and tape drives.)
2. **Select `Detailed by Slot` from the View menu.**

3. **Scroll through the drive information given for each board you added to your configuration, verifying that the correct information is listed for all the drives you installed.**

   If a drive you installed is not listed, or the wrong information is listed, highlight the drive information and press (Enter). When the Change Function window is displayed, select the correct information and press (Enter).

4. **If you have a printer connected to your computer, select `Print` from the System menu to print the switch and jumper settings of your boards.**

5. **Select `Exit` from the System menu when all your boards have been correctly added to your configuration and the correct information is listed for each drive you installed.** The Exit window is displayed

6. **If you do not have a parallel printer or a printer configured as PRN connected to your computer, select `View switch, jumper, and software settings`. Be sure to record any changes that you need to make to your switches and jumpers in the "Additional Items Installed" section of Chapter 1.**

7. **Select `Save configuration and exit` to exit EASY CONFIG, and save your configuration in CMOS and in an SCI file.**

8. **If necessary, set the switches and jumpers on your boards as recommended by EASY CONFIG and reinstall them in your computer.**

Removing Drives from Your Configuration

If you want to remove both the drive and its board from your configuration, follow the steps below. If you want to remove the drive *only*, follow the second set of steps.

1. **Remove the board and drive from your computer.**

2. **Insert EASY CONFIG diskette #1 in drive A and then turn on your computer.**

3. **Select `Configure Computer` from the Main Menu.**

4. **Select `Configure computer - advanced method` from the Configure Computer menu.** The System Configuration Overview is displayed.

5. **Highlight the board that you want to remove.** *NOTE: Do not remove multi-function boards that are also being used by other drives unless you wish to remove those drives from your computer as well.*
6. **Select `Remove ...` from the Edit menu. Follow the prompts for removing the board from your configuration.**
7. **Select `Exit` from the System menu.** The Exit window is displayed.
8. **Select `Save configuration and exit` to save your configuration and quit EASY CONFIG.**

To remove the drive *only* from your configuration:

1. **Disconnect your drive from its controller or host adapter and remove the drive from your computer.**
2. **Insert EASY CONFIG diskette #1 in drive A and then turn on your computer.**
3. **Select `Configure Computer` from the Main Menu.**
4. **Select `Configure computer - advanced method` from the Configure Computer menu.** The System Configuration Overview is displayed.
5. **Highlight the board that was attached to the drive you removed and press** Enter. The System Configuration Detailed View is displayed.
6. **Verify that the non-SCSI drive you removed is listed as "not installed."** If it is not, highlight the drive that you removed and press Enter. Select "Not Installed" from the list of choices displayed.

   If you removed a SCSI drive, verify that all entries for the drive address are "No." If they are not, highlight any "Yes" entry and press Enter. Change the entry to "No."
7. **Select `Exit` from the System menu.**
8. **Select `Save configuration and exit` to save your changes in CMOS and in an SCI file and to exit EASY CONFIG.**

Moving Controller or Host Adapter Boards in Your Configuration

EASY CONFIG provides an easy method of moving boards to other slots in your computer. If you move your *drives* to other shelves in your computer but you leave their boards in their original slots, it is not necessary to run EASY CONFIG to change your configuration.

To move a controller board, simply follow the instructions in "Moving Boards to Other Slots in Your Configuration" earlier in this chapter.

Enabling and Disabling Hard Disk Drive Splitting

HP Vectra 486 PC models with a 670 MB high performance ESDI hard disk drive come with hard disk drive splitting enabled. Hard disk drive splitting is enabled because operating systems such as Microsoft Operating System/2 and MS-DOS cannot access more than 530 MB of any logical hard disk drive. The UNIX operating systems, on the other hand, can access all 670 MB of the hard disk drive.

If you use the UNIX operating system *and* your computer has a 670 MB ESDI hard disk drive, you may want to turn off hard disk drive splitting. Although there is no perceptible performance benefit in disabling hard disk drive splitting, you may find the arrangement more convenient. (Instead of having two virtual hard disk drives of 530 MB and 140 MB each, you will have only one 670 MB hard disk drive.)

To disable hard disk drive splitting:

1. **Insert EASY CONFIG diskette #1 in drive A and then turn on your computer.**
2. **Select `Configure Computer` from the Main Menu.**
3. **Select `Configure computer - advanced method` from the Configure Computer menu.**
4. **Select `Detailed by Slot` on the View pull-down menu.**
5. **Move the cursor to the hard disk drive splitting function on the ESDI hard disk controller board.**
6. **Select `Change Function` on the Edit pull-down menu and disable hard disk drive splitting.**

7. **Select `Disabled (jumper installed)`.**
   (If you removed the jumper for drive splitting from the controller board, accept the default `Disabled (jumper not installed)`.)
8. **Move the cursor to drive C on the ESDI controller board.**
9. **Select `Change Function` on the Edit pull-down menu, and select drive type `30 (670 MB)`.**
10. **Move the cursor to drive D on the ESDI controller board.**
11. **Select `Change Function` on the Edit pull-down menu, and select `Not Installed`.**
12. **Select `Exit` on the System pull-down menu.**
13. **Then select `Save configuration and exit` to save your changes and exit EASY CONFIG.**

Reinitializing a Non-SCSI Hard Disk Drive with EASY CONFIG

Although Hewlett-Packard hard disk drives are already initialized at the factory and under normal circumstances should *not* be re-initialized, it is possible to reinitialize them with EASY CONFIG. (EASY CONFIG cannot initialize non-Hewlett-Packard or SCSI hard disk drives.)

1. **Insert EASY CONFIG diskette #1 in drive A and then turn on your computer.**
2. **If you have not already done so, add the hard disk drive to your configuration. Follow the steps in "Configuring Controller and Host Adapter Boards" earlier in this chapter.**
3. **Select `Access other system utilities` from the Main Menu.**
4. **Select `Initialize hard disk` from the System Utilities menu.**
5. **Follow the onscreen instructions for reinitializing your hard disk drive.**

Getting Detailed Information about Your Configuration

Getting Information about CFG Files

Use the PrintCFG utility to view and print information about CFG files. (Refer to Chapter 9 for detailed information about PrintCFG.)

PrintCFG Syntax

Variables that you fill in appear in *italics*. Optional parameters are enclosed in brackets [ ]. Note that you may also use the standard MS-DOS wildcard characters, question mark [?] and asterisk [*], for looking at information about multiple CFG files.

`PRINTCFG [`*drive:*`] [`*path*`]` *filename.cfg* `[>PRN]`

Parameter	Description
drive:	is the drive on which the CFG file is stored. The default is the active drive.
path	specifies the path from the root directory to the directory where the CFG file is stored. The default is the current directory.
filename.cfg	is the name of the CFG file. You *must* specify the CFG extension. To display information about more than one CFG file, use the MS-DOS wildcard characters (? and *).
`>PRN`	sends the CFG file information to your printer. If you do not specify this command, the CFG file information is "printed" on your screen.

Changing the View of Your Configuration

1. **Insert EASY CONFIG diskette #1 in drive A and then turn on your computer.**
2. **Select `Configure Computer` from the Main Menu.**
3. **Select `Configure computer - advanced method` from the Configure Computer menu.**

4. **Select either** `Detailed by slot` **or** `Detailed by type` **from the View menu.**
5. **To go back to a general overview of your configuration, select** `Overview` **from the View menu.**

Looking at Your Memory Configuration

1. **Insert EASY CONFIG diskette #1 in drive A and then turn on your computer.**
2. **Select** `Configure Computer` **from the Main Menu.**
3. **Select** `Configure computer - advanced method` **from the Configure Computer menu.**
4. **Highlight the memory board.**
5. **Select either** `Detailed by slot` **or** `Detailed by type` **from the View menu.** The System Configuration Detailed View is displayed.
6. **Highlight** `View Memory Module Configuration` **on the memory board.**
7. **Press** Enter **to display your memory module configuration.** Select `<OK>` when you have finished.

Looking at the Software Parameters Needed for Your Boards

Some board manufacturers include information in their CFG files about how to configure certain software to function correctly with their boards. For example, a board that requires an MS-DOS driver might specify that you need to add a command to your CONFIG.SYS file in order to install the driver in MS-DOS. EASY CONFIG provides a quick way of looking at the information about any necessary software parameters that the board manufacturer has provided.

1. **Insert EASY CONFIG diskette #1 in drive A and then turn on your computer.**
2. **Select** `Configure computer` **from the Main Menu.**
3. **Select** `Configure computer - advanced method` **from the Configure Computer menu.** The System Configuration Overview is displayed.

4. **Select `Software parameters ...` from the View menu.** You will be asked whether you want to see *all* software parameters, only the parameters that have *changed*, or only the parameters for the *current board*.
5. **Select `<OK>` when you have finished looking at the software parameters.**
6. **The Software Parameter window will be displayed again—you can either select another view of software parameters, or select `<Cancel>` to return to the System Configuration Overview.**

Displaying and Printing Switch and Jumper Settings

1. **Insert EASY CONFIG diskette #1 in drive A and then turn on your computer.**
2. **Select `Configure computer` from the Main Menu.**
3. **Select `Configure computer - advanced method` from the Configure Computer menu.** The System Configuration Overview is displayed.
4. **If you want to see information about a particular board, highlight that board.** Otherwise, skip to the next step.
5. **Select `Switch & jumper settings ...` from the View menu.**
6. **Select whether you want to see settings for the currently selected board, for all boards, or only for changed boards, and press Enter**
7. **Scroll through the displayed information and select `<OK>` when you have finished.**
8. **If you do not have a printer connected to your computer, be sure to record any switch or jumper settings on your boards and options that you need to change in the "Additional Items Installed" section of Chapter 1.** (If you have a parallel printer, it is not necessary to record any information since you will be able to print it out later.)
9. **Select `<OK>` when you have finished.**
10. **If you have a printer connected to your computer, select `Print` from the System pull-down menu.** This prints your switch and jumper settings and other configuration information.
11. **Select `Exit` from the System pull-down menu.**

12. **Select `Exit` again to quit EASY CONFIG without saving any changes.**

Looking at the External Cable Connections of Boards

1. **Insert EASY CONFIG diskette #1 in drive A and then turn on your computer.**
2. **Select `Configure computer` from the Main Menu.**
3. **Select `Configure computer - advanced method` from the Configure Computer menu.** The System Configuration Overview is displayed.
4. **Select `Connections ...` from the View menu.**
5. **Select `<OK>`when you have finished looking at the Connections Map.**

Looking at the Specifications of Boards

1. **Insert EASY CONFIG diskette #1 in drive A and then turn on your computer.**
2. **Select `Configure computer` from the Main Menu.**
3. **Select `Configure computer - advanced method` from the Configure Computer menu.** The System Configuration Overview is displayed.
4. **Highlight the board whose specifications you want to see.**
5. **Select `Board Specifications ...` from the View menu.**
6. **Either select `<OK>` to return to the System Configuration Overview, or select `System Information` to see specifications for the entire system.**

Looking at the Ports, Addresses, IRQ Lines, DMA Channels, and Caching Status of Boards

Computer resources such as memory addresses, ports, IRQ lines, and DMA channels are used by your boards to carry out their functions. You can look at the resources being used by your boards using EASY CONFIG.

1. **Insert EASY CONFIG diskette #1 in drive A and then turn on your computer.**
2. **Select `Configure computer` from the Main Menu.**

3. **Select `Configure computer - advanced method` from the Configure Computer menu.** The System Configuration Overview is displayed.
4. **Select `Resources ...` from the View menu.**
5. **Select `<OK>` when you have finished looking at the Resource Map.**

Resolving Resource Conflicts

Most conflicts are resolved automatically by EASY CONFIG, however it is possible to install a combination of boards that will not allow your computer to start. If this happens, follow these steps:

1. **Turn off your computer and disconnect all power cords.**
2. **Remove the cover and metal plate.** (Refer to Chapter 2.)
3. **Remove all boards and options except the video board and the controller or host adapter board for your hard disk drive.**
4. **Replace the metal plate and cover. Reconnect all power cords.**
5. **Insert EASY CONFIG diskette #1 in drive A and then turn on your computer.**
6. **Use EASY CONFIG to add the remaining boards and options to your configuration.** (Refer to "Configuring Your Computer for the First Time" in this chapter.)
7. **Set the switches and jumpers on your boards and options, then reinstall them in your computer in the locations recommended by EASY CONFIG.** (Refer to Chapter 6.)

Saving Your Configuration and Exiting EASY CONFIG

Saving and Exiting

EASY CONFIG saves the configuration you have created in CMOS (nonvolatile memory) and in a System Configuration Information (SCI) file. The default file name given to the SCI file is SYSTEM.SCI.

1. **Select `Exit` from the System menu.**
2. **Look at the switch and jumper settings for the items you may have installed.** If you do not have a parallel printer connected to your computer, record any switches or jumpers that you need to set on your boards in the "Additional Items Installed" section of Chapter 1. (If you have a parallel printer, it is not necessary to record any information since you will be able to print it out later.)
3. **If you have a parallel printer or a printer configured as PRN connected to your computer, select `Print` from the System menu.**
4. **Select `Save configuration and exit`.** The configuration you have just created is saved, and your computer restarts.
5. **Remember to set any switches and jumpers on your boards as recommended by EASY CONFIG.**

Exiting Without Saving Your Configuration

In some situations, such as when you are looking at your configuration information but are not changing anything, you may want to quit EASY CONFIG without saving your configuration. Simply select `Exit` from the System menu, then select `Exit` again when the next window is displayed.

Verifying Your Configuration

EASY CONFIG automatically checks to see that your configuration has no resource conflicts. If EASY CONFIG detects no resource conflicts, you will see a message that tells you that your computer is configured correctly. If there are resource conflicts, you will see a message telling you how to resolve the problem. You may also choose to turn off automatic verification. To turn off automatic verification:

1. **Insert EASY CONFIG diskette #1 in drive A and then turn on your computer.**
2. **Select `Configure computer` from the Main Menu.**
3. **Select `Configure computer - advanced method` from the Configure Computer menu.** The System Configuration Overview is displayed.
4. **Select `Manual Verify` from the Settings menu.**
5. **Whenever you want to confirm that changes you have made to your configuration are free of conflicts, select `Verify` from the System menu.**

To turn on automatic verification (this is the default setting):

Repeat steps 1 through 3 above, then select `Auto Verify` from the Settings menu.

Restoring Configurations

Restoring Your Computer's Configuration

When you configure your computer, a System Configuration Information (SCI) file is created when you chose to save your configuration and exit EASY CONFIG. This SCI file contains all the information EASY CONFIG needs to restore your configuration. Your configuration information is also saved in CMOS (nonvolatile memory).

Normally, EASY CONFIG uses the information in CMOS to restore any damaged configuration information without consulting you. However, if the configuration information stored in CMOS is damaged, EASY CONFIG will

ask you if you want to restore your configuration from the SYSTEM.SCI file or from other SCI files you may have created. If you answer "no," EASY CONFIG will take you through the entire configuration process.

1. **Insert EASY CONFIG diskette #1 in drive A and then turn on your computer.**
2. **Select `Configure computer` from the Main Menu.**
3. **Select `Configure computer - advanced method` from the Configure Computer menu.**
4. **When the System Configuration Overview is displayed, select `Open` from the System menu.** You will see a message warning you that your current configuration information will be lost if you continue.
5. **Select `<OK>` to continue.** The System Configuration Information (SCI) File Selection windows is displayed.
6. **Select the SCI file that you want to use to restore your configuration. Then select `<OK>`.** The default filename that EASY CONFIG uses to create an SCI file when you save and exit is SYSTEM.SCI. (You may have chosen a different filename if you selected `Save As ...`)
7. **You are returned to the System Configuration Overview.**
8. **Select `Exit` from the System menu.**
9. **Select `Save configuration and exit` to quit EASY CONFIG and save the changes you have made to your configuration.**

Making a System Configuration Information (SCI) File for Another Computer

You can use Modeling Mode to create System Configuration Information (SCI) files for other computers without changing your own configuration. Modeling Mode allows you to create an SCI file for a computer other than the one on which you are running EASY CONFIG, to create multiple SCI files, and to create one SCI file for multiple computers. When the configuration is saved, it is saved to a specified SCI file only. It is not saved to nonvolatile memory (CMOS).

Refer to "Starting EASY CONFIG from the MS-DOS Prompt" later in this chapter for more information on starting EASY CONFIG in Modeling Mode.

Reverting to a Previously Saved Configuration

EASY CONFIG allows you to discard your current configuration and revert to a configuration you had previously saved in CMOS. You can do this for any individual board, or for your entire configuration.

1. **Insert EASY CONFIG diskette #1 in drive A and then turn on your computer.**
2. **Select `Configure computer` from the Main Menu.**
3. **Select `Configure computer - advanced method` from the Configure Computer menu.** The System Configuration Overview is displayed.
4. **Highlight the board you want to change and Select `Revert to Saved ...` from the Edit menu.** You also will be offered the option of reverting to a previous configuration for the entire system.
5. **The message "`The configuration for the current board (or entire system) will be restored to the last saved settings`" is displayed. Select `<OK>`.** The saved configuration is restored and you are returned to the System Configuration Overview.
6. **Select `Exit` from the System menu.** The Exit window is displayed.
7. **Select `Save configuration and exit` to quit EASY CONFIG and save the changes you have made to your configuration.**

Reverting to the Manufacturer's Defaults

EASY CONFIG allows you to discard your current configuration and revert to the manufacturer's default settings for individual boards, or for your entire system.

1. **Insert EASY CONFIG diskette #1 in drive A and then turn on your computer.**
2. **Select `Configure computer` from the Main Menu.**
3. **Select `Configure computer - advanced method` from the Configure Computer menu.** The System Configuration Overview is displayed.

4. **Highlight the board you want to change.**
5. **Select `Reset to Defaults ...` from the Edit menu.** You also are offered the option of resetting to the defaults for the entire system. The message **"`The configuration for the current board (or entire system) will be reset to the manufacturer's defaults`" is displayed.**
6. **Select `<OK>`.** Your configuration is reset and you are returned to the System Configuration Overview.
7. **Select `Exit` from the System menu.** The Exit window is displayed.
8. **Select `Save configuration and exit` to quit EASY CONFIG and save the changes you have made to your configuration.**

Preventing EASY CONFIG From Changing a Previous Configuration

EASY CONFIG provides a means of locking the configuration of boards or options installed in your system. Use this capability when you want to prevent EASY CONFIG from moving or changing boards you have previously configured to accommodate new boards you are adding to your configuration. The configuration will remain locked only for your current session.

1. **Insert EASY CONFIG diskette #1 in drive A and then turn on your computer.**
2. **Select `Configure computer` from the Main Menu.**
3. **Select `Configure computer - advanced method` from the Configure Computer menu.** The System Configuration Overview is displayed.
4. **Highlight the board whose configuration you want to lock.**
5. **Select `Lock ...` from the Edit menu.** You also are offered the option of locking the configuration of the entire system. The message **"`The configuration for the current board (or entire system) will be locked`" is displayed.**
6. **Select `<OK>`.** The configuration information is locked and you are returned to the System Configuration Overview where the boards are labeled "! Locked."
7. **Select `Exit` from the System menu.** The Exit window is displayed.
8. **Select `Exit` again to return to the Main Menu.**

Unlocking a Configuration

If you want to allow EASY CONFIG to move and change boards in your configuration to accommodate new boards that you are adding, the configuration information must be unlocked. (This is the default—if you have not locked your configuration during the current session, you do not need to unlock it.)

1. **Insert EASY CONFIG diskette #1 in drive A and then turn on your computer.**
2. **Select `Configure computer` from the Main Menu.**
3. **Select `Configure computer - advanced method` from the Configure Computer menu.** The System Configuration Overview is displayed.
4. **Highlight the board whose configuration you want to unlock.**
5. **Select `Unlock ...` from the Edit menu.** You also are offered the option of unlocking the configuration of the entire system. The message `The configuration for the current board (or entire system) will be unlocked` is displayed.
6. **Select `<OK>`.** The configuration information is locked and you are returned to the System Configuration Overview.
7. **Select `Exit` from the System menu.** The Exit window is displayed.
8. **Select `Exit` again to return to the Main Menu.**

Setting Your Power-On Password

EASY CONFIG allows you to set a password to prevent unauthorized use of your computer. After you set the password, every time you start your computer you will be prompted with a key symbol to enter the password. Refer to Chapter 10 for more information about passwords.

1. **Insert EASY CONFIG diskette #1 in drive A and then turn on your computer.**
2. **Select `Access other system utilities` from the Main Menu.**

3. **Select Set power-on password from the System Utilities menu.**
4. **Follow the onscreen instructions for setting the password.**

Setting Your Computer to Work as a Network Server

When you run EASY CONFIG, you have the option of setting network server mode. Using the power-on password, network server mode prevents unauthorized use of the keyboard while the computer is functioning as an unattended file server. Even if there is a power failure, network server mode will ensure that the keyboard remains locked when the computer restarts.

When network server mode is enabled, you must enter the power-on password to enable the keyboard.

1. **Insert EASY CONFIG diskette #1 in drive A and then turn on your computer.**
2. **Select Access other system utilities from the Main Menu.**
3. **Set a power-on password if you have not already done so.** (You must set a power-on password *before* you can use network server mode.)
4. **Select Set network server mode from the System Utilities menu.**
5. **Select either Enable or Disable network server mode. Then select <OK>.**
6. **Select Return to the last menu.**
7. **Select Exit from this Utility from the Main Menu.**

Setting Your Keyboard Language Type

Using EASY CONFIG, you can specify the language of the keyboard you will be using within EASY CONFIG.

1. **Insert EASY CONFIG diskette #1 in drive A and then turn on your computer.**
2. **Select `Access other system utilities` from the Main Menu.**
3. **Select `Set control panel options` from the System Utilities menu.** The Control Panel Options window is displayed.
4. **Select the keyboard language you want, and select `<OK>`.**
5. **Select `Return to the last menu`.**
6. **Select `Exit from this Utility` from Main Menu.**

Selecting an Alternate Video Mode for EASY CONFIG

Using EASY CONFIG, you can specify the video mode you will be using within EASY CONFIG.

1. **Insert EASY CONFIG diskette #1 in drive A and then turn on your computer.**
2. **Select `Access other system utilities` from the Main Menu.**
3. **Select `Set control panel options` from the System Utilities menu.** The Control Panel Options windows is displayed.
4. **Select the video mode you want and select `<OK>`.**
5. **Select `Return to the last menu`.**
6. **Select `Exit from this Utility` from Main Menu.**

Installing an Operating System with EASY CONFIG

1. **If you are configuring your computer for the first time, set up your computer as described in the "Setup Steps" in Chapter 1. Then configure your computer as described in the "Configuring Your Computer for the First Time" section of this chapter.**
2. **Insert EASY CONFIG diskette #1 in drive A and then turn on your computer.**
3. **Select `Install operating system` from the Main Menu.**
4. **Follow the onscreen instructions for installing your operating system.**

Installing EASY CONFIG on Your Hard Disk

If you have MS-DOS version 4.0 or later installed, you may copy the EASY CONFIG files to your hard disk.

Note

Do not install EASY CONFIG in your root directory (C:\) because your CONFIG.SYS file will be replaced with the one on EASY CONFIG diskette #1.

Also, if you want to copy EASY CONFIG diskette #2 to your hard disk, remember that all the CFG files are stored in a directory on that disk. To copy the CFG files, make A the active drive, change to the directory named ISACFG, and then follow the instructions below.

1. **Make a directory in which to store your EASY CONFIG files on your hard disk drive by entering**

   `MKDIR [`*drive:*`] [`*path*`]` *directory*

   Where *drive:* is the drive to which you will copy the EASY CONFIG files, *path* is the path to the directory in which you will store the EASY CONFIG files, and *directory* is the name of the directory in which you will store your EASY CONFIG files.

2. **Insert EASY CONFIG diskette #1 in drive A and enter:**

   `COPY A:*.* [`*drive:*`] [`*path*`]` *directory*

Starting EASY CONFIG from the MS-DOS Prompt

You can start EASY CONFIG with command line parameters from EASY CONFIG diskette #1 or from your hard disk. Use the following format to enter the command that starts EASY CONFIG from the MS-DOS prompt. Variables that you fill in appear in *italics*. Optional parameters appear in brackets [ ]. Do not enter the brackets.

