

Portable Vectra CS

HP D1004A Dual-Serial/EMS Adapter Owner's Manual



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D1004-90001

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**Personal Computer Group
974 E. Arques Avenue
P.O. Box 486
Sunnyvale, CA 94086, U.S.A.**

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Radio and Television Interference

The HP D1004A Dual-Serial/EMS Adapter generates and uses radio frequency energy. If not installed and used properly—that is, in strict accordance with the instructions in this manual—the computer can cause interference to radio and television reception. It has been tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation.

In the unlikely event that your system (computer and peripheral devices) does cause interference to radio or television reception (which can be determined by turning the system off and on), you are encouraged to try to correct the interference by one or more of the following measures:

- Reorient the receiving antenna.
- Reorient the system with respect to the receiver.
- Move the system away from the receiver.
- Make sure you use only shielded cables to connect peripheral devices to your computer.
- Make sure that all of your peripheral devices are certified Class B by the FCC.

Refer to *Setting Up the Portable Vectra* for more suggestions. If necessary, you should consult your dealer or an experienced radio/television technician for additional suggestions. You may find the following booklet, prepared by the Federal Communications Commission, helpful: *How to Identify and Resolve Radio-TV Interference Problems*. This booklet is available from the U.S. Government Printing Office, Washington, D.C. 20402, Stock Number 004-000-00345-4.

Contents

Before You Begin-2	Before You Begin
3	What Should I Read?
4	Handling Adapters and Chips Safely
5	Changing a Jumper Setting
	README.DOC File

Chapter 1	Installing the Dual-Serial/EMS Adapter
1-1	Before You Start
1-2	Configuring the Adapter
1-4	Placing the Adapter in the Computer
1-4	Removing the Battery
1-5	Opening the Bottomcase
1-8	Inserting the Adapter
1-10	Replacing the Bottomcase
1-10	Labeling the Connectors
1-11	Replacing the Battery
1-11	Returning the Computer to Use
1-12	Applying Power to the Adapter
1-12	Completing the Adapter Installation

Chapter 2

Installing Expanded Memory

- 2-1** Before You Start
- 2-2** Getting the Adapter
- 2-2** New Adapter
- 2-3** Existing Adapter in Computer
- 2-4** Configuring the Adapter for Expanded Memory
- 2-4** Enabling EMS
- 2-5** Setting EMS I/O Addresses
- 2-6** Inserting the Memory Chips
- 2-8** Placing the Adapter in the Computer
- 2-8** Running Diagnostics
- 2-10** Loading Expanded Memory Software
- 2-11** Copying Expanded Memory Software
- 2-11** Loading the Expanded Memory Manager (EMM)
- 2-14** Finishing the Memory Installation

Chapter 3

Using the Dual-Serial/EMS Adapter

- 3-1** Using the Serial Interface
- 3-2** Using Expanded Memory
- 3-3** Using Memory as Application Data Memory
- 3-3** Using Memory as a RAM Disc
- 3-5** Using Memory as a Print Spooler
- 3-5** Other Printer Commands
- 3-6** Allocating a Print Spooler
- 3-7** Using the Print Spooler
- 3-8** Using the Spooler Function Keys
- 3-9** Deleting a Print Spooler
- 3-10** Changing Buffer Size
- 3-10** Customizing Your Print Spooler
- 3-11** Memory Allocation Examples

Appendices and Index

A-2	Configuration Settings
A-2	Serial Configuration Settings
A-3	Serial Enable/Disable
A-3	XT/AT Setting
A-3	Communication Port Assignments
A-4	Interrupt Assignments
A-6	EMS Settings
A-6	EMS Enable/Disable Jumper
A-6	EMS I/O Addresses

Messages

B-1	Diagnostic Program Messages
B-3	Memory Manager Program Messages
B-6	RAM Disc Program Messages
B-8	Print Spooler Messages

Index-1	Index
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Before You Begin

The D1004A Dual-Serial/EMS Adapter has two main features:

- Two serial interfaces—one with a 9-pin RS-232-C connector and the other with a 25-pin RS-232-C/HP-422 connector.