`[`*drive:*`] [`*path*`] SD [/A] [/B] [/H] [/K] [/M]`

OR

`[`*drive:*`] [`*path*`] CF [/B] [/H] [/K] [/M] [/N] [/T] [/F] [/E]`

Parameter	Description
drive:	is the drive that contains the EASY CONFIG files.
path	is the path that contains the EASY CONFIG files.
SD	is the command that starts EASY CONFIG and displays the Main Menu.
CF	is the command that starts the `Configure computer - advanced method` from MS-DOS, bypassing the Main Menu.
/A	starts EASY CONFIG in Advanced Mode. Advanced Mode provides an expanded set of menus.
/B	displays all screens using BIOS Int 10h calls. This parameter should be used on computers with non- standard displays. The default mode is to write directly to video memory. You can also display all screens using BIOS Int 10h calls by selecting `Set control panel options` on the Configure Computer menu.

/E	sets easy configuration mode. This parameter can only be used with the CF command. Use this parameter to start the basic method of configuration from MS-DOS, bypassing the Main Menu.
/F	sets fast configure mode. This parameter can only be used with the CF command. Use this parameter to update and save the computer's configuration with (1) information in the SYSTEM.SCI file and (2) information about any boards and options that are detected in the computer.
/H	displays EASY CONFIG in 43-line mode if you have an EGA display. Displays EASY CONFIG in 50-line mode if you have a VGA display. If you do not use this parameter, 25 lines will be displayed on your screen. You can also change the display mode by selecting `Set control panel options` on the Configure Computer menu.
/K	prevents the computer from supporting the use of a mouse even if one is present. The default is to support a mouse if its driver is loaded in memory. You can also change mouse support by selecting `Set control panel options` on the Configure Computer menu.
/M	displays EASY CONFIG screens in black and white. You can also change the way the screen is displayed by selecting `Set control panel options` on the Configure Computer menu.
/N	runs EASY CONFIG in modeling mode. This parameter can only be used with the CF command. Modeling mode allows you to create an SCI file for a computer other than the one on which you are running EASY CONFIG, and to create multiple SCI files.. When you run EASY CONFIG in modeling mode, you can create a new configuration or open an existing System Configuration Information (SCI) file. When the configuration is saved, it is saved to a specified SCI file only. It is not saved to nonvolatile memory (CMOS).

/T	displays the computer's configuration in a detailed view. This parameter can only be used with the CF command. Use this parameter to display configuration information in a detailed view, instead of an overview.

If you enter an incorrect command line parameter, EASY CONFIG provides you with a list of correct command line parameters.

9

Installing the HP Utilities

About the HP Utilities

This chapter provides instructions for installing the HP Utilities: EXMODE, PrintCFG, HP Memory Manager (HPMM) (formerly called HPEMM/486), and RELOCATE. Although these utilities are *optional*, we recommend that you install them because of the added functionality they can provide. You will find the HP Utilities on EASY CONFIG diskette #2.

Note

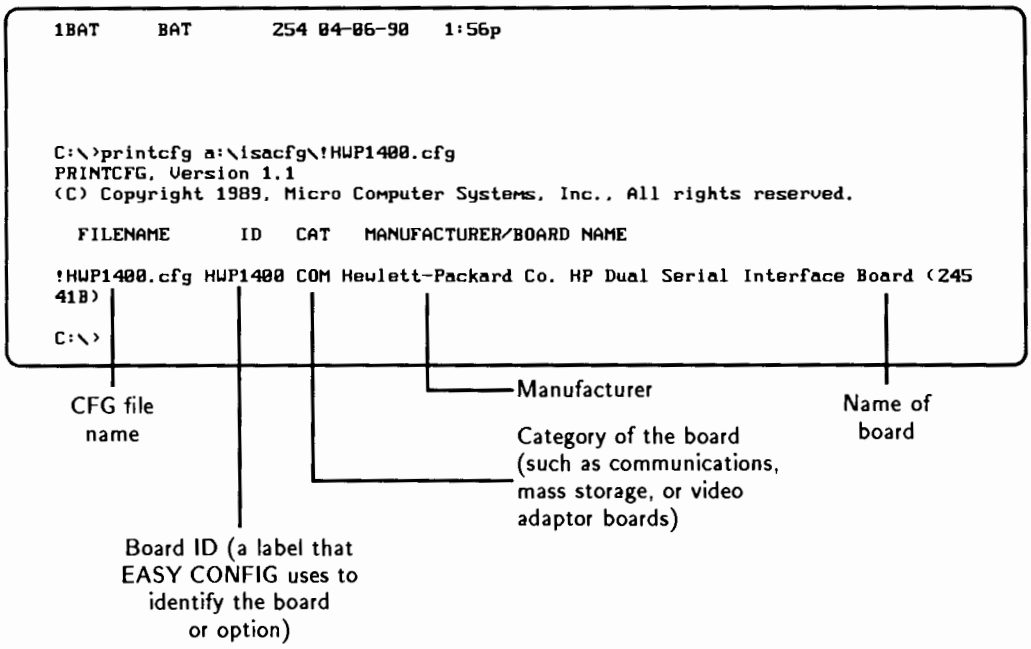
- The HP Utilities are for MS-DOS users with 80386- and 80486-based computers only.
- If you plan to use the HP Vectra Disk Cache utility (HPDCACHE), it is important that you install HPMM and RELOCATE *before* you install the disk cache utility. Disk caching may need to use some of the memory created by HPMM. HPDCACHE is an MS-DOS utility.

EXMODE

EXMODE is an HP Utility that allows you to change the processing speed of your computer, to change the volume of your keyboard click, and to turn memory cache on and off temporarily until you restart your computer.

PrintCFG

PrintCFG is an HP Utility that allows you to view information about CFG files and the boards they represent. You can display this information on your screen, or print it. PrintCFG displays the following information:



HP Memory Manager (HPMM)

HPMM is an HP Utility that allows you to use larger programs and data files, and facilitates multitasking. It does this by swapping blocks of base, reserved, and extended memory and converting them into expanded memory. Most MS-DOS applications can use expanded memory.

HPMM offers the following important features. Note that your computer must have greater than 1 MB of memory to use these features with HPMM.

- support for the Lotus Intel Microsoft Expanded Memory Specification (LIM 4.0)
- support for the eXtended Memory Specification (XMS)

- support for the Weitek 4167 coprocessor
- support for Microsoft Windows 3.0 in 386 Enhanced Mode (you cannot use HPMM with a Windows/386 version prior to 3.0)
- Virtual Control Program Interface specification (VCPI), which supports such applications as AutoCAD, ME10/DOS, Paradox386 (a product of Borland International, Inc.), FoxBase+386 (a product of Fox Software), and Lotus 1-2-3 version 3.0 (a product of Lotus Development Corporation)
- Virtual DMA Services specification (VDS), which supports bus-master boards and DMA device drivers in virtual mode

RELOCATE

RELOCATE is a utility that works in conjunction with HPMM to relocate device drivers and terminate-and-stay-resident (TSR) programs from conventional memory to reserved memory. This frees conventional memory for application programs to use.

You can relocate *device drivers permanently* to reserved memory (memory between 640 KB and 1 MB) by including a RELOCATE command in your CONFIG.SYS file. You can relocate *TSRs permanently* to reserved memory by including a RELOCATE command in your AUTOEXEC.BAT file. You can also relocate TSRs by entering the RELOCATE command at the MS-DOS prompt.

RELOCATE also allows you to do the following at the MS-DOS prompt:

- turn support for the Weitek 4167 coprocessor on and off
- specify that HP Memory Manager be on, off, or set to auto
- display the status of the Weitek 4167 coprocessor and HPMM
- list the available blocks of reserved memory

Preliminary Installation Steps

1. **Make a backup copy of your CONFIG.SYS and AUTOEXEC.BAT files by entering**

   ```
   COPY CONFIG.SYS CONFIG.OLD
   COPY AUTOEXEC.BAT AUTOEXEC.OLD
   ```

   at the C:\> prompt.

2. **Check EASY CONFIG diskette #2 to see if there is a README file that includes the latest information about the HP Utilities.** (You will only have a README file if there are updates which are not included in this manual.)

   Read the contents of the README file (if you have one) by inserting EASY CONFIG diskette #2 in drive A, and entering

   ```
   MORE <A:read.me
   ```

   (Press Enter to "page through" the information on your screen.)

Installing EXMODE

To copy EXMODE to the root directory of your hard disk, insert EASY CONFIG diskette #2 in drive A and enter

```
COPY A:\EXMODE.* C:\
```

EXMODE is now installed.

You can use EXMODE to:

- change the processing speed of your computer
- change the volume of your keyboard click
- turn memory cache on and off whenever you wish

You can put the EXMODE command in your AUTOEXEC.BAT file to change the processing speed or volume of the keyboard click permanently.

You can also create a batch file for running speed-sensitive applications. The batch file should include: the EXMODE command to switch your computer to a lower speed, the command to start the application, and the EXMODE command to switch back to the original speed on exiting the application.

Or you can change the processing speed from the MS-DOS prompt.

EXMODE Syntax

The following is the EXMODE command syntax. Variables that you fill in appear in *italics*. Optional parameters are enclosed in brackets [ ]. Do not enter the brackets.

```
[drive:] [path] EXMODE [MEMCACHE state]
[SPEED number] [CLICK volume]
```

Parameter	Description
drive:	is the drive on which EXMODE is located.
path	is the path to the EXMODE program.

MEMCACHE (or MEM)	affects the memory cache. Entering MEMCACHE without the *state* parameter will display the current state of memory cache. The shortened form of the command is MEM.
state	is the state of memory cache. Possible values are ON and OFF. If you do not specify *state*, the current state of memory cache will be displayed.
SPEED (or SPE)	affects the processing speed. Entering SPEED without the *number* parameter will display the current processing speed. The shortened form of the command is SPE.
number	is the processing speed in MHz *or* the automatic speed switching parameter "AUTO", *or* the word "HIGH" or "LOW". Possible variables for *number* are: ■ Any number between 1 and 25 for the HP Vectra 486/25T PC or any number between 1 and 33 for the HP Vectra 486/33T PC. ■ The word "AUTO" to turn on automatic speed switching. If you specify this parameter the computer runs at high speed, switches automatically to 8 MHz when it is reading from a flexible disk, then switches back to high speed. ■ The word "HIGH". This variable switches the computer's speed to 25 MHz for the HP Vectra 486/25T PC, or 33 MHz for the HP Vectra 486/33 PC. ■ The word "LOW" to switch the computer's speed to 8 MHz. If you do not specify *number*, the current setting is displayed.
CLICK (or CLI)	affects the volume of the keyboard click. The shortened form of the command is CLI.

volume	is the volume of your keyboard click. A possible value is any number between 0 and 15. Zero makes the keyboard click inaudible and 15 makes the keyboard click as loud as possible.

Installing PrintCFG

Copy PrintCFG to the root directory of your hard disk drive. (Or, if you copied EASY CONFIG to a directory on your hard disk drive, copy PrintCFG to the same directory.)

With EASY CONFIG diskette #2 in drive A, enter

```
COPY A:\PRINTCFG.EXE C:\
```

PrintCFG Syntax

Variables that you fill in appear in *italics*. Optional parameters are enclosed in brackets [ ]. Do not enter the brackets.

PRINTCFG [*drive:*] [*path*] *filename.cfg* [>PRN]

Parameter	Description
drive:	is the drive on which the CFG file is stored. The default is the active drive.
path	specifies the path from the root directory to the directory where the CFG file is stored. The default is the current directory.
filename.cfg	is the name of the CFG file. You *must* specify the CFG extension. To display information about more than one CFG file, use the MS-DOS wildcard characters (? and *).
>PRN	sends the information to your printer.

Example PrintCFG Commands

Example 1

To look at information about the board that uses the CFG file called !HWP0030.CFG in the ISACFG directory on EASY CONFIG diskette #2, insert EASY CONFIG diskette #2 in drive A and enter

```
PRINTCFG A:\ISACFG\!HWP0030.CFG
```

You will see a message similar to the one below.

```
C:\>printcfg a:\isacfg\!HWP0030.cfg
PRINTCFG, Version 1.1
(C) Copyright 1989, Micro Computer Systems, Inc., All rights reserved.

  FILENAME       ID   CAT   MANUFACTURER/BOARD NAME

!HWP0030.cfg HWP0030 VID Hewlett-Packard Co. HP Enhanced Graphics Adapter Board
(45983A)

C:\>
```

Example 2

To print information about all CFG files beginning with the characters !HWP in the ISACFG directory of EASY CONFIG diskette #2, insert EASY CONFIG diskette #2 in drive A and enter

```
PRINTCFG A:\ISACFG\!HWP*.CFG >PRN
```

You will see a message similar to the one below:

```
PRINTCFG, Version 1.1
(C) Copyright 1989, Micro Computer Systems, Inc., All rights reserved.

  FILENAME      ID   CAT   MANUFACTURER/BOARD NAME

!HWP0000.CFG HWP0000 VID Hewlett-Packard Co. HP Monochrome Plus Video Board (357
3ZA)
!HWP0010.CFG HWP0010 VID Hewlett-Packard Co. HP Multimode Video Adapter (45981A)

!HWP0020.CFG HWP0020 VID Hewlett-Packard Co. HP Multimode Color Adapter Board (4
5984A)
!HWP0030.CFG HWP0030 VID Hewlett-Packard Co. HP Enhanced Graphics Adapter Board
(45983A)
!HWP0060.CFG HWP0060 VID Hewlett-Packard Co. HP Intelligent Graphics Controller
10 (A1086A)
```

Installing HPMM

You may choose between two methods of installing HPMM: default installation and customized installation. The *default installation* method is the simplest way to get HPMM working on your computer. You just add the default HPMM command to your CONFIG.SYS file. The *customized installation* method requires you to add the customized HPMM command to your CONFIG.SYS file and specify certain parameters. You should use the customized installation method if:

- you *do not* want to store and use HPMM from the root directory
- you are an experienced MS-DOS user who wants more control over the HPMM installation process
- you will install other programs in extended memory *after* you install HPMM
- you want to use HPMM with Windows 3.0. (You need to specify the EXT parameter)
- you want to use the RELOCATE utility

If you encounter an error message during the installation and use of HPMM, refer to Chapter 13, "Troubleshooting and Error Messages."

Default Installation Method

1. **Copy HPMM to the root directory of your hard disk drive. With EASY CONFIG diskette #2 in drive A, enter**

   ```
   COPY A:\HPMM.SYS C:\
   ```

2. **Change to the root directory.**

3. **At the MS-DOS prompt, enter the command**

   ```
   TYPE CONFIG.SYS
   ```

4. **When the CONFIG.SYS file is displayed, check to see if it contains the line**

   ```
   DEVICE=HIMEM.SYS
   ```

   If it does, delete this line. (Use a word processor or the MS-DOS line editor, EDLIN.)

5. **Add the line**

   ```
   DEVICE=HPMM.SYS
   ```

   to your CONFIG.SYS file. Make sure the HPMM device driver is the first device driver in your CONFIG.SYS file.

Note

If you are using Windows 3.0 in 386 Enhanced Mode, do not delete the `DEVICE=HIMEM.SYS` line. Add the line `DEVICE=HPMM.SYS` *after* the `DEVICE=HIMEM.SYS` line.

---

6. **Remove EASY CONFIG diskette #2 from drive A.**

7. **Restart your computer by holding down** Ctrl **and** Alt **and pressing** Del
   HPMM is loaded automatically as soon as your CONFIG.SYS file is executed. It operates "behind the scene," providing expanded memory.

Refer to the "Optimizing Your Computer's Memory" section in Chapter 11 for more information about how HPMM works.

Customized Installation Method

1. **Copy HPMM to the directory where you plan to keep the HPMM files. With EASY CONFIG diskette #2 in drive A, enter**

   `COPY A:\HPMM.SYS C:\`*directory*

   where *directory* is the directory where you want your HPMM files.

2. **Change to the root directory.**

3. **At the MS-DOS prompt, enter the command**

   `TYPE CONFIG.SYS`

4. **When the CONFIG.SYS file is displayed, check to see if it contains the line**

   `DEVICE=HIMEM.SYS`

   If it does, delete this line. (Use a word processor or the MS-DOS line editor, EDLIN.)

5. **Add a customized HPMM command (including the path to your files) to your CONFIG.SYS file.** Refer to the "Customizing the HPMM Command" section below for HPMM command syntax.

   Note that if you wish to use the RELOCATE utility, you must specify the RELOCATE parameter in your HPMM command. Make sure the HPMM device driver is the first device driver in your CONFIG.SYS file.

Note

If you are using Windows 3.0 in 386 Enhanced Mode, do not delete the `DEVICE=HIMEM.SYS` line. Add the line `DEVICE=HPMM.SYS` *after* the `DEVICE=HIMEM.SYS` line.

---

6. **Remove EASY CONFIG diskette #2 from drive A.**

7. **Restart your computer by holding down Ctrl and Alt and pressing Del.**

Finding Out How Much Expanded Memory You Have

When you restart your computer you will see a message that tells how much total memory, base memory, reserved memory, and extended memory you have. (Total memory = base + reserved + extended.) Since HPMM has not been

loaded yet, this message does *not* include the amount of expanded memory you have.

A few seconds later, when CONFIG.SYS is executed and HPMM is loaded, you get a revised memory message, similar to the one shown below.

```
640K Base Memory
    576K Usable as Expanded Memory
  384K Reserved Memory
    224K Previously Allocated
    160K Converted to Expanded Memory
  15104K Extended Memory
    0K Previously Allocated
    6760K Converted to Expanded Memory
    152K Occupied by HPMM
    8192K Available
  6920K Expanded Memory Available
```

Message Displayed After HPMM Is Loaded

The values for base memory, reserved memory, and extended memory should be unchanged from the previous message. The other lines in the message are explained below.

- **Usable as Expanded Memory:** The amount of base memory under the control of HPMM.
- **Previously Allocated:** When referring to reserved memory, this is memory that cannot be used because other installed *boards* are using it. When referring to extended memory, this is the amount of extended memory being used by other *programs*.
- **Converted to Expanded Memory:** The amount of reserved memory under the control of HPMM.
- **Converted to Expanded Memory:** The amount of extended memory under the control of HPMM.
- **Occupied by HPMM:** The amount of extended memory used to store the HPMM.SYS file.

- **Available:** The amount of extended memory not being used by HPMM or other programs. (This amount equals the total extended memory minus previously allocated memory, memory converted to expanded memory, and memory occupied by HPMM.)
- **Expanded Memory Available:** The total amount of reserved memory and extended memory under the control of HPMM. (This amount equals the sum of the reserved memory converted to expanded memory plus the extended memory converted to expanded memory.) If you specified a *size* parameter in your CONFIG.SYS file, this amount also equals that value.

Note

The MS-DOS command CHKDSK only shows the amount of *base memory* you have (up to 640 KB). To find out the amount of expanded and extended memory you have, use the MS-DOS 4.0 MEM command.

Refer to the "Optimizing Your Computer's Memory" section in Chapter 11 for more information about how HPMM works.

Customizing the HPMM Command

If you want to modify the way HPMM functions, you must create a customized form of the HPMM command and place the command in your CONFIG.SYS file. Use the syntax and parameters described below to create a customized command.

Variables that you fill in appear in *italics*. Parameters that are optional appear in brackets [ ]. Do not enter the brackets.

```
DEVICE=[drive:][path]HPMM.SYS [size][state][FRAME=frame][W=ON|OFF]
[INCLUDE=xxxx-yyyy][EXCLUDE=zzzz-aaaa][EXT=ext][DMA=nnn][NOXRAM]
[AMRS=xx][NOHMA][HMAMIN=nn][RELOCATE=xxxx-yyyy]
```

Parameter	Description
drive:	is the drive on which HPMM is installed. The default is the active drive.
path	specifies the path from the root directory to the directory where HPMM is installed. The default is the current directory.
size	specifies, in kilobytes (KB), the amount of memory to convert into expanded memory. If you use the *size* parameter, do not use the EXT parameter, and vice versa. The size must be a multiple of 16 KB and can range from 16 KB to the total amount of memory available to HPMM. If you specify a size that is greater than the amount of memory available, all available memory is converted. Memory available to HPMM equals the sum of all extended memory not in use plus a portion of reserved memory (up to a maximum of 256 KB, depending on the boards you have installed), minus about 120 KB to store the HPMM.SYS file. We suggest that you specify a size only if you plan to install other programs (for example, RAMDRIVE) in extended memory after you install HPMM. In this case, to calculate the value for size, subtract the amount of extended memory you wish to leave for these programs from the amount of memory available to HPMM. The default is to convert all available memory to expanded memory.

state

specifies the ON or OFF state of expanded memory as soon as CONFIG.SYS is executed. (In all cases, HPMM is loaded, but depending on the state you select, it might or might not convert any memory into expanded memory.) Options for *state* are AUTO, ON, and OFF.

- AUTO makes expanded memory available *only* when it is requested by an application. This is the recommended value.
- ON makes expanded memory available as soon as MS-DOS has executed the CONFIG.SYS file. If a LIM Expanded Memory Specification application does not function properly with AUTO, use ON.
- OFF turns off expanded memory. Use OFF if you get an error message stating that your application is not compatible with expanded memory.

The default is AUTO.

`W=ON|OFF`

specifies whether support for the Weitek 4167 coprocessor is ON or OFF. The default is OFF.

If you enable the Weitek coprocessor, the state of HPMM is set to ON. Do not change the state of HPMM to OFF or AUTO, because the Weitek will not function properly.

If you have enabled the Weitek coprocessor and are no longer using it with applications that require a memory manager to access the floating point coprocessor, turn the Weitek support OFF.

Note

You will not be able to run Windows 3.0 in 386 Enhanced Mode if Weitek support is enabled. If you have enabled Weitek support, and you wish to run Windows 3.0 in 386 Enhanced Mode, disable the Weitek *prior* to running Windows 3.0.

FRAME=*frame*

specifies the beginning address (in hexadecimal notation) of the 64 KB primary page frame. The beginning address must be a multiple of 16 KB (or 4000 hex) and must fall between 768 and 896 KB (segment C000 and segment E000 hex). (This address is called the *page frame address*.) See the table below for possible page frame addresses you can enter.

We recommend that you *do not* specify a page frame address, but let HPMM choose the most appropriate value. If you find, however, that HPMM interferes with the operation of another I/O device (such as a network board, video board, or external disk drive board), you might want to specify a page frame address. From the following list, pick an address that is not being used by any of your boards; for example, D000. Then add the parameter (**FRAME=D000** for this example) to the HPMM command line in your CONFIG.SYS file.

Page frame addresses you can use:

C000	C400
C800	CC00
D000	D400
D800	DC00
E000	

The default is the most appropriate page frame address for you (selected by HPMM), depending on the boards installed in your computer.

`INCLUDE=`*xxxx-yyyy*
`EXCLUDE=`*zzzz-aaaa*

specifies (in hexadecimal notation) portions of address space between 0 KB and 1 MB to add (INCLUDE) or subtract (EXCLUDE) from the default addresses to which HPMM maps pages of expanded memory. (The default addresses are 0 to 640 KB, or 0 to A000 hex, as well as unused addresses between 640 KB and 1 MB.) Each address used with INCLUDE or EXCLUDE must be a multiple of 16 KB (4000 hex).

Note

The values that you can use for INCLUDE and EXCLUDE depend on the optional hardware installed in your computer. We recommend that you do *not* specify INCLUDE or EXCLUDE values unless you are familiar with how your optional hardware and LIM EMS 4.0 operate.

The default is to map expanded memory to addresses from 0 KB to 640 KB and to the unused addresses between 640 KB and 1 MB.

Example:
Suppose you want HPMM to map expanded memory to addresses from 640 to 704 KB (A000 to AFFF hex) and addresses from 800 to 832 KB (C800 to CFFF hex) in addition to default addresses from 0 to 640 KB. You would add the following parameters to the HPMM command in your CONFIG.SYS file:

```
INCLUDE=A000-AFFF INCLUDE=C800-CFFF
```

Example:
Suppose you have a large number of installed drivers and do *not* want HPMM to map memory to addresses from 256 to 384 KB (4000 to 5FFF hex). (You still want HPMM to map memory to addresses from 384 to 640 KB.) You would add this parameter to the HPMM command in your CONFIG.SYS file:

```
EXCLUDE=4000-5FFF
```

Note

If you have an HP A1083A Intelligent Graphics Controller 20 board or an HP ScanJet board installed, you must specify the board's address range using the EXCLUDE parameter. The address range for the Intelligent Graphics Controller board is C800–CC00. The address range for the HP ScanJet board is C000–DC00. Refer to the documentation that comes with your graphics board for more information.

`EXT=`*ext*

specifies, in kilobytes (KB), the amount of extended memory to leave as extended memory when HPMM is installed. The rest of available memory is converted to expanded memory. If you use the EXT parameter, do not use the *size* parameter, and vice versa. Use the EXT parameter when you want to install other programs (for example, RAMDRIVE) in extended memory after you install HPMM.

The default is to convert into expanded memory (1) all available memory except for the 64 KB that XMS uses, *or* (2) the amount of memory you specified for *size*.

Note

If you want to use HPMM with Windows 3.0, you must specify the amount of extended memory to leave for Windows using the EXT parameter. The amount you specify will depend on the memory that you have, but we recommend a minimum of 1 MB.

`DMA=`*nnn*	specifies the number of internal DMA (Direct Memory Access) buffers HPMM uses. Each DMA buffer is 1 KB in size. A possible value for *nnn* is any number between 8 and 128. When applications or drivers perform DMA, the data being transferred must first pass through buffers inside HPMM. The number of DMA buffers must be large enough to accommodate the largest DMA request made by your application. However, allocating unneeded DMA buffers increases the amount of memory used by the HPMM program, thus reducing the amount of expanded memory that can be provided to applications. In almost all cases, the default value provides sufficient DMA buffers. You may wish to increase the number of DMA buffers if you suspect that HPMM is interfering with the operation of a controller board (such as a tape drive or flexible disk drive controller board). You may wish to decrease the number of DMA buffers if you need a little more expanded memory and doing so does not interfere with the operation of other devices in your system. The default is 16 DMA buffers.
`NOXRAM`	prevents HPMM from recovering reserved memory. You may wish to use this parameter if you suspect that HPMM's recovery of reserved memory is interfering with the operation of a board. Using this parameter will result in less expanded memory being available for use by your applications. The default is to recover as much reserved memory as possible.

AMRS=*xx*	allocates Alternate Map Register Sets. These are useful to speed program switching under some environments, such as Windows. Each AMRS increases the memory used by HPMM by 4 KB. Possible *xx* values are 0–15, the default is zero.
NOHMA	disallows High Memory Area usage (63 KB above 1 MB).
HMAMIN=*nn*	requires that users of the High Memory Area request at least *nn* kilobytes of memory. The minimum value for *nn* is 0, the maximum is 64, and the default is 0.
RELOCATE=*xxxx-yyyy*	enables the use of the RELOCATE utility. *xxxx* and *yyyy* specify (in hexadecimal notation) portions of reserved memory between 640 KB and 1 MB to be used by RELOCATE. If you do not specify *xxxx* and *yyyy*, RELOCATE can use any unused portion of reserved memory. If you do not specify this parameter, you will get an error message when you attempt to use the RELOCATE utility.

Example HPMM Commands

Here are three examples of a customized HPMM command.

Example 1

```
DEVICE=HPMM.SYS EXT=256
```

In this example, all parameters have their default settings except for the EXT parameter.

This tells the computer:

1. Look for HPMM files in the root directory of the current drive and convert all of extended memory (except for the 256 KB specified) to expanded memory when requested by an application (the state is AUTO). Let HPMM choose the most appropriate page frame address (FRAME).
2. Reserve 256 KB of memory for other programs (like Windows 3.0) that require some extended memory.

Example 2

```
DEVICE=C:\UTIL\HPMM.SYS 8192 ON FRAME=C800 INCLUDE=B000-B7FF
```

This tells the computer:

1. Look on drive C in the UTIL directory for the HPMM files.
2. Convert 8192 KB (8 MB) of reserved memory plus extended memory into expanded memory (and leave the rest as extended memory).
3. Turn expanded memory ON when CONFIG.SYS is executed.
4. Set the page frame address to C800 (800 KB).
5. In addition to mapping expanded memory to the default addresses from 0 to 640 KB, let HPMM map memory to addresses from 704 to 768 KB (B000 to B7FF hex) and recover reserved memory (if your computer has reserved memory).

Example 3

```
DEVICE=HPMM.SYS EXCLUDE=C800-CBFF W=ON
```

1. Look for HPMM files in the root directory of the current drive and convert all extended memory to expanded memory.
2. Do not map memory into address C800-CC00 because this address is being used by another peripheral/accessory card in your computer.
3. Enable the Weitek 4167 coprocessor. (Enabling the Weitek coprocessor forces HPMM into the ON state.)

Installing RELOCATE

The RELOCATE utility allows you to relocate device drivers and terminate-and-stay-resident (TSR) programs from conventional memory to reserved memory. This frees conventional memory for application programs to use. This utility is optional; however, if you want to install it, you must install HPMM first.

RELOCATE will always relocate a device driver or TSR into the largest available block (not necessarily the first available block). Therefore, to optimize the performance of your computer, we recommend that you either:

- RELOCATE your largest device drivers and TSRs first, or
- use the BLOCK= parameter to relocate your device drivers and TSRs into specific blocks

Refer to the "Customizing the RELOCATE Command" section in this chapter for RELOCATE command syntax.

Note

RELOCATE does not work with Windows 3.0. Also, RELOCATE does not work with some device drivers and TSRs. If your computer does not respond, or you experience problems with a device driver or TSR after you attempt to relocate it, we recommend that you do not relocate that particular device driver or TSR.

1. **Make sure you have installed HPMM on your hard disk and the RELOCATE parameter is in the HPMM command of your CONFIG.SYS file.** To check your CONFIG.SYS file, enter the command

   ```
   TYPE CONFIG.SYS
   ```

   When the CONFIG.SYS file is displayed, make sure it contains the line

   ```
   DEVICE=HPMM.SYS RELOCATE
   ```

   If it does not contain the line shown above, you can add it now. Use a word processor or the MS-DOS line editor, EDLIN.

2. **Copy RELOCATE to the directory where you plan to keep the HPMM files.** With EASY CONFIG diskette #2 in drive A, enter

   `COPY A:\RELOCATE.* C:\`*directory*

   where *directory* is the directory where you want your HPMM files.

3. **Change to the root directory.**

4. **If you want to move a device driver to reserved memory, add the line**

   `DEVICE=RELOCATE.EXE` *driver* [*parameters*]

   to your CONFIG.SYS file. *driver* is the name of the device driver you want to relocate and [*parameters*] are any parameters associated with the driver.

   Refer to the "Customizing the RELOCATE Command" section below for RELOCATE command syntax.

5. **If you want to move a terminate-and-stay-resident (TSR) program to reserved memory, add the line**

   `RELOCATE` *tsr* [*parameters*]

   to your AUTOEXEC.BAT file. *tsr* is the name of the terminate-and-stay-resident program you want to relocate and [*parameters*] are any parameters associated with the TSR.

   Refer to the "Customizing the RELOCATE Command" section below for RELOCATE command syntax.

Note

You can also relocate TSRs by entering the RELOCATE command at the MS-DOS prompt. The TSRs will be relocated to reserved memory and stay there until you restart your computer. You cannot relocate device drivers by entering the RELOCATE command at the MS-DOS prompt; device drivers can only be relocated by including the RELOCATE command in the CONFIG.SYS file.

---

6. **Remove EASY CONFIG diskette #2 from drive A.**

7. **Restart your computer by holding down Ctrl and Alt and pressing Del.**

Customizing the RELOCATE Command

To modify the way RELOCATE functions, you must create a customized form of the RELOCATE command. If you are relocating a device driver, place the command in your CONFIG.SYS file. If you are relocating a TSR, place the command in your AUTOEXEC.BAT file. Use the syntax and parameters described below to create a customized command.

Variables that you fill in appear in *italics*. Parameters that are optional appear in brackets [ ]. Do not enter the brackets.

To relocate a device driver, use the following syntax to place this command in the CONFIG.SYS file:

DEVICE=[*drive:*][*path*]RELOCATE.EXE [QUIET] [BLOCK=*nn*]
[NOENVIRONMENT] [W=ON|OFF][*state*][*drive:*][*path*][*file*][*parameters*]

To relocate a terminate-and-stay-resident (TSR) program, use the following syntax to place this command in the AUTOEXEC.BAT file:

[*drive:*][*path*]RELOCATE [QUIET][BLOCK=*nn*] [NOENVIRONMENT]
[W=ON|OFF][*state*][*drive:*][*path*][*file*][*parameters*]

Parameter	Description
QUIET	causes the signon (copyright) message and any status display to be suppressed. Any errors generated are still displayed.
BLOCK=*nn*	specifies the reserved memory block number in which to load the file (device driver or TSR) specified. The default block number is the reserved memory block with the largest block of memory available. For a list of available reserved memory blocks, enter RELOCATE at the MS-DOS prompt.
NOENVIRONMENT	causes an empty environment to be used instead of the currently active environment. This saves memory for programs that do not require the environment variables.

W=ON|OFF

specifies whether support for the Weitek 4167 coprocessor is on or off. The default is OFF.

If you enable the Weitek coprocessor, the state of HPMM is set to ON. Do not change the state of HPMM to OFF or AUTO, because the Weitek will not function properly.

If you have enabled the Weitek coprocessor and are no longer using it with applications that require a memory manager to access the floating point coprocessor, turn the Weitek support OFF.

Note

You will not be able to run Windows 3.0 in 386 Enhanced Mode if Weitek support is enabled. If you have enabled Weitek support, and you wish to run Windows 3.0 in 386 Enhanced Mode, disable the Weitek *prior* to running Windows 3.0.

---

state

specifies the ON or OFF state of expanded memory as soon as CONFIG.SYS is executed. (In all cases, HPMM is loaded; however, depending on the state you select, it might or might not convert any memory into expanded memory.) Options for *state* are AUTO, ON, and OFF.

- AUTO makes expanded memory available *only* when it is requested by an application. This is the recommended value.
- ON makes expanded memory available as soon as MS-DOS has executed the CONFIG.SYS file. If a LIM EMS application does not function properly with AUTO, use ON.
- OFF turns off expanded memory. Use OFF if you get an error message stating that your application is not compatible with expanded memory.

The default is AUTO.

drive:	specifies the drive on which the device driver or TSR is installed. The default is the active drive.
path	specifies the path from the root directory to the directory where the device driver or TSR is installed. The default is the current directory.
file	specifies the device driver or TSR to be relocated.
parameters	specifies any parameters associated with the device driver or TSR.

Example RELOCATE Commands

Here are three examples of a RELOCATE command that you might put in your CONFIG.SYS or AUTOEXEC.BAT file, or use at the MS-DOS prompt.

Example 1 (in CONFIG.SYS file)

```
DEVICE=HPMM.SYS RELOCATE
DEVICE=RELOCATE.EXE MOUSE.SYS
```

This tells the computer:

1. Look for HPMM files in the root directory of the current drive and convert all of extended memory to expanded memory. Allow relocation of TSRs and device drivers. Note that RELOCATE forces HPMM into the ON state. Let HPMM choose the most appropriate page frame address (FRAME).
2. Relocate the mouse driver (MOUSE.SYS) from conventional memory to reserved memory. There are no parameters associated with the mouse driver.

Example 2 (in AUTOEXEC.BAT file)

```
RELOCATE BLOCK=0 C:\UTIL\HPDCACHE /S:1024 /A+
```

This tells the computer to relocate the HPDCACHE TSR from conventional memory to block 0 of reserved memory. The HPDCACHE TSR is located on drive C in a directory called UTIL and it has two parameters associated with it.

Example 3 (at MS-DOS prompt)

```
C:>RELOCATE
```

This tells the computer to list the current status of the Weitek 4167 coprocessor and HPMM, the available blocks of reserved and system memory, and the size of each block. You will see a message similar to the one shown below.

```
Weitek FPA is : OFF
HPMM is       : ON

Address    Block     Bytes Used   Type    Path\Program
  0EE0       S           3392     Code    Used by DOS
  0FB4       S             64     Env     Free memory
  0FB8       S            528     Env     Used by DOS
  0FD9       S         590448     Code    Free memory
  C800       0             64     Env     RESIDENT.COM
  C804       0          47258     Code    RESIDENT.COM
  D6DA       0          50982     Data    Free memory
```

RELOCATE Message

Replacing Your Keys

If you lose the keys to your security locks, replace them as follows:

1. **Make sure that you have the serial number for your keys.** (You recorded the number in the "Security Lock Key Serial Number" section of Chapter 1.)
2. **Send a request for replacement keys (including the key serial number) and a check for $7.00 (U.S. funds) to:**

   Jin Tay Industries Co., Ltd.
   P.O. Box 11310 Taipei, Taiwan, R.O.C.
   Attention: Key Replacement
   Telephone Taiwan 886-2-903-9350
   Facsimile Taiwan 886-2-902-3039

It takes approximately three to four weeks to receive the replacement keys.

Setting the Power-On Password

The power-on password is a unique password that you can set when you run EASY CONFIG. To set your power-on password,

1. **Insert EASY CONFIG diskette #1 in drive A and then turn on your computer.**
2. **Select `Access other system utilities` on the Main Menu.**
3. **Select `Set power-on password` on the System Utilities menu.**
4. **Follow the instructions on your screen to set the password.**

Once you have set your power-on password, you will be prompted with a key symbol to enter the password every time you turn on the computer. For security reasons, the characters you type will not appear on the screen. If you enter the password incorrectly, you have two more chances to enter the correct password. After three unsuccessful tries, you must turn off your computer and then turn it on again before you can try to enter your password correctly.

Note

The power-on password is *not* case sensitive. However, you must use the same keys to enter your password every time. For example, the number 2 at the top of the keyboard is not considered the same as the number 2 on the numeric keypad.

Changing the Power-On Password

To change your current power-on password:

1. **Start your computer.**
2. **Enter**

   oldpassword/newpassword

   at the key symbol, where *oldpassword* is your current password and *newpassword* is the new password you want to use. If you are using a non-U.S. keyboard, use the slash (/) on the numeric keypad.
3. **Restart your computer to put the new password into effect.**

Deleting the Power-On Password

To delete your power-on password, enter:

yourpassword/

at the key symbol. *yourpassword* is the current password you are using. If you are using a non-U.S. keyboard, use the slash (/) on the numeric keypad.

Note

Deleting the power-on password also disables network server mode.

Disabling the Power-On Password Feature

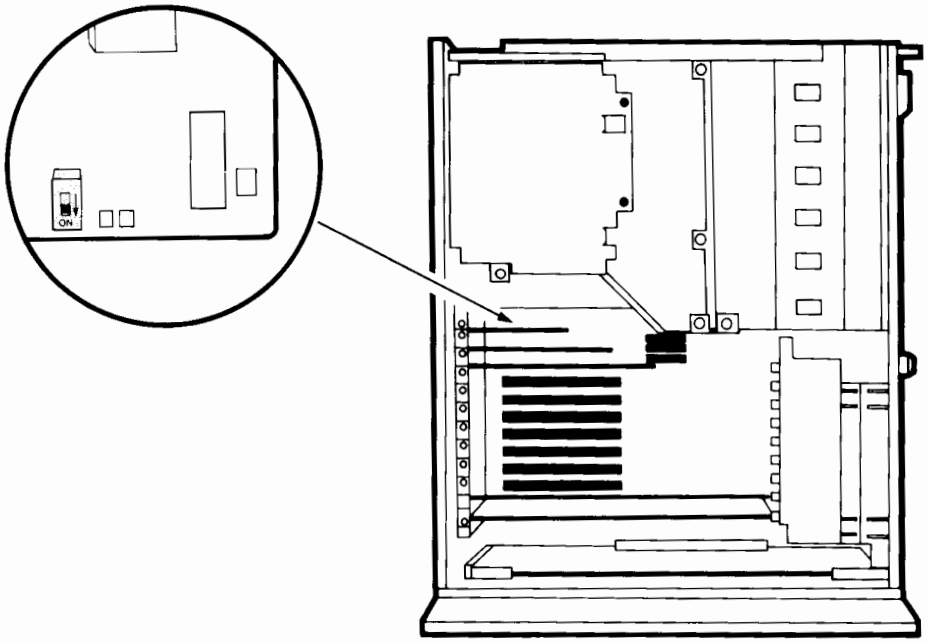
You may disable the power-on password feature (for example, if you forget your password) by clearing the password from the computer's memory. This is accomplished by setting a switch on the mouse/keyboard/serial port board to disable the power-on password feature.

1. **Turn off your computer and display, and disconnect all cables and power cords.**
2. **Make sure your cover lock is in the unlocked position.**
3. **Remove the cover and metal plate.** (Refer to Chapter 2.)
4. **Locate the mouse/keyboard/serial port board.** (Refer to the "Inside View of Computer" in Chapter 1.)

5. **Set the switch to ON as illustrated below.** This disables the password.

Note

Do *not* use a lead pencil to slide the switch. If the pencil lead gets in the switch, it can cause a short circuit.



10

Locking Your Computer and Setting Passwords

About Security Locks and the Power-On Password

Your computer comes with security locks that prevent unauthorized use and secure your computer's internal components from theft.

You also have the option of setting a power-on password. The power-on password prevents unauthorized users from gaining access to data on your hard disk. It also prevents unauthorized users from using the computer while it is running as an unattended file server (called *network server mode*).

Note

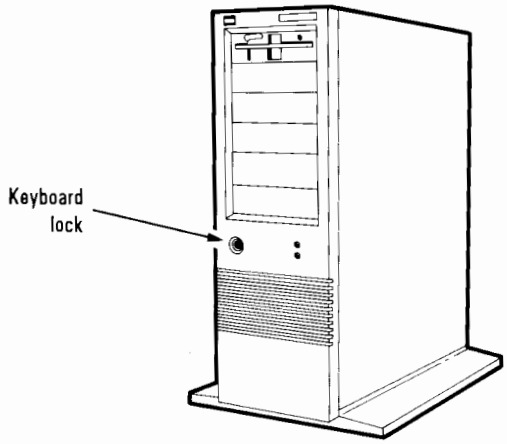
Your security locks come with a set of keys. It is extremely important that you record the serial number of your keys in the "Security Lock Key Serial Number" section in Chapter 1. If you lose your keys, *you will not be able to order replacement keys for your locks unless you have this serial number.* Refer to the section "Replacing Your Keys" later in this chapter for information about ordering replacement keys.

Using the Security Locks

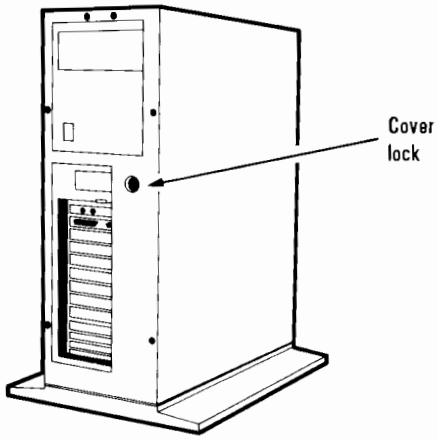
Your security locks are located on the front and back of your computer. When the keyboard lock (in front) is locked, no one may enter data using the keyboard or the mouse. When the cover lock (in back) is locked, no one may remove the cover. To enter data or to access the computer's internal components, simply unlock the appropriate lock with your key. (The same key fits both locks.)

Note

Your computer will not start when the keyboard is locked *unless* the computer is running in network server mode. (Refer to the section "Using Network Server Mode" later in this chapter for more information.)



Front of Computer



Back of Computer

6. **Replace the cover and metal plate.** (Refer to Chapter 2.)
7. **Connect all cables and power cords.**
8. **Relock your security lock, if necessary.**
9. **Start your computer.** You must start your computer after setting the password switch to "wipe out" the old password from nonvolatile memory (CMOS).

To enable the power-on password feature again, turn the machine off and set the switch on the mouse/keyboard/serial port board to OFF. Then use EASY CONFIG to set the new power-on password.

Using Network Server Mode

When you run EASY CONFIG, you have the option of setting network server mode. Using the power-on password, network server mode prevents unauthorized users from using the keyboard while the computer is functioning as an unattended file server. Even if there is a power failure, network server mode allows the computer to restart normally, but ensures that the keyboard remains locked. When network server mode is turned on, you must enter the power-on password to enable the keyboard.

To turn on or turn off network server mode:

1. **Insert EASY CONFIG diskette #1 in drive A and then turn on your computer.**
2. **Select `Access other system utilities` on the Main Menu.**
3. **Set a power-on password if you have not already done so.**
   (You must set a power-on password *before* you can use network server mode.)
4. **Select `Set network server mode` on the System Utilities menu.**
5. **Select `Enable` or `Disable` network server mode. Then select `OK`.**
6. **Select `Return to the last menu`.**
7. **Select `Exit from this utility` from the Main Menu.**

Note

If you enter the power-on password when network server mode is turned on, the only way you can *relock* your keyboard is with the mechanical lock on the front of your computer.

11

Optimizing Your Computer's Performance

Performance is very application- and workload-dependent. However, there are some areas where you can improve the performance of your HP Vectra PC by "fine tuning:"

- your computer's processing speed
- your mass storage capacity
- your operating system
- your video system
- your computer's memory

This chapter provides some guidelines you can follow to maximize performance.

Optimizing Your Computer's Processing Speed

The HP Vectra 486/25T PC can run at any speed between 5 and 25 MHz, and the HP Vectra 486/33T PC can run at any speed between 5 and 33 MHz.

Your computer is preset to run at its highest speed. In general, you should leave it set at its highest speed. However, some speed-sensitive applications require a slower speed to start or run properly.

Note that when you set your computer to run at a speed less than 9 MHz or to automatic speed switching, you can read data on a diskette. However, you *cannot* format or write data to a diskette.

If MS-DOS is your operating system:

You can use EXMODE, an HP Utility, to change the processing speed of your computer in the following ways:

- Change the processing speed for speed-sensitive applications by running the application from a batch file. The batch file should include: the EXMODE command to switch your computer to a lower speed, the command to start your application, and the EXMODE command to switch back to the original speed on exiting the application.

  For example, running Lotus 123 from the following batch file switches your computer to 8 MHZ, starts Lotus 1-2-3, then switches back to 25 MHz on exiting the application:

  ```
  EXMODE SPEED 8
  123.EXE
  EXMODE SPEED 25
  ```

- Change the processing speed from the MS-DOS prompt. For example, the following command switches the speed to 8 MHz:

  ```
  EXMODE SPEED 8
  ```

  The new speed remains in effect until you restart your computer or enter another EXMODE command.

- Change the processing speed permanently by adding the EXMODE command to your AUTOEXEC.BAT file. The speed specified in the command remains in effect until you change it to another speed.

- Use the *automatic* speed switching option to switch your computer's speed between high speed (25 MHz for the HP Vectra 486/25T PC, 33 MHz for the HP Vectra 486/33T PC) and low speed (8 MHz). When the computer is reading from the flexible disk drive, it switches to 8 MHz. Then, when the flexible disk drive motor shuts off, the computer automatically switches back to the high speed.

Refer to the "Installing EXMODE" section of Chapter 9 for more information about EXMODE syntax.

If your operating system is not MS-DOS:

Use EASY CONFIG to change the processing speed. The new speed remains in effect until you change it again using the EASY CONFIG program.

a. Insert EASY CONFIG diskette #1 in drive A and then turn on your computer.
b. Select **Configure computer** from the Main Menu.
c. Select **Configure computer - advanced method** from the Configure Computer menu. The System Configuration Overview is displayed.
d. Select **Detailed by Slot** on the View pull-down menu.
e. Your current processing speed is displayed under System Board Options on the system board for your computer.
f. If you do not have to change the processing speed, select **Exit** on the System pull-down menu. Then select **Exit** to quit EASY CONFIG.
g. If you need to change the processing speed, press Esc to go back to **Detailed by Slot** on the View pull-down menu. Move the cursor to **Power-on Speed** on the system board for your computer.
h. Use the arrow keys to select a new speed. Possible values are HIGH (25 MHz for the HP Vectra 486/25T PC or 33 MHz for the HP Vectra 486/33T PC), and AUTO (for the automatic speed switching mode). Press Enter when you have finished.
i. Select **Exit** on the System pull-down menu.
j. Select **Save configuration and exit** to save your changes and quit EASY CONFIG.

Optimizing Your Mass Storage Capacity

- Use a file defragmenting utility (such as Norton Utilities or PC Tools) to recover lost disk space caused by fragmented files. Fragmented files can result in lower performance.

Caution

Do *not* run a defragmenting utility when you are using memory resident programs such as the HP Vectra Disk Cache utility. The defragmenting utility moves data around and it can cause problems when the disk cache looks for information that has been moved to a new location.

- Use a disk optimization utility (such as Norton Utilities) to place frequently used files in close physical proximity to each other. This reduces the frequency with which the drive head needs to search the disk in order to find your files.
- Turn off hard disk drive splitting if you use the UNIX operating system *and* your computer has a 670 MB ESDI hard disk drive. Models with 670 MB ESDI hard disk drives come with hard disk drive splitting automatically turned on. This is because operating systems such as Microsoft Operating System/2 and MS-DOS cannot access more than 530 MB of any logical hard disk drive. The UNIX operating systems, on the other hand, can access all 670 MB of the hard disk drive. Therefore it does not require the drive splitting feature.

  Although there is no perceptible performance benefit in disabling hard disk drive splitting, you may find the arrangement more convenient. (Instead of having two virtual hard disk drives of 530 MB and 140 MB each, you will have only one 670 MB hard disk drive.)

  Use EASY CONFIG to disable hard disk drive splitting. Refer to the "Enabling and Disabling Hard Disk Drive Splitting" section in Chapter 8.

Optimizing MS-DOS

Using the HP Memory Manager (HPMM) and RELOCATE Utilities

HPMM (formerly HPEMM/486) increases the amount of memory available for MS-DOS applications. It converts portions of base, reserved, and extended memory into expanded memory, which most MS-DOS applications can access.

RELOCATE relocates device drivers and terminate-and-stay- resident (TSR) programs from conventional to reserved memory. You use RELOCATE in conjunction with HPMM.

Refer to the "Optimizing Your Computer's Memory" in this chapter for information about using HPMM and RELOCATE.

Using the HP Vectra Disk Cache Program (HPDCACHE)

What is Disk Caching?

Disk caching is based on the idea that once you access a certain piece of information, you will probably want to access it again in the near future. For example, suppose you are looking up a phone number in the yellow pages. You know that you will need to use the number again later. You have two options: either use a bookmark to remind you of the exact location of the phone number or copy the information to a location that you can gain access to more easily (such as a memo pad).

Disk caching works in a similar manner—it copies frequently used information (or a pointer to the location of that information—the "bookmark") to a temporary storage area in RAM. MS-DOS can read and write information in RAM much more quickly than it can on a hard disk or diskette.

If you use applications that read the disks frequently, (databases, for example) you will experience a dramatic improvement in performance with disk cache. If you use applications that do not read the disks frequently, like spreadsheets and word processors, you will still notice that your application programs load more quickly than without disk cache.

Tips for Using HPDCACHE

The HP Vectra Disk Cache program (HPDCACHE) comes with your MS-DOS diskettes.

- Install HPDCACHE *after* you have installed HP Memory Manager (HPMM).

  Refer to your *MS-DOS User's Reference* for information about installing and using HPDCACHE.

- Install the disk cache in either expanded or extended memory. (You created expanded memory when you installed HPMM.) Depending on the application you are using, you may notice a very small improvement in performance when HPDCACHE is installed in *expanded* memory rather than extended memory.

  If you are using a non-HP disk cache utility, follow the manufacturer's instructions.

- Make your HPDCACHE disk cache size between 256KB and 1024 KB. Generally, a larger disk cache gives you greater performance. Be aware, however, that there may be a performance tradeoff with some of your applications. Disk caching uses the same memory that your applications may need. Experiment to find the optimum disk cache size for your particular applications.

- Set the number of MS-DOS buffers to 4 to allow you the greatest amount of conventional memory *and* peak performance with HPDCACHE. (Do this by editing the BUFFERS= line in your CONFIG.SYS file.) HPDCACHE performs a similar function to the MS-DOS buffers, but is more efficient. Therefore, the general rule is: If HPDCACHE is *not* installed, you should *increase* the number of MS-DOS buffers; if HPDCACHE *is* installed, you should *decrease* the number of MS-DOS buffers. Restart your computer in order for the new buffer value to take effect.

Using the FASTOPEN Command

If you are *not* using HPDCACHE, issue the MS-DOS FASTOPEN command. FASTOPEN loads a terminate-and-stay-resident (TSR) program that stores the locations of the directories and files you have recently accessed in a cache. When MS-DOS needs a file, it looks in the FASTOPEN cache first. If the

needed file is not there, MS-DOS will then search through the path specified in the PATH statement of your AUTOEXEC.BAT file.

Refer to your *MS-DOS User's Reference* for more information about FASTOPEN.

Caution

Do *not* use a disk defragmenting utility while FASTOPEN is in use–you may destroy your data. FASTOPEN does not know that the defragmenting utility has moved your files and will look for them in their original location.

Optimizing Microsoft Operating System/2 (OS/2)

- Increase RAM by adding memory modules to your memory board. OS/2 performs **memory swapping**, a way of moving less frequently accessed information from RAM into a disk storage area. This process frees RAM for more frequently used information. Additional RAM lessens the number of times this memory swap must happen since it allows the computer more space to store the pieces of information.

  Computers that support more than one user (such as network servers) will experience increasing benefits from additional RAM as the number of users on the system increases. While users of any application will probably benefit from additional RAM, users of graphics applications (such as CAD packages) and calculation-intensive applications (such as spreadsheets) will generally reap the greatest benefits.

  Refer to Chapter 5, "Upgrading Memory," for information about what types of memory modules you can add to your computer to increase your RAM.

- Experiment with the following OS/2 configuration commands that help your computer manage memory efficiently.

  diskcache enables disk caching and specifies the disk cache size.

  memman specifies whether memory swapping and moving is permitted.

  swappath specifies the location of the disk-swap file and the minimum free space in kilobytes.

buffers specifies the number of disk buffers in memory.

For information about how to use these commands, refer to the *Microsoft Operating System/2 User's Guide*.

- Use the **maxwait** command to specify the maximum amount of time an active process must wait before being run. In a multitasking environment, each process that runs is assigned a priority level, which determines how often a process can run. If a process has a high priority, it will be granted permission to run more often than a process with a low priority.

  For information on how to use the **maxwait** command, refer to the manual that came with your Microsoft Operating System/2.

- If you do not plan to run MS-DOS applications, set **protectonly=yes** in your CONFIG.SYS file. The **protectonly** configuration command controls the DOS session. This will result in more memory being available for protected mode applications.

  For information on the **protectonly** command, refer to the *Microsoft Operating System/2 User's Manual*.

Optimizing the UNIX Operating Systems

- Increase RAM by adding memory modules to your memory board. The UNIX operating systems perform *memory swapping*, a way of moving a less frequently accessed information from RAM into a disk storage area. This process frees RAM for more frequently used information. Additional RAM lessens the number of times this memory swap must happen since it allows the computer more space to store the information.

  Computers that support more than one user (such as network servers) will experience increasing benefits from additional RAM as the number of users on the system increases. While users of any application will probably benefit from additional RAM, users of graphics applications (such as CAD packages) and calculation-intensive applications (such as spreadsheets) will generally reap the greatest benefits.

Refer to Chapter 5, "Upgrading Memory," for information about what types of memory modules you can add to your computer to increase your RAM.

- If you have added memory to your computer, or if you are getting persistent error messages, experiment with redefining (or tuning) the resource parameters. The commonly-tuned parameters are described briefly below. For information on how to set the parameters, refer to the manual that came with your UNIX operating system.

NPROC	specifies how many active processes can be running simultaneously.
MAXUP	specifies how many processes a non-superuser can run simultaneously. The processes are identified by the user identification number.
NINODE	specifies how many active inodes can be open on your computer.
NFILE	specifies how many active files can be open simultaneously.
NBUF	specifies the disk buffer cache size. For example, setting NBUF to 1024 would give you a 1 MB disk buffer cache. Note that once memory has been assigned to a disk buffer cache, it is not available for general use. Since the disk buffer cache also uses RAM, you will need to balance its size against the amount of RAM needed to reduce memory swapping. When you increase this setting, you should also increase the NHBUF setting.
NHBUF	specifies how many hash buckets are allocated to the disk buffer.
NCALL	specifies how many entries will be in the callout table.

Optimizing Your Video

- Install and use the utilities that came with your video board. These video utilities provide additional functionality. For more information on the video utilities, refer to the manual that came with your video board.
- Install and use the drivers that came with your video board. The video drivers allow you to use enhanced display modes with some applications.
- Run EASY CONFIG to determine if you need to change your video board switches. Refer to the "Displaying and Printing the Switch and Jumper Settings of Boards Installed in Your Computer" section in Chapter 8.
- Shadow your video BIOS by copying it to your computer's RAM, or reserved memory. This creates a "shadow image" in RAM of your video BIOS ROMs. After the video BIOS is copied, the BIOS ROMs on the video board are turned off. Then when your computer executes a video function, it executes the function from your computer's RAM instead of from the BIOS ROMs on the video board.

  When stored in RAM, your video BIOS can run at maximum processing speed instead of the slower speed used by your video board because:

  - Your computer can gain access to RAM faster than it can gain access to BIOS ROMs on the video board. (Also, RAM may be cached, while ROM may not.)
  - When stored in RAM, the shadow image of your video BIOS can be executed from a 32-bit bus rather than the 8- or 16-bit bus of your video card. (The wider the bus, the more information that can be transported.)

  Run EASY CONFIG to shadow your video BIOS. Refer to "Using RAM to Shadow Your Video BIOS ROMs" in the "Memory" section of Chapter 8.

Note

Not all video boards can be shadowed. If you have a problem with an application after shadowing the BIOS, change to your previous address setting.

Optimizing Your Computer's Memory

Upgrading Your Memory Board

Increase the amount of RAM available to your computer by adding memory modules to the memory board. (Refer to Chapter 5, "Upgrading Memory," for information about adding memory modules.) This increased memory allows MS-DOS users to assign a larger amount of memory to disk caching which results in higher performance. Increased memory allows UNIX operating systems and Microsoft Operating System/2 users to multitask large, protected-mode applications. PC-CAD users will also experience increased performance with additional RAM if they are running applications that use RAM.

Using the HP Memory Manager (HPMM) and RELOCATE Utilities

HP Memory Manager (HPMM) (formerly HPEMM/486) and RELOCATE are HP Utilities that will help you optimize your computer's memory.

Note

HPMM and RELOCATE are for MS-DOS users with 80386- and 80486-based computers only.

HPMM is a utility that allows you to use larger programs and data files, and facilitates multitasking. It does this by swapping blocks of base, reserved, and extended memory and converting them into expanded memory, which some MS-DOS applications can use.

HPMM offers these important features:

- support for the Lotus Intel Microsoft Expanded Memory Specification (LIM 4.0)
- support for the eXtended Memory Specification (XMS)
- support for the Weitek 4167 coprocessor (HP Vectra 486/33T PC only)
- support for Microsoft Windows 3.0 (you cannot use HPMM with a Windows/386 version prior to 3.0)

- Virtual Control Program Interface specification (VCPI), which supports such applications as AutoCAD, ME10/DOS, Paradox386 (a product of Borland International, Inc.), FoxBase+386 (a product of Fox Software), and Lotus 1-2-3 version 3.0 (a product of Lotus Development Corporation)
- Virtual DMA Services specification (VDS), which supports bus-master boards and DMA device drivers in virtual mode

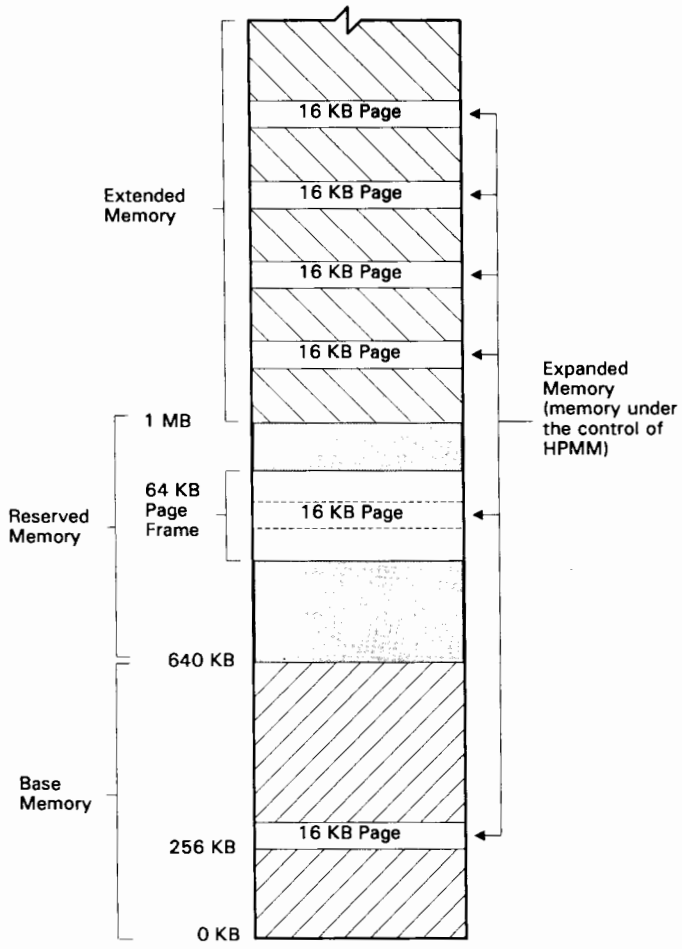
RELOCATE works in conjunction with HPMM to relocate device drivers and terminate-and-stay-resident (TSR) programs from conventional memory to reserved memory. This frees conventional memory for application programs to use.

You can relocate device drivers permanently to reserved memory by including a RELOCATE command in your CONFIG.SYS file. You can relocate TSRs permanently to reserved memory by including a RELOCATE command in your AUTOEXEC.BAT file. Or you can relocate TSRs temporarily by entering the RELOCATE command at the MS-DOS prompt.

For information about installing and customizing HPMM and RELOCATE, refer to Chapter 9, "Installing the HP Utilities."

How HP Memory Manager (HPMM) Works

Your computer can support up to 64 MB of memory. The first 1 MB of memory is called standard, or ordinary memory. Memory above 1 MB is called extended memory.



The first 1 MB of memory is divided into 640 KB of *base* (or conventional) memory, and 384 KB of *reserved* memory. Applications use the first 640 KB of memory. The memory between 640 KB and 1 MB is usually reserved for video, BIOS, I/O boards, ROM, and some peripherals.

Applications written for MS-DOS usually reside in base memory. However, if reserved memory can be freed for program code and data, large applications (such as spreadsheets), CAD, and network drivers will execute faster.

HP Memory Manager solves this problem by storing program code and data in 16 KB *pages* in *extended memory* above 1 MB. When an application needs to use the code or data, HPMM brings it into the memory below 1 MB so that the application can access it. The block that has been brought into the memory below 1 MB is called *expanded memory*.

When the application needs to access another piece of code or data, HPMM swaps the block in expanded memory with the block that it needs from extended memory. Swapping is done continually as pages in extended memory are needed by the application. All of this swapping takes place "behind the scenes," at your computer's normal speed.

To use HPMM, applications must be written to the Lotus-Intel-Microsoft Expanded Memory Specification 4.0 (LIM EMS). LIM EMS is an industry- standard specification which was developed to standardize the way expanded memory is used.

You can customize HPMM to optimize performance for certain applications. Refer to the "Installing HPMM Using the Customized Installation Method" section in Chapter 9 for more information.

Getting Additional Information about Your Computer

The HP PC Forum on the CompuServe Information Service is an easy way to obtain up-to-date information and answers to your questions about HP personal computers. The HP PC Forum is an online bulletin board messaging system maintained jointly by Hewlett-Packard and HP PC users. HP system operators answer questions and maintain libraries which contain contributed articles and software. Conferences are scheduled periodically for online discussions of selected topics.

The HP PC Forum is available through the CompuServe Information Service, the largest electronic information service in the world. To access the HP PC Forum, you must have an account with CompuServe and a PC with a 1200 or 2400 baud modem. As a preferred Hewlett-Packard customer, you are invited to join the HP PC Forum on CompuServe at no charge. In the United States, simply call toll-free 1-800-848-8199 (614-457-0802 if outside U.S. and Canada) and ask for Representative #133. In the United Kingdom, call toll-free 0800 289 458. In Switzerland and all other European countries, call (41) (031) 509 800.

CompuServe will send you a free introductory membership immediately.

12

Cleaning Your Computer and Changing the Battery Pack

Your computer is designed for years of trouble-free operation. The only maintenance required is cleaning the cover periodically and replacing the battery pack every three to five years.

Cleaning Your Computer

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 cover closed. Occasionally, you may want to wipe dust and fingerprints off the cover 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 cord 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 on.
- Do not attempt to clean diskettes.

Changing the Battery Pack

The battery pack in your computer maintains the correct date and time when your computer is turned off. It also preserves the system configuration settings in non-volatile memory (CMOS).

How to Tell When the Battery Pack Should Be Replaced

There are several indicators that your battery pack is worn out:

- When you start your computer, the error code 0240 appears.
- When you start your computer, the error codes 0280 or 0282 appear. While these codes may indicate that your battery needs replacement, they may also indicate corrupted data in your CMOS memory (the memory that holds your configuration information). Run EASY CONFIG to reestablish your configuration. Refer to the "Restoring Your Computer's Configuration " section in Chapter 8. If you continue to see the 0280 or 0282 error code the next time you turn on your computer, replace your battery.
- This message appears when you turn on the computer:

  ```
  Invalid configuration information--Run EASY CONFIG
  ```

  Note that this message may also appear if you have added memory modules or disk drives to your computer but have not yet run EASY CONFIG. If you have added options to your computer, run EASY CONFIG to add the options to the configuration and then restart your computer. If you still see the invalid configuration message, verify that the battery pack needs replacement by restarting your computer and looking for the error codes listed above.

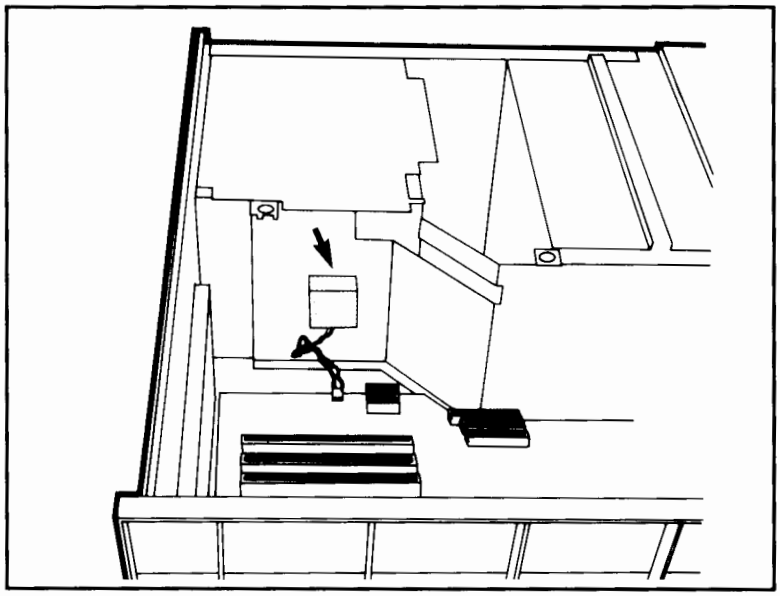
As soon as the battery pack wears out, replace the battery pack and run the EASY CONFIG program to reestablish your system configuration settings.

Warning

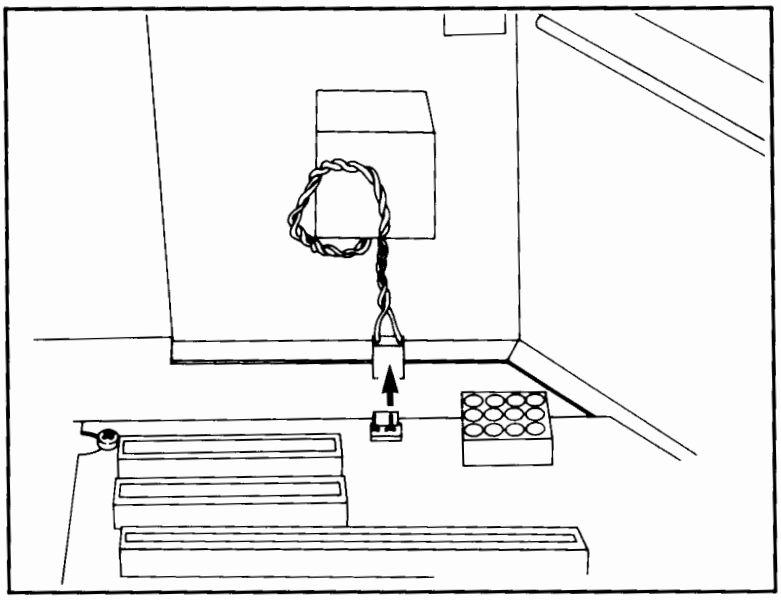
Your computer uses lithium batteries which may explode if mishandled. DO NOT recharge or disassemble them and DO NOT dispose of them by burning. Use ONLY lithium batteries (available from your HP sales representative); use of any other batteries risks explosion or fire.

Replacing the Battery Pack

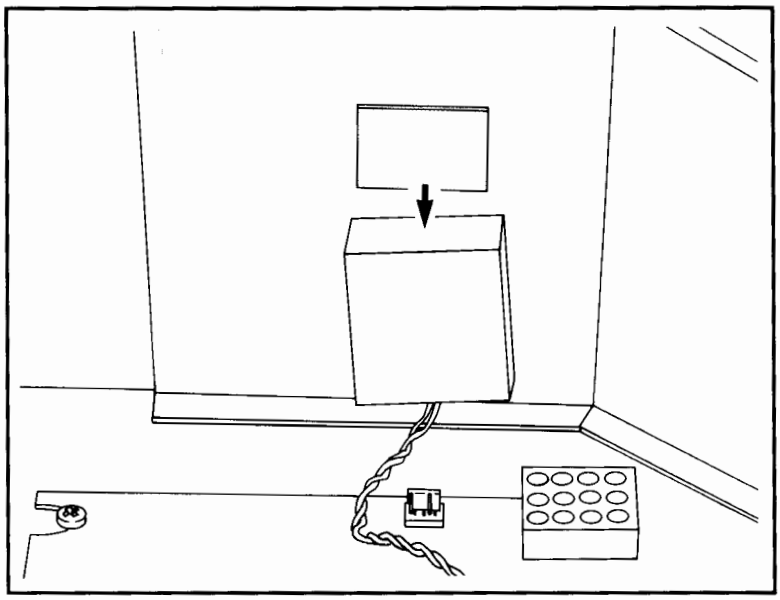
1. Turn off the computer and display. Disconnect all cables and power cords.
2. Remove the cover and metal plate. (Refer to Chapter 2.)
3. Locate the battery pack on the side of the power supply.



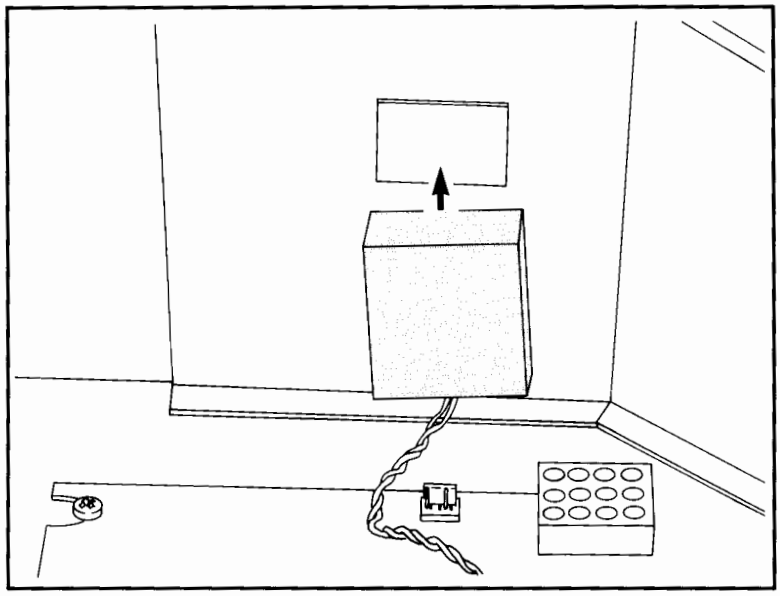
4. **Holding the connector (not the wires), pull up firmly to disconnect the battery connector from its socket.**



5. **Pull the battery pack from its Velcro strip.**



6. **Attach the new battery pack to the Velcro strip.**



7. **Reconnect the battery connector to the socket.**
8. **Replace the metal plate and cover.** (Refer to Chapter 2.)
9. **Reestablish your system configuration by running EASY CONFIG.** (Refer to the "Reverting to a Previously Saved Configuration" section in Chapter 8.)

13

Troubleshooting and Error Messages

If the computer does not work and no error message is displayed:

1. **Make sure that all cables and power cords are firmly plugged into their proper receptacles.**
2. **If the computer is plugged into a switched multiple-outlet box, make sure the switch on the outlet box is turned on.**
3. **Check that the computer and display are turned on.**
4. **Try adjusting the contrast and brightness controls of the display.**
5. **Make sure the AC outlet is working.** Plug a different electrical device (such as a printer) into the outlet and turn it on.
6. **Restart your computer.** Hold down Ctrl and Alt and press Del. If this does not restart your computer, turn the power off, wait a few seconds, and then turn it on.
7. **Check that all boards are installed properly. They should be firmly seated in their slots.**
8. **If your computer stopped working after you installed a new board, remove the board and restart the computer.** If your computer now works, run EASY CONFIG to get advice on how to set the jumpers and switches on the board.
   a. Insert your EASY CONFIG diskette #1 in drive A and then turn on your computer.
   b. Select `Configure computer` from the Main Menu.
   c. Select `Configure computer - advanced method` from the Configure Computer menu.

d. If you want to see information about a particular board, highlight that board when the System Configuration Overview is displayed. Otherwise, skip to the next step.
e. Select **Switch & jumper settings ...** from the View menu.
f. Select whether you want to see settings for the currently selected board, for all boards, or only for changed boards, and press Enter.
g. Scroll through the displayed information and select **<OK>** when you have finished.
h. Record any switch or jumper settings on your boards and options that you need to change
i. Select **Exit** from the System pull-down menu and then select **Exit** again to quit EASY CONFIG without saving any changes.

9. **If your computer still does not work, remove any boards and options that you have installed.** (Do not remove the video, mouse/keyboard/serial port, parallel/serial port or memory boards, or flexible and hard disk drives.) Start your computer. If your computer now works, run EASY CONFIG to get advice on how to set jumpers and switches on the boards. Follow the EASY CONFIG steps in step 8. Then add the boards and options one at a time to determine which one is causing the problem.

If the computer works, but your application does not run properly:

You may need to change the processing speed

Determine the speed at which your application must operate by referring to your application's manual. If necessary, change it, following the instructions below.

If MS-DOS is your operating system:

1. **To determine the speed at which your computer is running, enter the following at the MS-DOS prompt:**

   [*drive:*] [*path*] EXMODE SPEED

2. **Change the processing speed, if necessary, by entering the following at the MS-DOS prompt:**

   [*drive:*] [*path*] `EXMODE SPEED` [*number*]

   drive: is the drive that contains EXMODE.

   path is the path to EXMODE.

   number is the processing speed in MHz *or* the automatic speed switching parameter "AUTO", *or* the word "HIGH" or "LOW". Possible values for *number* are: any number between 1 and 25 for the HP Vectra 486/25T PC or any number between 1 and 33 for the HP Vectra 486/33T PC, the word "AUTO" to turn on automatic speed switching mode, or the word "HIGH" for your computer's highest speed, or "LOW" for its low speed.

   For example, if you want your computer to run at 8 MHz speed, you would enter

   ```
   EXMODE SPEED 8
   ```

   at the MS-DOS prompt.

   You can change the processing speed *permanently* by adding the EXMODE command to your AUTOEXEC.BAT file.

   You can change the processing speed *only for speed-sensitive applications* by running the application from a batch file. Include in the batch file: the EXMODE command to switch your computer to a lower speed, the command to start your application, and the EXMODE command to switch back to the original speed on exiting the application.

If MS-DOS is not your operating system:

Use EASY CONFIG to check the speed at which your computer is running, and change the speed if necessary.

a. Insert EASY CONFIG diskette #1 in drive A and then turn on your computer.
b. Select `Configure computer` from the Main Menu.
c. Select `Configure computer - advanced method` from the Configure Computer menu. The System Configuration Overview is displayed.

d. Select **Detailed by Slot** on the View pull-down menu.
e. Your current processing speed is displayed under System Board Options on the system board for your computer.
f. If you do not have to change the processing speed, select **Exit** on the System pull-down menu. Then select **Exit** to quit EASY CONFIG.
g. If you need to change the processing speed, press Esc to go back to **Detailed by Slot** on the View pull-down menu. Move the cursor to **Power-on Speed** on the system board for your computer.
h. Use the arrow keys to select a new speed. Possible values are HIGH (25 MHz for the HP Vectra 486/25T PC or 33 MHz for the HP Vectra 486/33T PC), and AUTO (for the automatic speed switching mode). Press Enter when you have finished.
i. Select **Exit** on the System pull-down menu.
j. Select **Save configuration and exit** to save your changes and quit EASY CONFIG.

You may need to turn memory cache off

Your computer comes with a built-in memory cache to increase its performance. Memory cache is a memory management system that copies a portion of your computer's memory into very high speed memory (or cache). This allows the processor to access frequently used pieces of information more quickly and efficiently. However there may be occasions when you need to turn memory cache off. You might need to turn memory cache off if you are using copy-protected applications or speed-sensitive applications running at HIGH (25 or 33 MHz) speed or running in automatic speed switching mode (AUTO). Note that memory cache is automatically turned off when your computer is *not* running at HIGH speed or when it is reading from the flexible disk drive while running in automatic speed switching mode.

If MS-DOS is your operating system:

1. **To determine whether your memory cache feature is turned on or off, enter the following at the MS-DOS prompt:**

   [*drive:*] [*path*] EXMODE MEMCACHE

2. **If necessary, turn memory cache off by entering the following command at the MS-DOS prompt:**

[*drive:*] [*path*] `EXMODE MEMCACHE OFF`

drive: is the drive that contains EXMODE.

path is the path to EXMODE.

If MS-DOS is not your operating system:

Check the state of memory cache, and if necessary, disable it, by running EASY CONFIG.

a. Insert EASY CONFIG diskette #1 in drive A and then turn on your computer.
b. Select `Configure computer` from the Main Menu.
c. Select `Configure computer - advanced method` from the Configure Computer menu. The System Configuration Overview is displayed.
d. Select `Detailed by Slot` on the View pull-down menu. The state of memory cache (listed as `Internal 80486 Cache Memory`) is displayed under System Board Options on your system board.
e. If memory cache is disabled, select `Exit` on the System pull-down menu. Then select `Exit` to quit EASY CONFIG.
f. Press (Esc) to go back to `Detailed by Slot` on the View pull-down menu.
g. Move the cursor to `Internal 80486 Cache Memory` on your system board.
h. Select `Change Function` on the Edit pull-down menu.
i. Select `Disable` and press (Enter)
j. Select `Exit` on the System pull-down menu.
k. Select `Save configuration and exit` to save your changes and quit EASY CONFIG.

You may need to disable read-ahead cache

1. **Check to see if you have an HP ESDI high-performance hard disk controller AND read-ahead cache is enabled (this is the default).** The controller reads one or more sectors ahead on the hard disk and places the sector data in a buffer. Your application may not allow the hard disk controller to read ahead.

2. **If necessary, disable read-ahead cache by purchasing a jumper and placing it on the fifth set of pins from the top on the J7 jumper block of the controller.** Refer to your *HP ESDI High-Performance Hard Disk Controller Board Installation Guide* for more information.

If your display is not working properly:

If nothing is displayed on the screen, but the computer starts and the keyboard, disk drives, and peripheral devices seem to operate properly (their indicator or in-use lights are on):

1. **Make sure that your display is plugged into the power source, and it is turned on.**
2. **Check that the brightness and contrast controls are properly set.**
3. **Ensure that the display's video cable is connected to the connector on the video board.**
4. **If you see a key symbol, you must enter the power-on password before you can use the keyboard.** (Refer to Chapter 10 for more information about the power-on password.)
5. **If you have an HP Super VGA Board, make sure other boards such as EMS boards, disk controllers, or LAN boards do not use the same memory addresses as the HP Super VGA Board.** The HP Super VGA Board uses I/O address 3BO–3DF. It uses the following memory segments:

Video RAM	A000–BFFF
8-bit Video ROM	C000–C7FF
16-bit Video ROM (default)	C000–C7FF
16-bit Video ROM (alternate)	C000–DFFF

   For more details about jumper and switch settings, refer to the *HP Super VGA Board User's Manual.*
6. **Turn off the display, unplug it from its power source, and examine the video cable pins to see if they are bent. If they are, carefully straighten them.**
7. **Remove the computer cover. Check that the video board is seated correctly in the slot. If it is not, remove the board and reinstall it.** (Refer to Chapter 3 for more information, if necessary.)
8. **Check that your video board is properly configured.** Refer to your video board manual for configuration details.
9. **Make sure there is no conflict between the video board to which the display is connected and another video board.** If you are using an HP

Super VGA Board, the other board must be a Monochrome Display Adapter, Hercules Graphics Card, or a Color Graphics Adapter. It *cannot* be an Enhanced Graphics Adapter, or another Video Graphics Adapter.

10. **If you have an HP Super VGA Board, try to run your video board's diagnostic program, DIAG.EXE.** For more details, refer to the *HP Super VGA Board User's Manual.*

11. **There may be commands in your AUTOEXEC.BAT or CONFIG.SYS files that interfere with your video board's operation. Try starting your computer without the AUTOEXEC.BAT and CONFIG.SYS files.** If the video board works properly, identify and remove the commands that are causing conflict with the video board's operation.

12. **If you are using the HP Super VGA utility Screen Saver and your screen goes blank while using the keyboard, you may be using an application that turns off the screen even when you are using the keyboard.** To disable Screen Saver, refer to the *HP Super VGA Board User's Manual.*

If your mouse is not working:

1. **Verify that you have installed the correct mouse driver on your hard disk.** You should have installed *either* MOUSE.SYS (and added `DEVICE=MOUSE.SYS` to CONFIG.SYS) *or* MOUSE.COM (and added `MOUSE` to AUTOEXEC.BAT), but not both. Note that your mouse will work properly with EASY CONFIG because EASY CONFIG diskette #1 contains the correct mouse driver if it has been installed. Refer to your mouse's manual for more information.

2. **Verify that the mouse port is enabled.**

   a. Insert EASY CONFIG diskette #1 in drive A and then turn on your computer.
   b. Select `Configure Computer` from the Main Menu.
   c. Select `Configure Computer - advanced method` from the Configure Computer menu.
   d. On the `System Configuration Overview` screen, highlight the keyboard, mouse, and serial port board.
   e. Press Enter for the `Detailed View`.
   f. Scroll down to the Mini-DIN Mouse Port board and check if it is `Enabled`.
   g. If it is not, select `Edit` from the `Detailed View` menu.
   h. Select `Change Function` from the pull-down menu and highlight `Enabled` on the `Change Function` screen.
   i. Select `System` on the `System Configuration Overview` screen.
   j. Select `Exit` on the `System` pull-down menu.
   k. If you have changed the mouse function, select `Save Configuration and Exit`. If not, select `Exit`.

If you cannot access part or all of your entire hard disk:

1. **If you have two ESDI hard disk drives, hard disk drive splitting may be disabled.**

   Refer to the section "Enabling and Disabling Hard Disk Drive Splitting" in Chapter 8. Refer also to your hard disk drive installation guide for information about hard disk drive splitting.

2. **Make sure that all cables are connected correctly.** Refer to Chapter 7 for more information on connecting the cables.

If your SCSI subsystem does not work at installation:

If you need to understand more about SCSI, refer to the appendix "Understanding the SCSI Subsystem." If you purchased your SCSI device and host adapter as accessories, refer to the documentation that came with them for more information.

1. **Check that your SCSI host adapter is properly installed.**
2. **Check that your SCSI host adapter BIOS is being executed properly.** When you start your computer you will see the incrementing count of the RAM test. Then the host adapter BIOS will display a banner similar to the following: (Press Pause to stop the scrolling, and any key to continue.)

   ```
   Adaptec AHA-1740 BIOS
   Version 1.21
   Copyright 1990 Adaptec, Inc.
   All Rights Reserved
   ```

   If this banner is not displayed, the host adapter BIOS is not being executed.

   The BIOS then checks for valid devices on the SCSI bus, and reports which devices are found. If you have installed and configured your SCSI devices correctly, you will see a message similar to the following, depending on your device addresses:

   ```
   SCSI ID0 installed
   SCSI ID1 installed
   ```

   If the BIOS *cannot* find a valid device, for example at address 1, you will see the following message:

   ```
   SCSI ID1 not installed
   ```

3. **Try each of the following suggestions to help you find the problem:**
   - Verify that power is properly connected to the hard disk drive.
   - Check the SCSI bus cable for correct orientation, alignment, and seating on the host adapter and the SCSI device.
   - Check to verify that terminators are installed at each end of the SCSI bus, but not on any other devices.

- Verify that all SCSI devices are single-ended SCSI and that no differential SCSI devices have been added to the bus.
- Verify that the SCSI hard disk drive is set to address 0. (Use EASY CONFIG to do this. Refer to Chapter 8.)
- If a second hard disk drive is connected to the SCSI bus, check it for proper address selection (use EASY CONFIG), SCSI cable connection, and proper power. If you're using MS-DOS, check the disk partition by loading MS-DOS from a flexible diskette and using FDISK. Partition the hard disk drive if necessary.
- Disconnect all SCSI devices except the host adapter and the drive at SCSI address 0, and try again. If this fails, try substituting a known good host adapter and disk drive.

If your SCSI Subsystem stops working:

If your SCSI subsystem has been operating properly for a reasonable length of time, and if no specific errors are announced on your display, the problem is most likely due to:

- recent hardware change
- recent software change
- recent physical damage
- equipment failure

1. **Check if there is a resource conflict between any new board you have added and existing boards. Also, if you have changed the options on an existing board, there may be a resource conflict.**

   a. Remove the new board and restart the computer. If this corrects the problem, the board is either defective, or it is trying to use a system resource used by the SCSI subsystem.

   b. Check if the board is using memory, I/O addresses, or interrupt lines that are also used by the SCSI subsystem. Refer to the manual that came with your board for more information.

2. **Check if you have made recent changes to your software. For example, have you moved, removed, or changed the configuration files or drivers?** Refer to your software documentation for further information.
3. **Check the SCSI interconnecting cable for problems that may have been caused by recent computer maintenance, hardware upgrades, or physical damage.**
4. **If you suspect hardware failure and there are no system error messages, check each component associated with the failure.** Equipment failure, however, is probably the most unlikely reason for a SCSI subsystem failure.

If your printer is not working:

1. **Verify that the AC power cord is plugged into the power source and the printer.**
2. **Make sure the printer's power switch is on.**
3. **If the printer is plugged into a switched multiple-outlet box, make sure the switch on the outlet box is turned on.**
4. **Make sure the AC outlet is working.** Plug a different electrical device (such as a computer) into the outlet and turn it on.
5. **Check that the printer is online.**
6. **Examine the paper feed for a paper jam.**
7. **Run the printer's internal self-test, if it has one, to make sure the printer is functional.** Refer to the printer's manual for instructions.
8. **Verify that you have the correct interface cable for your printer.**
9. **Make sure that the interface cable is connected to the correct interface connector (port), that its pins are not bent, and that it isconnected at both ends.**
10. **Make sure that you have selected the correct port setting when you configured your printer.** The printer should be configured correctly for your computer and for your application. You may need to change some

switch settings. Use EASY CONFIG to verify the port settings and external connections.

a. Insert EASY CONFIG diskette #1 in drive A and then turn on your computer.
b. Select `Configure computer` from the Main Menu.
c. Select `Configure computer - advanced method` from the Configure Computer menu.
d. When the System Configuration Overview is displayed, select `Resources ...` from the View menu to verify the port setting.
e. Select `OK` when you have finished looking at the Resource Map.
f. When the System Configuration Overview is displayed, select `Connections ...` from the View menu to look at the external cable conections.
g. Select `OK` when you have finished looking at the Connections Map.

11. **Check to make sure that the port is configured the same way as the printer.**

a. Insert EASY CONFIG diskette #1 in drive A and then turn on your computer.
b. Select `Configure computer` from the Main Menu.
c. Select `Configure computer - advanced method` from the Configure Computer menu.
d. When the System Configuration Overview is displayed, select `Resources ...` from the View menu.
e. Select `OK` when you have finished looking at the Resource Map.

12. **If you have a serial printer and are using MS-DOS, make sure you have used the MODE command correctly.** Refer to your MS-DOS manual for more information.
13. **Check that your computer's port is working properly by running another peripheral connected to the port.**
14. **If your printer still does not work, it may be in conflict with another board or option. Remove boards and options (except the video board and hard disk drive) one at a time to isolate the conflict. Check the printer after you remove each board or option.**
15. **If an error message is displayed on your screen, refer to the error messages in your printer's manual for help.**

If the board or option you have added is not displayed when you run EASY CONFIG:

1. **Copy the CFG file for the board to your EASY CONFIG diskette #1. Then add the board or option to your configuration.** Some options do not require a CFG file. For example, a hard disk drive does not require a CFG file because it is attached to a controller or has an embedded controller; only the controller requires a CFG file.

   a. Insert EASY CONFIG diskette #1 in drive A and then turn on your computer.
   b. Select `Configure computer` from the Main Menu.
   c. Select `Copy selected CFG files from option diskette` from the Configure Computer menu.
   d. Copy CFG files for the boards and options you have already installed or plan to install in your computer following the onscreen instructions. Press (Enter) when you have selected all the necessary CFG files.
   e. When prompted, select the slot in which you have installed your board. (The list of suggested slots is given in order of preference, with the most preferred slot at the top of the list. Options with embedded controller boards will just list "embedded.")

      When all the boards and options have been added to your configuration EASY CONFIG displays Your Current Configuration with the new boards and options labeled "Added."
   f. Select `Save Configuration and Exit` on the System pull-down menu.

2. **Display your computer's configuration using the Advanced Method of Configuration.** Some options (hard disk, flexible, and tape drives, option ROMs, memory modules, and the Weitek 4167 coprocessor) can only be displayed using the advanced method in detailed view.

   a. Insert your EASY CONFIG diskette #1 in drive A and then turn on your computer.
   b. Select `Configure computer` from the Main Menu.
   c. Select `Configure computer - advanced method` from the Configure Computer menu.
   d. If you want to see information about a particular board, highlight that board when the System Configuration Overview is displayed. Otherwise, skip to the next step.

e. Select **Switch & jumper settings ...** from the View menu.
f. Select whether you want to see settings for the currently selected board, for all boards, or only for changed boards, and press Enter.
g. Scroll through the displayed information and select **<OK>** when you have finished.
h. Record any switch or jumper settings on your boards and options that you need to change
i. Select **Exit** from the System pull-down menu and then select **Exit** again to quit EASY CONFIG without saving any changes.

If the board or option you want to add is not displayed when you run EASY CONFIG:

You may not have copied the configuration (CFG) file for the board or option to EASY CONFIG diskette #1. The CFG file may be found in two places, on the diskette that came with your board or option, or in the library of CFG files on EASY CONFIG diskette #2.

Note

Some options do not have a CFG file. For example, a hard disk drive does not require a CFG file because it is attached to a controller or has an embedded controller; only the controller requires a CFG file.

1. **If the CFG file is on the diskette that came with your board or option:**
   a. Start EASY CONFIG by inserting EASY CONFIG diskette #1 in drive A and then turning on your computer.
   b. Select **Configure computer** from the Main Menu.
   c. From the Configure computer menu, select **Copy selected CFG files from option diskette**.
   d. Insert the diskette that came with your board.
   e. Copy the CFG file for the board you want to install in your computer following the instructions on the screen.

2. **If the CFG file is supplied in the library of CFG files on EASY CONFIG diskette #2:**

   a. Start EASY CONFIG by inserting EASY CONFIG diskette #1 in drive A and then turning on your computer.
   b. Select `Configure computer` from the Main Menu.
   c. From the Configure computer menu, select `Copy selected CFG files from option diskette`.
   d. Copy the CFG file for the board you want to install in your computer following the instructions on the screen.

3. **If the CFG file is not on the diskette packaged with your board or option, or in the library of CFG files on EASY CONFIG diskette #2, you have three options:**

   a. Contact your HP dealer.
   b. Install the board or option according to the instructions that were provided with it.
   c. Create your own CFG file referring to the *Dealer Configuration (CFG) File Creation Guide* .

If you cannot remember the power-on password that you set with EASY CONFIG:

Clear the password from the computer's memory by disabling the power-on password feature. Then, enable the power-on password feature and reset the password. Refer to Chapter 10 for instructions on disabling and enabling the power-on password feature.

If you need to relock a network server's keyboard after unlocking it with the power-on password:

Relock the keyboard with the mechanical keyboard lock or restart the network server.

If you have lost your key:

Call, fax, or write to the following company. Include the serial number of your key. (Refer to the "Security Lock Key Serial Number" section in Chapter 1.) Each key will cost approximately $7.00 in U.S. cash or check. Delivery will take approximately three to four weeks.

Jin Tay Industries Co., Ltd.
Attention: Key Replacement
P.O. Box 11310 Taipei, Taiwan, R.O.C.
Telephone number: Taiwan 886-2-903-9350
Fax number: Taiwan 886-2-902-3039

If you cannot format 3.5-inch diskettes:

1. **Format the 3.5-inch diskette with the correct command:**
   - To format 1.44 MB 3.5-inch high-density diskettes to 1.44 MB format, enter

     `FORMAT [`*drive*`]`

   - To format 710 and 720 KB 3.5-inch low-density diskettes to 720 KB format, enter

     `FORMAT [`*drive*`] /t:80 /n:9`

2. **Run EASY CONFIG to make sure that the 3.5-inch disk drive is configured correctly.** Refer to the "Hard Disk Drives, Flexible Disk Drives, and Tape Drives" section of Chapter 8 for information about running EASY CONFIG.

3. **If you are using the INDSKBIO.SYS driver for compatibility with an HP 150/Touchscreen, HP 110 Portable, or HP Portable Plus, refer to your *MS-DOS User's Reference* for instructions on using this driver.**

If you cannot format or write to a diskette:

If your computer is running at less than 9 MHz or at automatic speed switching you will not be able to format or write data to a diskette. You will need to increase the speed to the high speed.

If MS-DOS is your operating system:

1. **To find out the speed at which your computer is running, enter the following at the MS-DOS prompt:**

   [*drive:*] [*path*] EXMODE SPEED

2. **If necessary, change the processing speed by entering the following at the MS-DOS prompt:**

   [*drive:*] [*path*] EXMODE SPEED [*number*]

drive:	is the drive that contains EXMODE.
path	is the path to EXMODE.
number	is the number 25 for the HP Vectra 486/25T PC and the number 33 for the HP Vectra 486/33T PC.

You can change the processing speed *permanently* by adding the EXMODE command to your AUTOEXEC.BAT file.

You can change the processing speed *only for speed-sensitive applications* by running the application from a batch file. Include in the batch file: the EXMODE command to switch your computer to a lower speed, the command to start your application, and the EXMODE command to switch back to the original speed on exiting the application.

If MS-DOS is not your operating system:

Use EASY CONFIG to check the speed at which your computer is running and change it if necessary.

a. Insert EASY CONFIG diskette #1 in drive A and then turn on your computer.
b. Select `Configure computer` from the Main Menu.
c. Select `Configure computer - advanced method` from the Configure Computer menu. The System Configuration Overview is displayed.
d. Select `Detailed by Slot` on the View pull-down menu.
e. Your current processing speed is displayed under System Board Options on your system board.
f. If the speed shown is less than 9 MHz or is set to AUTO, select `Exit` on the System pull-down menu. Then select `Exit` to quit EASY CONFIG.
g. If you need to change the processing speed, press (Esc) to go back to `Detailed by Slot` on the View pull-down menu.
h. Move the cursor to `Power-on Speed` on the system board and select `Change Function` on the Edit pull-down menu.
i. Use the arrow keys to select a new speed. Possible values are HIGH (25 MHz for the HP Vectra 486/25T PC, or 33 MHz for the HP Vectra 486/33T PC), and AUTO (for the automatic speed switching mode). Press (Enter) when you have finished.
j. Select `Exit` on the System pull-down menu.
k. Select `Save configuration and exit` to save your changes and quit EASY CONFIG.

If the volume of your keyboard click is too loud or too soft:

Use EASY CONFIG to select the loudness of your keyboard click. The volume you select will remain in effect until you change the volume setting again with EASY CONFIG. (Refer to Chapter 8 for more information about running EASY CONFIG.)

a. Insert EASY CONFIG diskette #1 in drive A and then turn on your computer.

b. Select **Configure computer** from the Main Menu.
c. Select **Configure computer - advanced method** from the Configure Computer menu. The System Configuration Overview is displayed.
d. Select **Detailed by Slot** on the View pull-down menu.
e. Move the cursor to **Click Volume** on the Keyboard, Mouse, and Serial Port board for your computer and select **Change Function** on the Edit pull-down menu.
f. Use the arrow keys to select a new volume. Press (Enter) when you have finished.
g. Select **Exit** on the System pull-down menu, then select **Save configuration and exit** to save your changes and quit EASY CONFIG.

If an error message appears:

1. **Copy the message on a piece of paper.**
2. **Find the message in the "Error Messages" section of this chapter and follow the suggested action.**
   - If the message you found is not listed in the "Error Messages" section, it may be an operating system error message. Refer to your operating system manual for descriptions of these messages.
   - If the message you found is not in the "Error Messages" section, and it is not an operating system message, it may be an application message. Check your application's manual.
3. **If you cannot correct the error, refer to the "If you have a problem you cannot resolve:" section in this chapter.**

Error Messages

Power-on self-test (POST) numerical error codes are listed first, followed by an alphabetical listing of other error messages.

Power-On Self-Test (POST) Error Codes

POST error codes appear on the screen as a number. Only the most common POST error codes are listed here. Refer to the *HP Vectra 486 Personal Computer Configuration and Service Manual* (HP part number 5960-0746) for a complete list of POST error codes.

0240 0241 0280 0282

Explanation: These errors indicate that your battery pack may need to be replaced. If you see the 0241, 0280, or 0282 error code, run EASY CONFIG to check your configuration. If you continue to see these errors the next time you turn on the computer, replace your battery pack.

0341 0342 0343 0344 0345 346 350 0351 0352 0353 0354

Explanation: These are POST keyboard errors. Check your keyboard cable.

03E0 03E1 03E2 03E3 03E4 03E5 03E6 03E7 03E8 03E9 03EA 03EB 03EC

Explanation: These are POST input device errors. Make sure your input device (such as a mouse) is connected correctly.

0503 0505

Explanation: These are POST serial port errors. Check your serial port connections.

0543

Explanation: This is a POST parallel port error. Check your parallel port connections.

06*xx*

where *xx* is the scan code of the stuck key.

Explanation: This is a POST keyboard error. One of the keys on your keyboard is stuck.

1300

Explanation: This is a POST flexible disk device error. Run EASY CONFIG and use the advanced method of configuration. Change the view of your configuration to a detailed view and check your flexible disk drive or tape drive configuration. Refer to Chapter 8 for information about using EASY CONFIG.

13*x*1 13*x*2 13*x*3 13*x*4 13*x*5

where *x* is the slot number where the error occurred

Explanation: These are POST nonvolatile memory errors. The configuration information stored in nonvolatile memory does not agree with the actual configuration of your computer. Run EASY CONFIG to make sure that your configuration is correct. Exit and save your configuration. Refer to Chapter 8 for information about using EASY CONFIG.

2000 2001 2002 2003 2005

Explanation: These are POST memory board errors. Verify that your memory board has been configured correctly.

8310 8311 8312

Explanation: These are POST hard disk drive, controller, or drive splitting (8312) errors. Check that you have installed and configured the controller correctly. If you have a second hard disk drive, make sure you have configured it correctly. Also, make sure that you have formatted your hard disk.

9XYZ

Explanation: This is a POST flexible disk device error. Run EASY CONFIG and use the advanced method of configuration. Change the view of your configuration to a detailed view and check your flexible disk drive or tape drive configuration. Refer to Chapter 8 for information about using EASY CONFIG.

Other Error Messages

This section lists error messages in alphabetical order, and gives an explanation of what to do, where necessary.

Note

For messages that do not appear here, refer to your operating system manual, your application manual, or your printer manual.

```
A Weitek FPA is not present.
Please check your PC and your CONFIG.SYS file
```

Explanation:

In the HPMM command of your CONFIG.SYS file or the RELOCATE command in your AUTOEXEC.BAT file, you indicated there is a Weitek floating point coprocessor installed in your computer (W=ON). However your computer cannot locate it. If you have a Weitek 4167 coprocessor installed in your computer, it may not be installed correctly. (Refer to Chapter 4 for installation instructions.) Or remove the W=ON parameter from the HPMM or RELOCATE command.

Bad command or file not found in your RELOCATE command line

Explanation: In the RELOCATE command, your computer cannot recognize one of the parameters you specified. Or your computer cannot locate the device driver or terminate-and-stay-resident (TSR) program you specified. Check the syntax of your RELOCATE command carefully. Make sure the device driver or TSR exists (with the correct drive, path and parameters specified) and reenter the RELOCATE command.

Cannot load memory manager with virtual mode active
Only one virtual (protected) mode program can be running

Explanation: HPMM detects that another program is already using virtual mode (also called protected mode, or virtual 86 mode). Virtual mode is a special mode used by certain programs such as HPMM. Only one program at a time can be running under virtual mode. To use HPMM, first exit the program that is using virtual mode.

Cannot load Windows with HPMM in the ON mode

Explanation: Your computer cannot load Windows because HPMM is in the ON mode. Re-enter the HPMM command in your CONFIG.SYS file; make sure the state is AUTO and that you have *not* specified RELOCATE as a parameter.

Cannot run Windows in standard mode with HPMM

Explanation: Your computer cannot run Windows in standard mode with HPMM. Run Windows in either 386 enhanced mode or in real mode.

Cannot use HIMEM when RELOCATE is specified
Modify the HPMM command line or delete HIMEM from CONFIG.SYS

Explanation: You cannot use RELOCATE with Windows 3.0. If you are not using Windows 3.0, remove the HIMEM command from your CONFIG.SYS file.

`DMA buffer size must be between 0 KB and 128 KB`
`Modify the DMA= parameter in your HPMM command`

Explanation: In the HPMM command of your CONFIG.SYS file, you specified an invalid DMA buffer size. You must specify a DMA buffer size between 0 KB and 128 KB. Check the DMA= parameter in your HPMM command.

`DOS version number must be 3.0 or higher for RELOCATE to load`

Explanation: In order to use the RELOCATE command, you must be running MS-DOS version 3.0 or greater.

`EMS expanded memory size specified cannot be zero`

Explanation: In the HPMM command of your CONFIG.SYS file, you did not specify enough expanded memory for HPMM to use. Modify the SIZE= parameter in your HPMM command to allow more expanded memory to HPMM.

`EXEC failure`

Explanation: RELOCATE cannot load the device driver or terminate-and-stay-resident (TSR) program you specified. Do not try to relocate this device driver or TSR.

`Expected equal after parameter`

Explanation: One of the parameters you specified in the HPMM command in your CONFIG.SYS file expected an equal sign (=) after the parameter, but none was found. Check the parameters in your HPMM command.

`Expected equal after parameter in your RELOCATE command line`

Explanation: One of the parameters you specified in the RELOCATE command expected an equal sign (=) after the parameter, but none was found. Check the parameters in your RELOCATE command.

```
Extended/XMS size specified is too large
Modify the EXT= parameter in your HPMM command line
```

Explanation: In the HPMM command of your CONFIG.SYS file, you specified more extended memory than was available to HPMM. Modify the EXT= parameter in your HPMM command.

```
HIMEM must be present to run Windows with HPMM
```

Explanation: The `DEVICE=HIMEM.SYS` line must appear in your CONFIG.SYS file before the `DEVICE=HPMM.SYS` line in order to run Windows 3.0 in Enhanced Mode.

```
HPMM driver is needed for RELOCATE to function
```

Explanation: You cannot use the RELOCATE command unless you have installed HPMM first. Check your CONFIG.SYS file to make sure it includes the following line: `DEVICE=HPMM.SYS`. If it does not, you need to install HPMM. Then you will be able to use the RELOCATE command.

```
Insert system disk in drive and press any key to continue
```

Explanation: There is no diskette in drive A and no operating system installed on drive C. Install your operating system, referring to the operating system manual.

```
INVALID CONFIGURATION INFORMATION - RUN EASY CONFIG PROGRAM
Strike F1 to continue
```

Explanation: Run EASY CONFIG to check your computer's configuration. Use the advanced method of configuration to change the view of your computer's configuration to a detailed view. Make sure that all boards and options are shown, that they are not deactivated, and that they do not have conflicts.

If your computer's configuration is correct, you may need to replace your battery. Refer to Chapter 12 for instructions.

```
Invalid exclusion specified
Modify the EXCLUDE= parameter in your HPMM command line
```

Explanation: In your CONFIG.SYS file, you incorrectly specified an exclusion parameter in the HPMM command with EXCLUDE=. Check the EXCLUDE= parameter in your HPMM command.

```
Invalid HIMEM (XMS) driver present in CONFIG.SYS
```

Explanation: The HIMEM.SYS driver you have installed is not the most recent version. Replace it with the most recent version in order to run Windows 3.0.

```
Invalid inclusion specified
Modify the INCLUDE= parameter in your HPMM command line
```

Explanation: In your CONFIG.SYS file, you incorrectly specified an inclusion parameter in the HPMM command with INCLUDE=. Check the INCLUDE= parameter in your HPMM command.

```
Invalid load block number specified in your RELOCATE command line
```

Explanation: The block number you specified in the RELOCATE command is invalid. Modify the BLOCK= parameter in your RELOCATE command. (For a listing of available block numbers, enter `RELOCATE` at the MS-DOS prompt.)

`Invalid number specified in your HPMM command line`

Explanation: One of the parameters you specified in the HPMM command of your CONFIG.SYS file was an alpha (non-numeric) character or an invalid character. A number was expected. Check the parameters in your HPMM command carefully.

`Invalid number specified in your RELOCATE command line`

Explanation: One of the parameters you specified in the RELOCATE command is an alpha (non-numeric) character or an invalid character. A number is expected. Check the parameters in your RELOCATE command carefully.

`Invalid page frame address specified`
`Modify the FRAME= parameter in your HPMM command line`

Explanation: In your CONFIG.SYS FILE, the page frame address you specified in your HPMM command with the FRAME= parameter is not available. HPMM needs a 64 KB area above A000 that is free of expansion ROM and RAM. Modify the FRAME= parameter in your HPMM command.

`Invalid parameter specified in your HPMM command line`

Explanation: One of the parameters you specified in the HPMM command in your CONFIG.SYS file is invalid. Check the parameters in your HPMM command carefully.

`Invalid parameter specified in your RELOCATE command line`

Explanation: One of the parameters you specified in the RELOCATE command is invalid. Check the parameters in your RELOCATE command carefully.

INVALID REAL TIME CLOCK VALUES - PLEASE RUN EASY CONFIG PROGRAM

Explanation: Run EASY CONFIG and select **Set Date and Time** to set your computer's date and time.

No 64 KB page frame available. HPMM cannot load.

Explanation: HPMM was unable to find a 64 KB window for the page frame. For HPMM to operate, a 64 KB window free of expansion ROM or RAM must exist above C000. Reconfigure your hardware and peripherals so that a continuous 64 KB window is available.

No expanded memory available for use

Explanation: No expanded memory is available for use.

No RELOCATE specified in your HPMM command line

Explanation: You are trying to use the RELOCATE utility, yet you have not turned on the ability to use it. Make sure the HPMM command in your CONFIG.SYS file includes the RELOCATE parameter.

Non-system disk or disk error

Explanation: Replace the diskette in drive A with the proper diskette and press any alphanumeric key to continue. Or remove the diskette from drive A so that the computer will start from the hard disk drive.

Not enough extended memory allocated. HPMM can not load
Modify the EXT= parameter in your HPMM command line

Explanation: In the HPMM command of your CONFIG.SYS file, you did not allocate enough extended memory to HPMM. You may need to lower the amount of extended memory allocated to other programs by modifying the EXT= parameter in the HPMM command.

```
Not enough high memory to load program
Loading program in conventional memory
```

Explanation: RELOCATE cannot find enough reserved memory for your device driver or terminate-and-stay-resident (TSR) program; therefore, it is unable to relocate it from conventional memory to reserved memory. RELOCATE always loads device drivers and TSRs into the largest available space in reserved memory. To maximize the amount of reserved memory available, relocate your biggest device drivers and TSRs first, or use the BLOCK= parameter.

```
Not enough memory available in system for HPMM to load
```

Explanation: There is not enough extended memory for HPMM to operate. You need to install more memory.

```
Not ready error reading (or writing) drive x:
```

Explanation: The device (usually a drive or printer) specified in the error message is not ready to accept or transmit data. This often happens when the flexible disk drive door is open. If this is the problem, close the door and enter R (for Retry). Or, check to see if the printer is on and ready to print.

```
Number of Alternate Map Registers must be between 00 and 32
```

Explanation: The number of Alternate Map Register Sets (AMRS) you specified was greater than 32. Check the AMRS= parameter in your HPMM command.

```
Number of XMS handles must be between 1 and 255
Modify the NUMHANDLES= parameter in your HPMM command line
```

Explanation: In the HPMM command of your CONFIG.SYS file, you specified an invalid number of XMS handles. Modify the NUMHANDLES parameter to specify a value greater than zero and less than 255.

`Please power cycle your system.`

Explanation: Turn your computer off, and after a few seconds turn it on again. If you see the message again, your computer cannot load HPMM because there is no 64 KB page frame available.

`Unable to initialize 386/486 kernel`

Explanation: This is an internal error which will only be displayed if the 386/486 operating environment failed to initialize. Contact your dealer or HP service representative for assistance.

If you have a problem you cannot resolve:

Getting Software Support

As part of the purchase of your computer, arrangements were made to provide after-sale software assistance.

- If you purchased your computer from an Authorized Hewlett-Packard Dealer, they are committed to provide full after-sale support. Your dealer has worked with you to define your application and configuration—perhaps selecting hardware or software not supplied by HP—and is able to provide local, personal, and uniquely-responsive support. Authorized Dealers are backed by the full resources of Hewlett-Packard.

  To locate an Authorized Hewlett-Packard Dealer, call (800) 752-0900 in the U.S., or contact your local Hewlett-Packard sales office.

- If you purchased your computer directly from Hewlett-Packard, arrangements for after-sale support were made as part of the sale. You may elect to purchase a Response Center contract from HP or to obtain your assistance from a support group within your own organization. Your internal support group has knowledge of your unique operating procedures and specific configuration, including any non-HP components, and is normally backed by a Response Center contract from HP.

Getting Hardware Support and Service

If you have a hardware problem that you cannot resolve, follow these steps:

1. Photocopy the Service Information Form located in this chapter.
2. Fill out the "What Is the Problem?" section of the Service Information Form. This will help you discuss the problem with your Repair Center.
3. Call your Authorized HP Personal Computer Dealer Repair Center or HP Customer Repair Center. Discuss the information that you entered on the Service Information Form. This may prevent shipment of equipment which is working properly, and will ensure that you send the correct items.

   (For the telephone number of your Repair Center, contact the company that sold you the computer. Or check your local telephone directory for the HP Sales and Service Office near you. If you cannot find an HP office, refer to the list of major HP Sales and Service Offices and Marketing Headquarters in this chapter.)
4. If the Repair Center asks you to ship or bring your computer to them, complete the entire Service Information Form. Make sure the form accompanies your computer to the Repair Center.

   (If you have a contractual agreement for onsite service with your dealer or HP, you can arrange for the warranty service to be performed at your location.)

Service Information Form

Make a photocopy of this form and fill in the first section ("What Is the Problem?") before you call your Repair Center. If the Repair Center asks you to ship or bring your computer to them, complete the rest of the form. Make sure the form accompanies your computer to the Repair Center. They cannot begin servicing your computer until they receive this information.

What Is the Problem?

1. What is the name, model number, and serial number of your computer? (You will find the model number and serial number on a label on the back of the computer.)

   Name _____

   Model Number _____

   Serial Number _____

2. What is the version number of your computer's BIOS? (You can find the BIOS version number by starting your computer. Press Pause when the version number is displayed.)

   _____

3. What is installed in your computer? (Refer to the section "Additional Items Installed" in Chapter 1.)

   Boards _____

   Drives _____

   Coprocessors _____

   Memory _____

4. Is your computer connected to any peripherals? If it is, list the manufacturer's name and model number of each peripheral.

   Printers _____

   Plotters _____

   Displays _____

   Other Computers _____

   Modems _____

   External Disk Drives _____

   Other Peripherals _____

5. What application, if any, were you using when the problem occurred?

   _____

6. What specific problem are you experiencing? Is the problem repeatable? If the problem is intermittent, how much time elapses between occurrences?

   _____

   _____

   _____

7. What error messages are displayed?

   _____

   _____

Who Is Returning the Equipment?

Date _____

Company or Institution _____

Person to Contact _____ Phone _____

Alternate Contact _____ Phone _____

Return Shipping Address

_____

_____

_____

Special Shipping Instructions

_____

_____

_____

How Will the Repair Be Paid For?

Complete *one* of the following.

- **If the repair is covered by the Warranty:**

  Date Purchased or Received _____

  Enclose proof of purchase or receiving document indicating original purchase date.

- **If the repair is covered by a maintenance contract:**

  Contract Number _____

- **If the repair will be paid for with a purchase order:**

  Except for contract and warranty in- services, a purchase order number or authorized signature must accompany any request for service.

  If standard repair prices do not apply, a minimum purchase order is required. Standard repair prices may be obtained by contacting the Repair Center.

  Purchase Order Number _____

  Billing Address _____

  _____

  _____

  Special Billing Instructions _____

  _____

  Authorized Signature _____ Phone _____

What Are You Shipping?

Model Number _____

Serial Number _____

List any other equipment you are shipping.

1. _____ 6. _____

2. _____ 7. _____

3. _____ 8. _____

4. _____ 9. _____

5. _____ 10. _____

Please Note:

- If a security lock is installed in the computer, be sure to include the key.
- Do not ship accessories which are not required to complete the repair. Do not ship your manuals. Your Repair Center will help you determine what to send.
- Use the original shipping container, if possible. If you do not have the original shipping container, contact your Repair Center for advice on packing your equipment. Please note that in-transit damage is not covered by the Warranty.
- Prepay the shipping charges, as specified in the Hardware Product Warranty. HP will pay for return shipment. (If you are returning the product from another country, refer to the HP Hardware Product Limited Warranty in the appendix for exceptions.) We suggest that you insure the shipment.

Thank you.

If you need to contact Hewlett-Packard

Should you need to contact Hewlett-Packard, check your local telephone directory for the HP Sales and Service Office near you. If you cannot locate an HP office, contact one of the major HP Sales and Service Offices or one of the Worldwide HP Marketing Headquarters listed here.

Major HP Sales and Service Offices

AUSTRALIA
Hewlett-Packard Australia Ltd.
31-41 Joseph Street
Blackburn, Victoria 3130
Melbourne, Australia

AUSTRIA, EASTERN EUROPE, and YUGOSLAVIA
Hewlett-Packard Ges.m.b.H.
Lieblgasse 1
P.O. Box 72
A-1222 Vienna

BELGIUM
Hewlett-Packard Belgium SA/NV
Blvd. de la Woluwe 100
Woluwedal
B-1200 Brussels

CANADA
Hewlett-Packard Ltd.
6877 Goreway Drive
Mississauga, Ontario
Canada, L4V 1M8

DENMARK
Hewlett-Packard A/S
Kongevejen 25
DK-3460 Birkerod

FINLAND
Hewlett-Packard OY,
Piispankalliontie 17
SF-02200 Espoo

FRANCE
Hewlett-Packard France
P.A. du Bois Briard
2, avenue du Lac
F-91040 Evry Cedex

GERMANY
Hewlett-Packard GmbH
Hewlett-Packard Strasse
D-6380 Bad Homburg

HONG KONG
Hewlett-Packard Hong Kong Ltd.
22nd Floor
West Tower, Bond Centre
89 Queensway, Central
Hong Kong

ITALY
Hewlett-Packard Italiana S.p.A.
Via G. di Vittorio, 9
I-20063 Cernusco S/N (MI)

JAPAN
Yokogawa-Hewlett-Packard Ltd.
29-21 Takaido-Higashi 3-chome
Suginami-ku
Tokyo 168 Japan

MEXICO
Hewlett-Packard de Mexico, S.A.
(Latin Am. Hdqtrs)
Monte Pelvoux 111
Lomas de Chapultepec
11000 Mexico D.F.
Tel. 5-40-76-82

NETHERLANDS
Hewlett-Packard Nederland B.V.
Startbaan 16
1187 XR Amstelveen

NORWAY
Hewlett-Packard Norge A.S.
Osterndalen 16-18
N-1345 Osteras

SPAIN
Hewlett-Packard Espanola S.A.
Crta. de la Coruna, km 16,500
E-28230 Las Rozas
E-Madrid

SWEDEN
Hewlett-Packard Sverige AB
Skalholtsgatan 9, Kista
Box 19
S-164t 93 Kista

SWITZERLAND
Hewlett-Packard (Schweiz) AG
Allmend 2
CH-8967 Widen

UNITED KINGDOM
Hewlett-Packard Ltd.
King Street Lane
Winnersh, Wokingham
GB-Berkshire RG11 5AR

UNITED STATES (EASTERN)
Hewlett-Packard Company
#4 Choke Cherry Road
Rockville, MD 20850

UNITED STATES (WESTERN)
Hewlett-Packard Company
5161 Lankershim Blvd.
North Hollywood, CA 91601

UNITED STATES (MIDWEST)
Hewlett-Packard Company
5201 Tollview Drive
Rolling Meadows, IL 60008

UNITED STATES (SOUTHERN)
Hewlett-Packard Company
2000 S. Park Place
Atlanta, GA 30339

Worldwide HP Marketing Headquarters

For countries not listed above, contact one of the following HP Marketing Headquarters.

ASIA
Far East Sales Region Hdqtrs
Hewlett-Packard Asia Ltd.
22nd Floor
West Tower, Bond Centre
89 Queensway, Central
GPO Box 863
Hong Kong

LATIN AMERICA
Hewlett-Packard Latin Am. Hdqtrs
Monte Pelvoux 111
Lomas de Chapultepec
11000 Mexico D.F.

EUROPE
European Operations Hdqtrs
Hewlett-Packard S.A.
150, route du Nant-d'Avril
P.O. Box
1217 Meyrin 2/Geneva
Switzerland

OTHER AREAS
Intercon Operations Hdqtrs
Hewlett-Packard Company
3495 Deer Creek Road
P.O. Box 10495
Palo Alto, CA 94303-0896
USA

A

Computer Specifications

Features

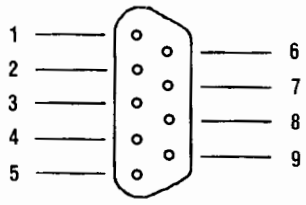
Unless otherwise noted, the following list of features applies to all models of the HP Vectra 486/25T and HP Vectra 486/33T PC. Some features are factory-installed, and others are optional. If you are not sure what is factory-installed on your computer, check the identification label on the rear of your computer. Features that are optional are fully supported, and may be installed after purchase.

- **Microprocessor:** Intel 80486–25 MHz (for the HP Vectra 486/25T PC); Intel 80486–33 MHz (for the HP Vectra 486/33T PC)
- **Static RAM for cache memory:** 8 KB internal to 80486. The HP Vectra 486/33T PC has an additional 128 KB external cache
- **Weitek Abacus 4167 coprocessor socket** (for the HP Vectra 486/33T PC only only)
- **Extended Industry Standard Architecture (EISA):**
  - 32-bit address and data buses
  - DMA data transfer rate of up to 33 MB/second
  - programmable interrupts for interrupt sharing by multiple input devices
  - slots for up to eight 32-bit EISA expansion boards or eight 16-bit or 8-bit ISA boards
- **System memory:** 4 MB of DRAM standard, expandable to 64 MB

- **Mass storage devices:** Up to six internal devices are supported. The devices are standard on certain models, or can be purchased as accessories.
  - embedded hard disk drives: 84 MB, 170 MB (interface on system board)
  - EISA differential host adapter
  - SCSI hard disk drives: 440 MB, 670 MB, 1000 MB
  - ESDI hard disk drive controller: 20 megabit/second, for up to two hard disk drives
  - ESDI hard disk drives: 330 MB, 670 MB
  - flexible disk controller for up to four flexible disk devices
  - flexible disk drive: 1.2 MB, 5.25-inch
  - flexible disk drive: 1.44 MB, 3.5-inch
  - flexible disk drive: 360 KB, 5.25-inch
  - tape drive: 120 MB
- **keyboard:** industry-standard, 101-key mini-DIN
- **mouse port:** Mini-DIN
- **parallel port** (25-pin) **and two serial ports** (9-pin)
- **power supply:** 264 watts (360 watts peak), with a maximum of 14 amps of +5 volts, 1.2 amps of +12 volts, .25 amps of −5 volts, and .25 amps of −12 volts allotted for the eight I/O slots

Connector Pinouts

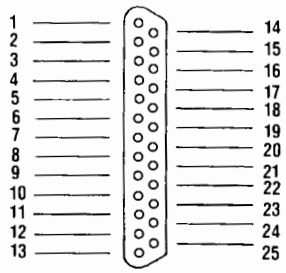
Serial Port Connector



Serial Connector Pinouts

Pin Number	Signal Description
1	Data Carrier Detect
2	Receive Data
3	Transmit Data
4	Data Term Ready
5	Signal Ground
6	Data Set Ready
7	Request To Send
8	Clear To Send
9	Ring Indicator

Parallel Port Connector

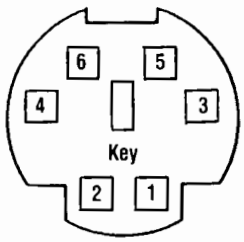


Parallel Connector Pinouts

Pin Number	Signal Description
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 end
13	Select
14	Auto line feed*
15	Error*
16	Initialize printer*
17	Select in*
18-25	Signal ground

*The signal is active low.
**All data bits are sent to a printer in an 8-bit parallel format.

Mini-DIN Connectors



Mini-DIN Connector Pinouts for the Mouse and Keyboard

Keyboard Connector (J1)

Pin Number	Signal Description
1	Data signal
2	Not used
3	Ground
4	Power (+5 V dc)
5	Clock signal
6	Not used

Mouse Connector (J2)

Pin Number	Signal Description
1	Data signal
2	Not used
3	Ground
4	Power (+5 V dc)
5	Clock signal
6	Not used

Environmental Specifications

Temperature

Operating temperature	+5° C to +40° C (+41° F to +104° F)
Non-operating temperature	−40° C to +70° C (−40° F to +158° F)

Humidity

Operating humidity	15% to 80% relative humidity at +40° C (+104° F)
Non-operating humidity	90% relative humidity at +65° C (+149° F)

Altitude

Operating altitude	0 to 4,600 meters (0 to 15,800 feet). If an ESDI hard disk controller is installed, the operating altitude changes to 0 to 3050 meters (0 to 10,000 feet) at 5° to +40° C (32° to 122° F)
Non-operating altitude	0 to 15,300 meters (0 to 50,490 feet)

Dimensions

System Processing Unit

Height	60 centimeters (24 inches)
Width	21 centimeters (8.3 inches)
Base Width	35.5 centimeters (14 inches)
Depth	51.5 centimeters (20.31 inches)
Weight	27 kilograms (60 pounds)*
	* Weight includes base, but excludes display and keyboard.

Keyboard

Height	3.4 centimeters (1.4 inches)
Width	46.8 centimeters (18.4 inches)
Depth	19.8 centimeters (7.8 inches)
Weight	1.9 kilograms (4.2 pounds)

Cable Lengths

Keyboard DIN cable	3 meters (9.9 feet)
Mouse cable	2.5 meters (8.25 feet)

Hard Disk Drive Types

The table of Hard Disk Characteristics can be found in a file called DRVTABLE.ENG on EASY CONFIG diskette #2. Use a word processor or line editor to view the contents of the file.

Technical Publications

If you need more detailed technical information, Hewlett-Packard publishes other references you may order from your dealer or sales representative:

For the HP Vectra 486/25T PC:

- *HP Vectra 486 PC Hardware Technical Reference Manual* (HP part number 5959-5094)
- *HP Vectra 486 PC System BIOS Technical Reference Manual* (HP part number 5959-5097)
- *HP Vectra 486 Personal Computer Configuration Self-Paced Training Kit* (HP part number D2226-60002) Includes:
  - *HP Vectra 486 Personal Computer Configuration and Service Manual* (HP part number 5959-5069)
  - *HP Vectra 486 PC Service and Configuration Self-Paced Guide and Final Review Package* (HP part number 5960-0710)
- *Dealer Configuration (CFG) File Creation Guide* (HP part number D2230-90001) (included with your HP Vectra 486/25T PC)

For the HP Vectra 486/33T PC:

- *HP Vectra 486/33T PC Hardware Technical Reference Manual* (HP part number 5960-0748)
- *HP Vectra 486/33T PC System BIOS Technical Reference Manual* (HP part number 5960-0749)
- *HP Vectra 486/33T Personal Computer Configuration and Service Manual* (HP part number 5960-0746)

- *HP Vectra 486/33T PC Self-Paced Training Kit* (HP part number D2237-60004) (includes service manual)
- *Dealer Configuration (CFG) File Creation Guide* (HP part number D2230-90001)(included with your HP Vectra 486/33T PC)

B

Understanding the SCSI Subsystem

The SCSI subsystem consists of an EISA host adapter, a SCSI cable, and a SCSI hard disk drive.

SCSI (Small Computer System Interface) is a standardized specification for a high-performance input/output data bus. The SCSI standard covers both hardware and software specifications. The major features of SCSI are:

High Speed	SCSI devices use a high-speed 8-bit parallel data bus to move data quickly between devices.
Intelligence	SCSI devices are intelligent. Data transfers are initiated and completed between SCSI devices without host computer CPU intervention, freeing the CPU for other activities.
Flexibility	In addition to hard disk drives, a SCSI bus can support other devices such as backup tape drives and CD-ROM drives.
Expandability	The SCSI bus is expandable. Each SCSI bus can accommodate up to eight separate SCSI devices—generally a host adapter and seven peripherals.

SCSI Devices

A SCSI bus can have from two to eight SCSI devices. The *host adapter* is a device that connects the SCSI bus to the host computer. The most common SCSI storage device is a hard disk drive. SCSI drives can be connected directly to the SCSI bus.

SCSI devices are either initiators or targets. The host adapter is an *initiator* device and a hard disk drive is a *target* device. The *initiator* device originates an operation and a *target* device performs the operation. In the case of a host

adapter and a hard disk drive, the host adapter requests a specific block of data and the hard disk drive finds the block of data and sends it to the host adapter. All communications are over the SCSI bus.

Addressing Conventions

Each device on the SCSI bus must have a numeric *SCSI address* from 0 through 7 to distinguish it from other devices. The SCSI address is sometimes referred to as SCSI ID, SCSI device ID, or target ID. The SCSI address is configured at the time of installation. The host adapter is given SCSI address 7, the highest priority address. Target devices are assigned lower SCSI addresses. Convention reserves SCSI address 0 for the drive that loads the operating system when the computer is turned on. The second SCSI drive is given address 1. The remaining SCSI addresses are assigned as devices are added. Except for SCSI address 0, the assignment of SCSI addresses is arbitrary.

The SCSI Bus

The SCSI bus has two electrical implementations: single-ended and differential. The *single-ended* version uses TTL logic levels for signaling, while the *differential* version uses balanced signal lines to allow longer cable lengths. Single-ended and differential SCSI devices cannot be used on the same bus.

The SCSI bus uses a 50-conductor cable that connects to each SCSI device. *The physical location of a device on the SCSI cable is not related to the SCSI address of the device.* Each SCSI device has jumpers or switches that must be configured to set its SCSI address.

Terminators

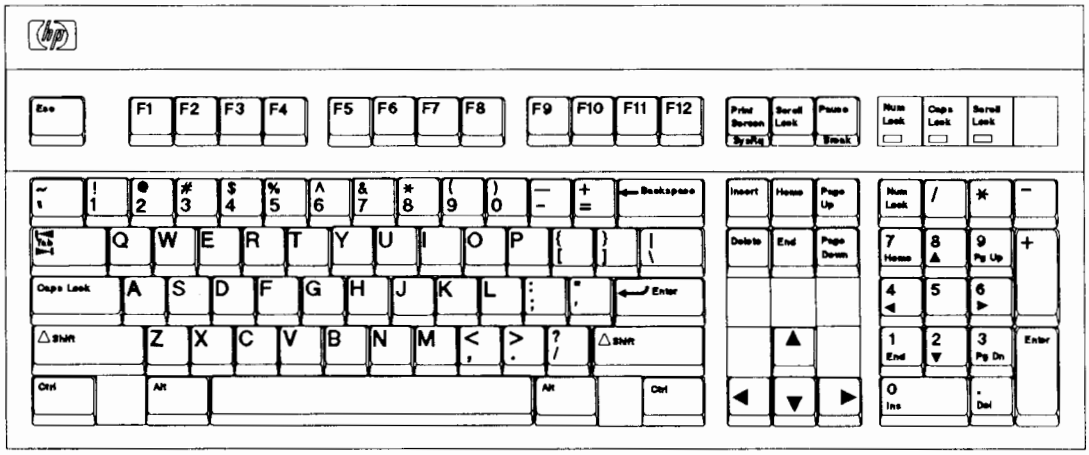
A properly terminated SCSI bus generates less electrical noise and is more immune to external noise sources. Most devices have removable resistor packs that can be installed to terminate the bus or removed if terminators are not required. The SCSI bus is terminated by installing terminators on the devices at each end of the bus and removing the terminators from all other devices on the bus. HP host adapters and SCSI hard disk drives are shipped with terminators installed.

C

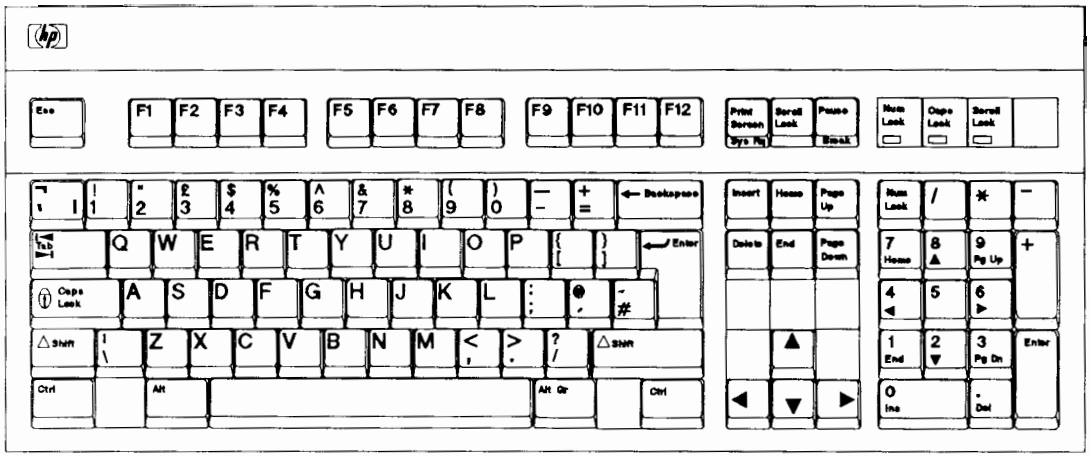
Typing Foreign Characters

Keyboard Layouts

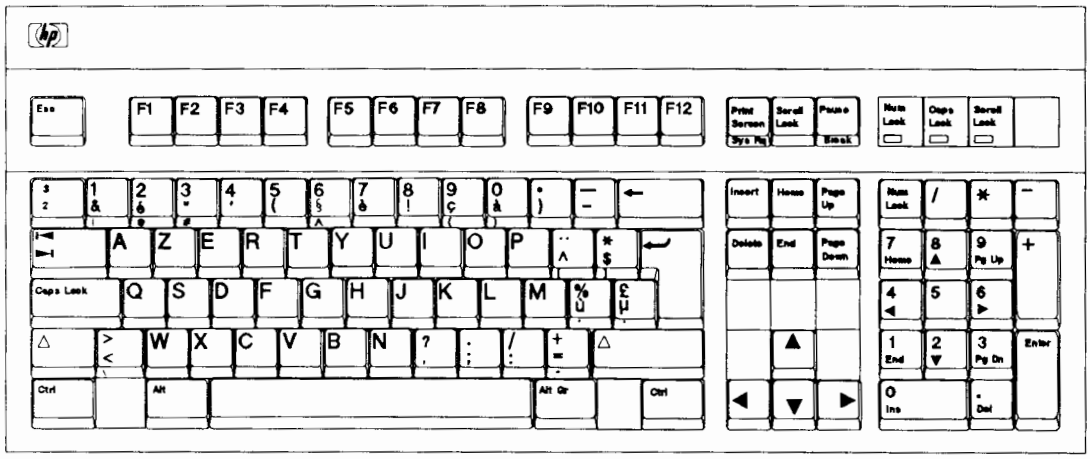
If you remap your keyboard to a different language using the MS-DOS KEYB command, the following keyboard layouts will help you to determine what foreign characters you may type.



U.S. English

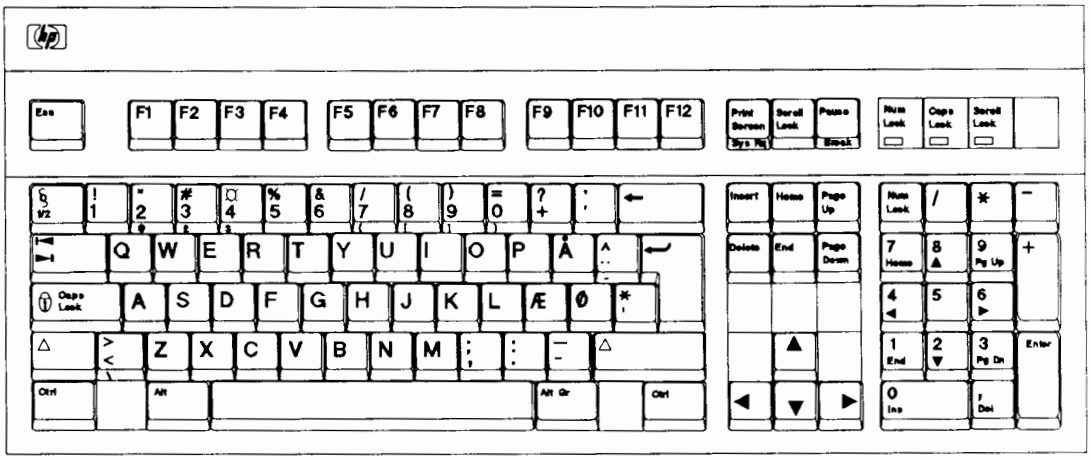


U.K. English

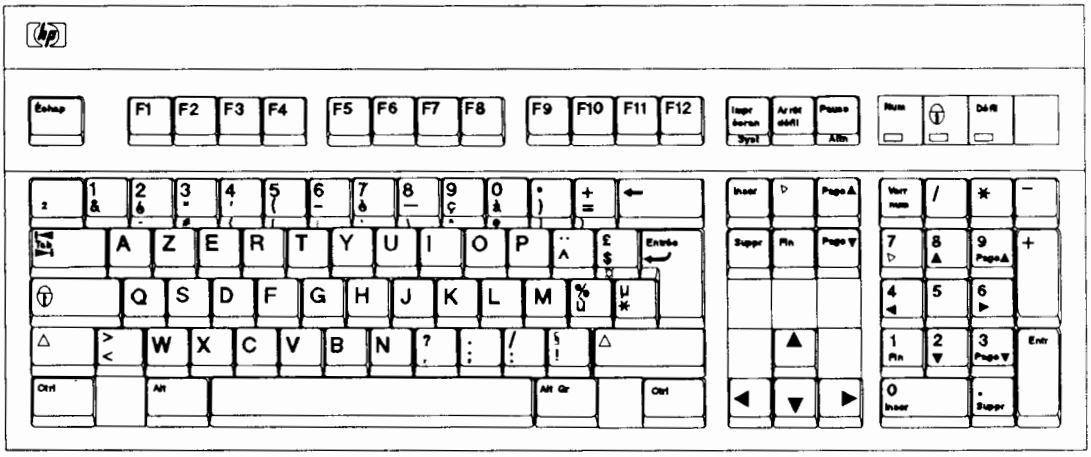


Belgian

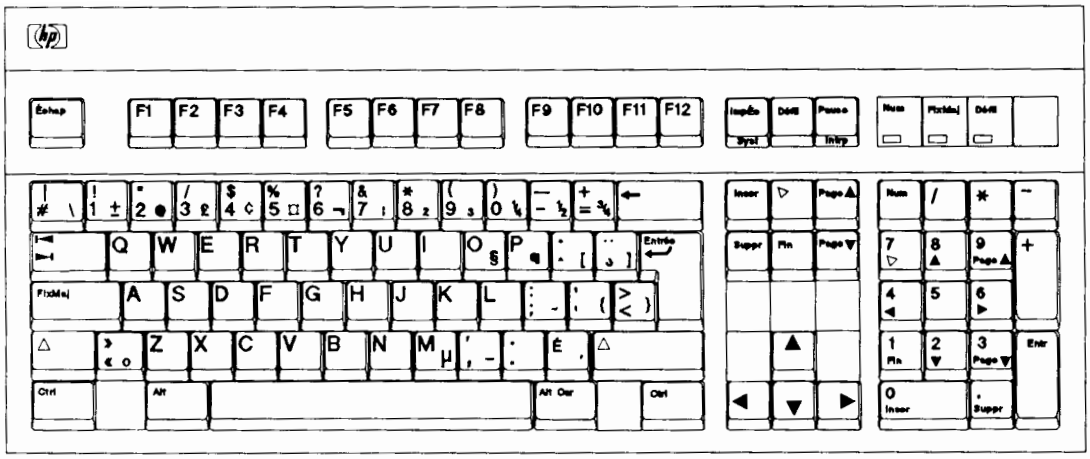
C-2 Typing Foreign Characters



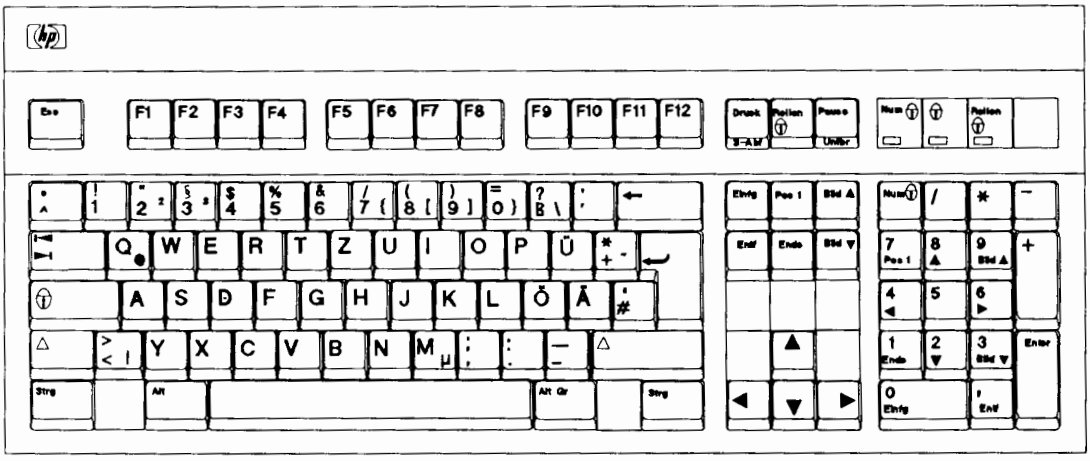
Danish



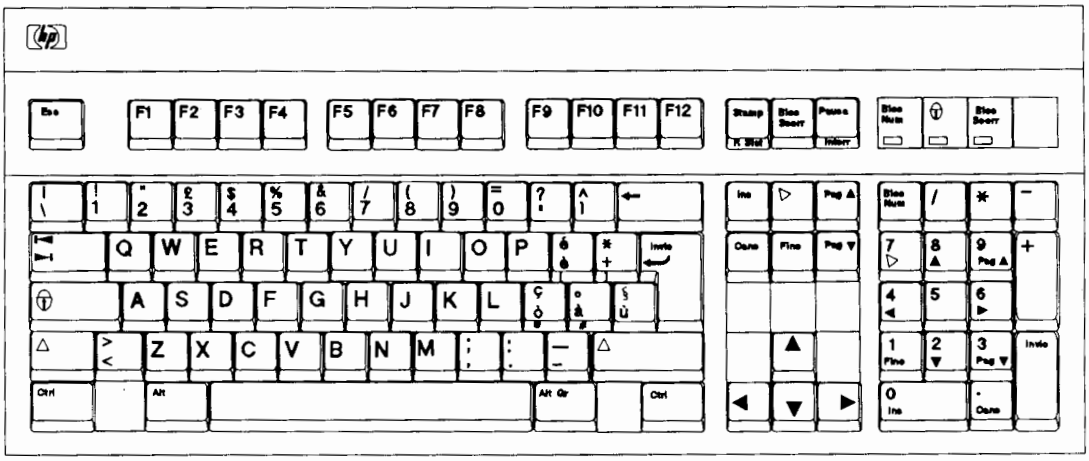
French



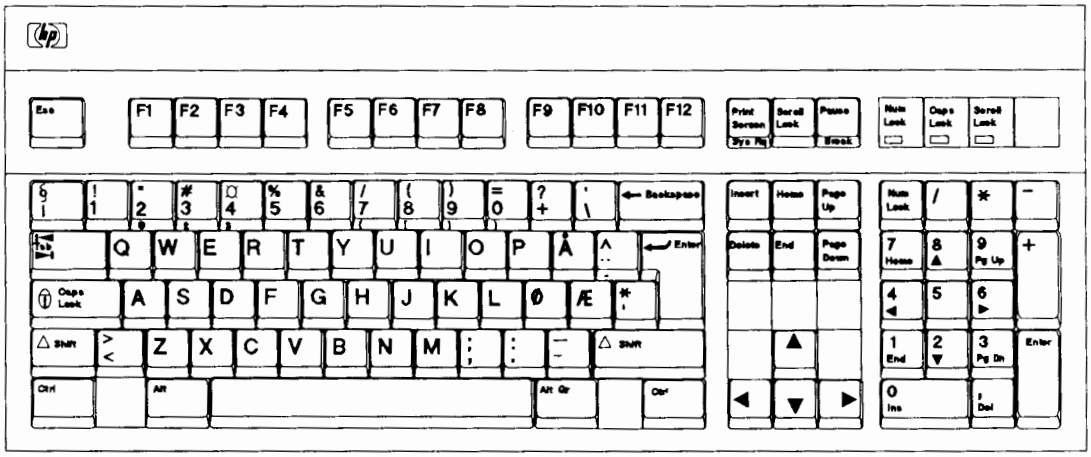
French Canadian



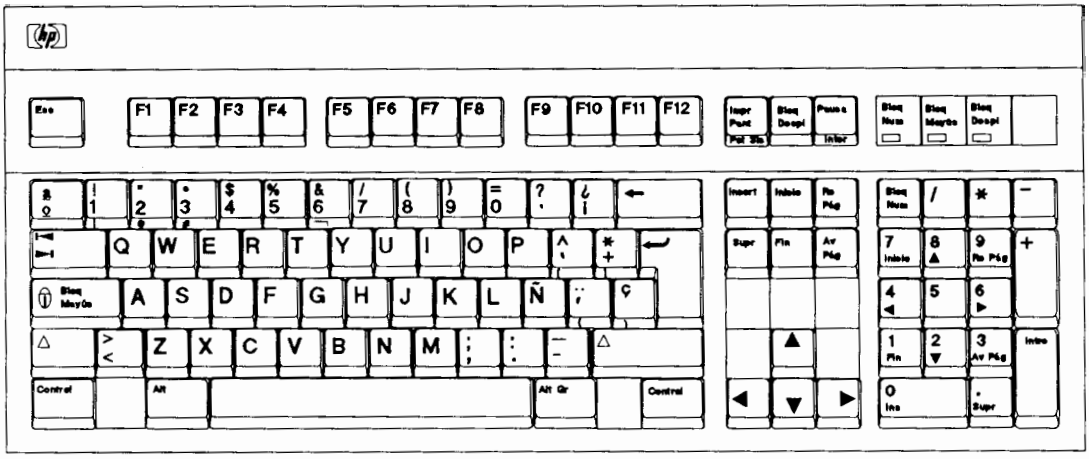
German



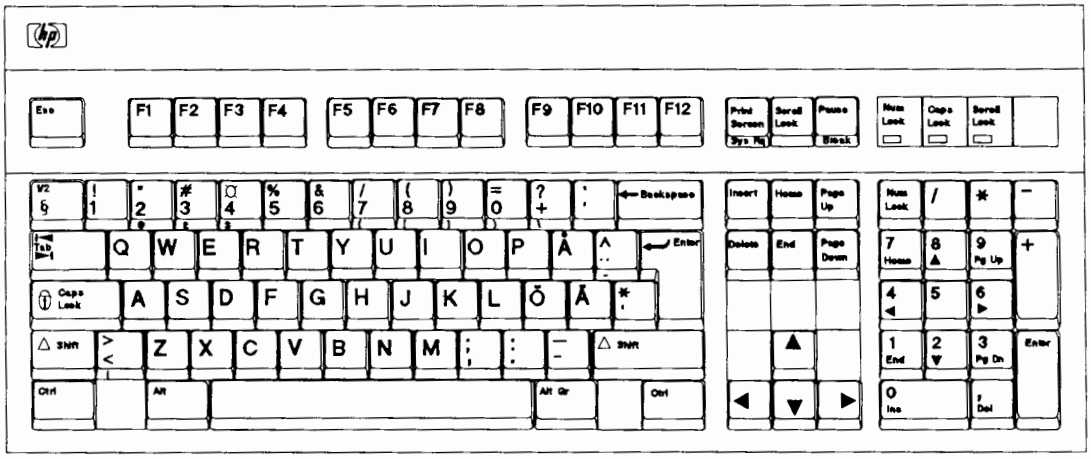
Italian



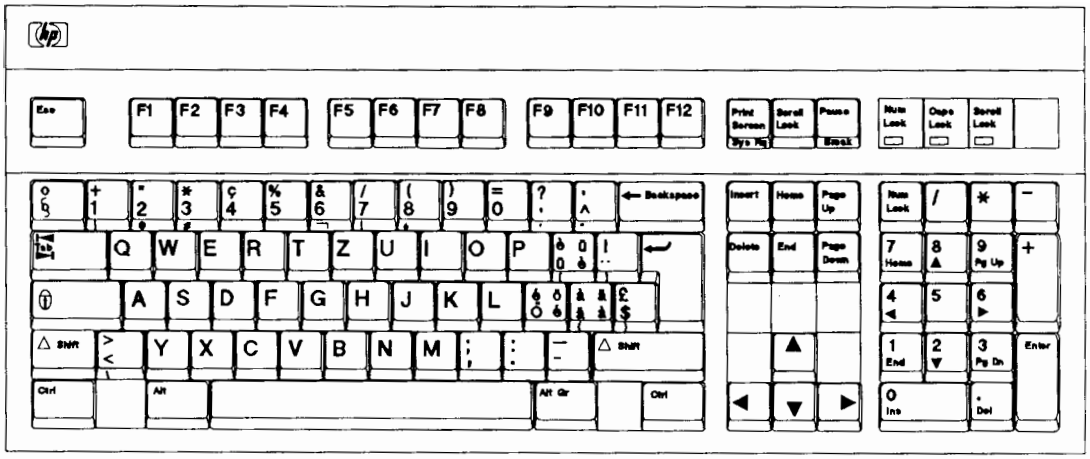
Norwegian



Spanish



Swedish/Finnish



Swiss French/Swiss German

D

Regulatory Information

Notice for U.S.

FCC Statement

This equipment has been verified to comply with the limits for a Class B computing device, pursuant to Subpart J of Part 15 of FCC Rules. Only peripherals (computer input/output devices, terminals, printers, etc.) complying 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 verification 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.

Notice for Germany

Manufacturer's Declaration

This is to certify that the equipment in HP Vectra 486/25T and in HP Vectra 486/33T is in accordance with the Radio Interference Requirements of Directive FTZ 1046/84. The German Bundespost was notified that this equipment was put into circulation; the right to check the series for compliance with the requirements was granted.

If this equipment is to be operated with a system, and if the General License is being claimed, the complete system has to comply with the General Licensing requirements. If this equipment is to be operated with a system that has its own FTZ-Serial-License, and for which an operating license has been granted or requested, usually no further steps are necessary.

Compliance with applicable regulations depends on the use of shielded cables. These are to be provided by the user.

Notice for U.K.

Warning: UK BS6301

- Interconnection directly, or by way of any other apparatus, of ports marked "WARNING CONNECT ONLY APPARATUS COMPLYING WITH BS6301 TO THESE PORTS" with ports not so marked may produce hazardous conditions on the network and advice should be obtained from a competent engineer before such a connection is made.
- Connect only apparatus complying with BS6301 to the video port.
- Connection to the network must be disconnected before the equipment power plug is removed.
- Connection to the network must not be hard-wired.

The HP Vectra 486/25T PC and HP Vectra 486/33T PC is approved under approval number NS/G/1234/J/100003 for indirect connection to Public Telecommunication Systems in the UK.

Notice for Japan

VCCI Statement

この装置は，第二種情報装置（住宅地域又はその隣接した地域において使用されるべき情報装置）で住宅地域での電波障害防止を目的とした情報処理装置等電波障害自主規制協議会（VCCI）基準に適合しております。

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

取扱説明書に従って正しい取り扱いをして下さい。

E

HP Hardware Product Limited Warranty

Important: This appendix contains your hardware product warranty statement.

Warranty terms may be different in your country. If so, your Authorized HP Dealer or Hewlett-Packard Sales and Service Office can give you details.

One-Year Limited Hardware Warranty

Hewlett-Packard (HP) warrants this hardware product against defects in materials and workmanship for a period of one year from receipt by the end user.

If HP receives notice of such defects during the warranty period, HP will either, at its option, repair or replace products which prove to be defective.

Should HP be unable to repair or replace the product within a reasonable amount of time, the customer's alternate exclusive remedy shall be a refund of the purchase price upon return of the product.

Limitation of Warranty

The above warranty shall not apply to defects resulting from: misuse; unauthorized modification; operation outside the environmental specifications for the product; in-transit damage; improper maintenance; or defects resulting from use of non-HP software, accessories, media, supplies, consumables, or such items not designed for use with the product.

HP makes no other express warranty, whether written or oral, with respect to this product. Any implied warranty of merchantability or fitness is limited to the one-year duration of this written warranty. Some states or provinces

do not allow limitations on how long an implied warranty lasts, so the above limitation or exclusion may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state, or province to province.

Limitation of Liability and Remedies

The remedies provided above are the customer's sole and exclusive remedies. In no event shall HP be liable for any direct, indirect, special, incidental, or consequential damages, whether based on warranty, contract, tort, or any other legal theory.

The foregoing limitation of liability shall not apply in the event that any HP product sold hereunder is determined by a court of competent jurisdiction to be defective and to have directly caused bodily injury, death, or property damage; provided, that in no event shall HP's liability for property damage exceed the greater of $50,000 or the purchase price of the specific product that caused such damage.

Some states or provinces do not allow the exclusion or limitation of incidental or consequential damages—including lost profit—so the above limitation or exclusion may not apply to you.

Obtaining Warranty Service

To obtain warranty service, the product must be returned to a service facility designated by HP.

The product must be returned to one of the authorized service facilities within the country of original purchase. The Customer shall prepay shipping charges (and shall pay all duty and taxes) for products returned to HP for warranty service. Except for products returned to the Customer from another country, HP shall pay for return of products to the Customer.

Under separate contractual agreement for onsite support with the customer, HP will repair at the customer's site. If no contractual agreement exists, HP may still repair onsite if requested by the customer. In that case, the customer is responsible for travel charges.

F

HP Software Product License Agreement and Software Product Limited Warranty

Important: This appendix contains your software product license agreement and warranty statement. Please read it carefully before opening the media envelope. The right to use this HP software product is sold only on the condition that the Customer agrees to the following License. If you do not agree to the terms of the License, you may return the unopened package for a full refund. HOWEVER, OPENING THE MEDIA ENVELOPE INDICATES YOUR ACCEPTANCE OF THESE TERMS AND CONDITIONS.

Software License Agreement

In return for the payment of the one-time fee for this software product, Customer receives from Hewlett- Packard (HP) a license to use the software product subject to the following terms and conditions:

- The product may be used without time limit on one personal computer or workstation.
- A separate license agreement and fee is required for each personal computer or workstation on which the product is used.
- The software product may not be duplicated or copied except for archive purposes, program error verification, or to replace defective media, and all copies made must bear the copyright notices contained in the original.
- This license and the software product may be transferred to a third party, provided the third party agrees to all the terms of this License Agreement and Customer does not retain any copies of the software product.
- The Customer may not reverse engineer, disassemble, or decompile the software.

- Purchase of this license does not transfer any right, title, or interest in the software product to Customer except as specifically set forth in this License Agreement. Customer is on notice that the software product is protected under the copyright laws. This software product may have been developed by an independent third party software supplier named in this package, which holds copyright or other proprietary rights to the software product. Customer may be held responsible by this supplier for any infringement of such rights by Customer.
- HP reserves the right to terminate this license upon breach. In the event of termination, Customer will either return all copies of the product to HP or, with HP's prior consent, provide HP with a certificate of destruction of all copies.
- In the event Customer modifies the software product or includes it in any other software program, upon termination of this license Customer agrees either to remove the software product or any portion thereof from the modified program and return it to HP or to provide HP with a certificate of destruction therefor.

Software Product Limited Warranty

Warranty terms may be different in your country. If so, your Authorized HP Dealer or HP Sales and Service Office can give you details.

Ninety-Day Limited Software Warranty

HP warrants for a period of ninety days from the date of purchase that the software product will execute its programming instructions when properly installed on the personal computer or workstation indicated on this package. HP does not warrant that the operation of the software will be uninterrupted or error free. In the event that this software product fails to execute its programming instructions during the warranty period, Customer's remedy shall be to return the diskettes or tape cartridges ("media") to HP for replacement. Should HP be unable to replace the media within a reasonable amount of time, Customer's alternate remedy shall be a refund of the purchase price upon return of the software product and all copies.

Media

HP warrants the media upon which this product is recorded to be free from defects in materials and workmanship under normal use for a period of ninety days from the date of purchase. In the event any media prove to be defective during the warranty period, Customer's remedy shall be to return the media to HP for replacement. Should HP be unable to replace the media within a reasonable amount of time, Customer's alternate remedy shall be a refund of the purchase price upon return of the software product and all copies.

Limitation of Warranty

The above warranty shall not apply to defects resulting from: misuse; unauthorized modification; operation outside the environmental specifications for the product; in-transit damage; improper maintenance; or defects resulting from use of non-HP software, accessories, media, supplies, consumables, or such items not designed for use with the product.

HP makes no other express warranty, whether written or oral, with respect to this product. Any implied warranty of merchantability or fitness is limited to the one-year duration of this written warranty. Some states or provinces do not allow limitations on how long an implied warranty lasts, so the above limitation or exclusion may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state, or province to province.

Limitation of Liability and Remedies

The remedies provided above are the customer's sole and exclusive remedies. In no event shall HP be liable for any direct, indirect, special, incidental, or consequential damages, whether based on warranty, contract, tort, or any other legal theory.

The foregoing limitation of liability shall not apply in the event that any HP product sold hereunder is determined by a court of competent jurisdiction to be defective and to have directly caused bodily injury, death, or property damage; provided, that in no event shall HP's liability for property damage exceed the greater of $50,000 or the purchase price of the specific product that caused such damage.

Some states or provinces do not allow the exclusion or limitation of incidental or consequential damages—including lost profit—so the above limitation or exclusion may not apply to you.

Obtaining Warranty Service

You may obtain Warranty service from your Authorized HP Dealer or HP Sales and Service Office.

Glossary

advanced method of configuration
A method of configuring your computer using EASY CONFIG. This method allows you to change functions and resources, and perform other tasks, as well as add boards and options.

automatic speed switching
An optional parameter in the HP Utility EXMODE which instructs the computer to run at its highest speed, switch automatically to 8 MHz when reading from a flexible disk, then switch back to its highest speed.

backup diskette
A diskette you create when you first run EASY CONFIG. It contains a backup copy of EASY CONFIG so that you do not have to use your master copy.

base memory
0 KB to 640 KB of address space in the standard memory (0 KB to 1 MB). MS-DOS resides in base memory. Also called conventional memory.

basic method of configuration
A method of configuring your computer using EASY CONFIG. This method only allows you to add or delete boards and options. If you want to change the functions or resources on your boards, or perform other tasks, use the advanced method. (*See* advanced method of configuration.)

BIOS
Basic Input/Output System. Code in your computer's ROM (read-only-memory) that provides the power-on self-test and other operating functions.

board
A printed circuit assembly (PCA). Also called a card or adapter.

bus
A common data path (electrical connection) over which data is transported.

bus-master board
A board that contains its own microprocessor and can take temporary control of the computer from the 80486 microprocessor.

CAD
Computer-aided design. The capability of a computer to be used for automated design through visual devices.

CFG file
A configuration file. Every board or option you plan to add to your computer needs a CFG (configuration) file. This file tells EASY CONFIG what resources the board will use, the best placement of the board in your computer, and whether you need to set any jumpers or switches on the board. Refer to Chapter 8 for information about where to locate the CFG files, and how to copy them to your system configuration work diskette.

CMOS memory
A separate portion of your computer's memory, the contents of which are preserved when you turn off the computer. CMOS memory stores information that must be maintained, such as your computer's configuration. Also called nonvolatile memory, nonvolatile RAM (NVRAM), or battery backed-up CMOS.

configuration
The hardware you have connected to form your computer, and the way you have instructed your computer to use the hardware. Hardware can include drives, boards, printers, displays , etc.

configuration file
See CFG File.

conventional memory
0 KB to 640 KB of address space in standard memory (0 KB to 1 MB). MS-DOS resides in conventional memory. Also called base memory.

coprocessor

A chip that performs mathematical operations, extending the power of the main processor. Also called a floating point or math coprocessor. A coprocessor will enhance the performance of any application that does floating point calculations. These applications include various CAD and spreadsheet programs.

differential bus

A form of the SCSI bus. A differential bus has balanced transmission line pairs, with greater immunity to noise. The differential bus is used in installations requiring long cable lengths or high bus speeds. (*See* also single-ended bus.)

DMA channel

Direct Memory Access channel. A circuit that facilitates high-speed transfer of information between a device and the system memory. DMA channels may work simultaneously.

EASY CONFIG

The Extended ISA Configuration Utility. EASY CONFIG is an MS-DOS-based configuration utility program that helps you configure your computer for both EISA and ISA accessories. You must use EASY CONFIG when you first set up your computer and each time you change its configuration.

EISA

Extended Industry Standard Architecture, an enhancement of the 8-bit and 16-bit Industry Standard Architecture (ISA) technology. EISA computers use a 32-bit EISA data bus which allows you to install EISA as well as ISA accessory boards.

embedded-AT hard disk drive

A hard disk drive with the controller embedded into the drive electronics. An embedded-AT drive connects directly to a compatible AT system board without a separate controller board. Other drives have separate controller boards that are installed in slots and are connected to the drive by cables.

EXMODE
An HP Utility for MS-DOS users that lets you change the processor speed, the volume of the keyboard click, and turn memory cache on and off.

expanded memory
Memory that an expanded memory manager (such as HPMM) brings from extended memory above 1 MB into reserved memory below 1 MB for applications that can only access memory below 1 MB. This makes more memory available for large MS-DOS applications (such as spreadsheets), CAD programs, network drivers, disk caching, and RAM disk.

eXtended Memory Specification (XMS)
A software specification for managing memory above 640 KB that is not managed by MS-DOS or an expanded memory manager. HPMM is written to the eXtended Memory Specification.

extended memory
Memory above 1 MB. It is typically used for print spoolers, RAM disk, and disk caching. Operating Systems/2, UNIX, and XENIX use extended memory.

function
The work that a board performs. For example, one function of the HP Vectra PC system board is controlling video BIOS shadowing. A function of the keyboard/mouse/serial port board is determining the keyboard language. Boards can have more than one function.

host adapter
An interface board that connects two separate bus structures like the SCSI bus and a computer's AT bus.

HP Memory Manager (HPMM)
An HP Utility that creates expanded memory (which is usable by MS-DOS) by swapping blocks of base, reserved, and extended memory. Using expanded memory managers such as HPMM will increase the performance of your computer.

HPMM
See HP Memory Manager (HPMM).

HP Utilities
These are utilities for use with MS-DOS. The HP Utilities are EXMODE, RELOCATE, PrintCFG, and HPMM.

initialization
When referring to a hard disk drive, initialization is the process of applying a low-level format to the drive. Initialization is the process which must be completed prior to doing a standard drive format (sometimes called a high-level format).

initiator
A SCSI device that requests that an operation be performed by another SCSI device (the target).

I/O Port
The plug or socket on the computer through which input and output devices (such as the mouse and the keyboard and peripheral devices) are connected with the SPU.

IRQ
Interrupt request. A signal used by a device, such as a mouse, to inform the CPU that it is present and functioning.

ISA
Industry Standard Architecture. An architecture once used by all IBM-compatible personal computers. Successor to ISA is EISA, Extended Industry Standard Architecture.

jumper
A tiny cap-like device used to connect two pins on a circuit board. It is one way of defining the configuration of the board.

Logical Unit Number (LUN)
An encoded three-bit identifier for a logical unit.

Lotus-Intel-Microsoft Expanded Memory Specification (LIM EMS)
A software standard to which many programs comply. MS-DOS programs that comply with version 4.0 of this specification can use memory above 640 KB with the help of HPMM.

memory

The computer's activity center, where programs and data are kept temporarily while the processor does its assigned task. Memory does not distinguish between programs and data.

memory cache

A memory management system that copies a portion of your computer's memory into very high speed memory. This allows the processor to access frequently used pieces of information more quickly and efficiently.

memory modules

Miniature boards containing memory chips. You add memory modules to your existing memory board to increase the amount of available memory.

menu bar

In EASY CONFIG (advanced method of configuration), the second line on the screen. The menu bar displays the names of pull-down menus.

modeling mode

A mode in EASY CONFIG that allows a computer dealer or system integrator to model and save possible configurations for later use on different computers. The configuration is saved to a file rather than to CMOS.

multitasking

The act of running several programs simultaneously. For example, a user can be entering data on a spreadsheet program while an electronic mail program is transmitting messages in the background.

network server mode

A security measure that prevents unauthorized use of an input device (such as a keyboard or mouse) while your computer is running as an unattended network server. The computer will start, but no data is received from the keyboard until you enter a password.

nonvolatile memory

A separate portion of your computer's memory, the contents of which are preserved when you turn off the computer. Nonvolatile memory stores information that must be maintained, such as your computer's

configuration. Also called CMOS memory, nonvolatile RAM (NVRAM), or battery backed-up CMOS.

option
An accessory (other than a board) used with your computer. For example, a flexible disk drive and a mouse are both options. Note that some options connect to a board, while others do not.

pages
Blocks of memory (16 KB each) stored in extended memory above 1 MB which an expanded memory manager such as HPMM brings into memory below 1 MB so that MS-DOS applications can access it.

page frame
An unused block of addresses under 1 MB into which your expanded memory manager brings pages of information stored in extended memory. This swapping is done because MS-DOS applications can only use information that has a logical address under 1 MB.

parallel printer
A printer that accepts data transmitted from the computer through a parallel interface. A parallel interface transfers bits of information down a number of wires simultaneously.

power-on password
A security measure that you can use to prevent unauthorized use of your computer. After setting the password using EASY CONFIG, you will be prompted for it with a key symbol every time you start your computer.

Power-On Self-Test (POST)
A series of tests your computer performs when you turn on the power. If any of the power-on self-tests fail, a beep will sound and an error code will appear on your screen as a number. (Fatal errors are not displayed on your screen.)

PrintCFG
An HP Utility that allows you to view information about configuration (CFG) files.

pull-down menu
In EASY CONFIG (advanced method of configuration), a menu displayed when you select its name on the menu bar. You can display, or "pull down," the menu using the cursor control keys or your mouse.

RAM
Random-access memory. Standard memory that you can read and write to. It is volatile; that is, the data will be preserved only as long as the computer is on.

RELOCATE
An HP Utility for MS-DOS users. You use it to relocate device drivers and terminate-and-stay-resident (TSR) programs from conventional memory to reserved memory. It is used in conjunction with the HP Memory Manager (HPMM).

reserved memory
640 KB to 1 MB of address space. It is usually reserved for ROM, video, and expanded memory. Applications cannot directly use these addresses.

resource
An item such as a DMA channel, I/O port, IRQ level, or memory address that your boards and options use to carry out their functions. You allocate or change the resources available to your boards and options with EASY CONFIG.

resource conflict
A condition created when two boards or options are trying to use the same resources in your computer. EASY CONFIG will alert you to this situation. EASY CONFIG will advise you to change a jumper or switch setting on one of the boards to resolve the conflict. If neither board can be reconfigured, one of the boards will be deactivated by EASY CONFIG and must be removed.

ROM
Read-only-memory. Memory on a chip that contains permanent data (firmware). You can execute and read it, but you cannot write to it or change it with application programs. It is permanent; that is, turning off the computer does not alter it.

SCI files
See System Configuration Information (SCI) files

SCSI
Small Computer System Interface (pronounced "scuzzy"). SCSI is a high-speed input/output specification for small computers.

SCSI address
The logical address, from zero to seven, for a device connected to a SCSI bus. Address seven has the highest priority, address zero has the lowest.

SCSI bus
An interconnection system utilizing 50 parallel conductors to interconnect SCSI devices. A SCSI bus may have both an internal flat cable and an external shielded cable.

SCSI device
Any I/O board or storage unit connected to a SCSI bus and assigned a SCSI address.

shadowing
A technique where you copy the contents of a BIOS ROM from the board where it is located to your computer's RAM. This creates a "shadow image" in RAM of the BIOS ROM. After the BIOS is copied, the BIOS ROM on the board is turned off. When your computer executes a video function, it executies the function from your computer's RAM which is much faster than executing code from the BIOS ROM on the board.

single-ended bus
A form of the SCSI bus. The singled-ended bus is used for most internal SCSI installations. (*See* also differential bus.)

slots
The openings on the system board into which you can install boards. The memory board also has slots into which you can install memory modules.

switch
A small two-position switch on a board that you set to define the configuration of the board. There are two types of switches: rocker switches and sliding tab switches.

system board
The main circuit board into which all other boards, such as the memory board and video board, are connected. Also called the mother board.

System Configuration Information (SCI) files
Files created by EASY CONFIG that store the configuration of your computer. (Your configuration is also stored in nonvolatile memory.) When you have created a configuration with EASY CONFIG and select to **Save and Exit**, the configuration will automatically be saved to a System Configuration Information file named SYSTEM.SCI.

SYSTEM.SCI
The file created when you exit EASY CONFIG and save your configuration. This file contains all the configuration information you specified when you installed your boards and options. Also called a system configuration information (SCI) file.

target
A SCSI device that performs an operation requested by an initiator.

terminate-and-stay-resident (TSR) program
A program that sits invisibly in memory and comes forward when you press a specific combination of keys.

terminator
A resistor network used to ensure a transmission line or bus is maintained at its characteristic impedance.

TSR
See terminate-and-stay-resident (TSR) program

utility
A program that carries out routine procedures to make computer use easier.

Virtual Control Program Interface specification
(VCPI) A software interface standard that specifies how 80386 control programs and MS-DOS extenders communicate with each other. HPMM is written to the Virtual Control Program Interface specification.

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Reader Comment Card

Setting Up and Using Your HP Vectra 486/25T and 486/33T (5960-0750)

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