Many computer peripherals, such as printers, plotters, and modems, connect to the computer through a serial interface. The two different connectors allow you to connect most serial peripherals to your computer.

- 16 sockets for additional memory.

Although your computer has a generous amount of built-in memory, you may add up to 2M bytes more per adapter by plugging in 256K x 4, 120 nanosecond dynamic RAM, called memory chips in this manual. Memory may be added in 256K-byte increments. You can have up to three dual-serial/EMS adapters in your computer for a total of 6M bytes of expanded memory.

Expanded memory can be used as:

- Application data memory. Software that is written to use expanded memory can often run more quickly and process more information.
- RAM disc. You can use the memory just like a disc drive, with one exception. Any information stored on the RAM disc is lost when you turn off the computer.
- Print spooler. By using memory as a print spooler, you can continue using your computer when you have directed it to print something.

What Should I Read?

This manual contains directions for both installing and using the adapter. Your adapter may already have been installed into your computer by the factory or your dealer. Your System Checklist will tell you if the adapter is installed. If the adapter was factory or dealer installed, this manual was included to provide operating instructions for the adapter. Check the chapter descriptions below to see which chapters to read.

- Chapter 1, "Installing the Dual-Serial/EMS Adapter," gives directions for installing the adapter in your computer. If the adapter is not already installed, you must follow the steps in this chapter before you can use it.

- Chapter 2, "Installing Expanded Memory," gives directions for installing memory and making it available for use.

If memory chips are not already installed or if you add more memory to the adapter, you must follow the steps in this chapter.

If the adapter and expanded memory are already installed, follow the steps in "Loading Expanded Memory Software" on page 2-10.

- Chapter 3, "Using the Dual-Serial/EMS Adapter," explains how to use the two serial interfaces and the expanded memory.
- Appendix A, "Configuration Settings," gives the meaning of different switch and jumper settings on the adapter.

Handling Adapters and Chips Safely

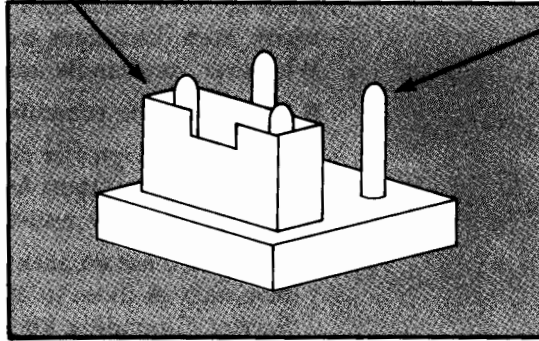
Follow these guidelines to minimize the chance of damaging your computer, adapter, and chips.

- **HANDLE GENTLY.** Handle as little as possible. Do not drop or handle roughly. Take care during unpacking and during installation.
- **PROTECT FROM STATIC ELECTRICITY.** Adapters and chips are easily damaged by small amounts of static electricity, even discharges too small for a person to notice. Whenever you handle adapters or chips:
 - Make sure the computer is turned off.
 - Leave the adapter or chip in its antistatic bag until it is installed. If you must leave for a while, replace the chip or adapter in the antistatic bag.
 - If you can, use an antistatic wrist strap and a grounding mat such as those in the Electrically Conductive Field Service Grounding Kit (HP 9300-0933.)
 - If you don't have a grounding kit, help discharge static electricity by touching a nearby metal surface for 5 seconds before removing the adapter or chips from the antistatic bag.
 - Before you remove the adapter or chip from the antistatic bag, touch the surface of the bag first to help discharge static electricity.
 - When you remove the adapter or chip from the antistatic bag, handle adapters only by the edges, and handle chips only by the edges. *Try not to touch electrical components, traces, or connectors.*
 - Save the antistatic bag so you can protect adapters and chips if you remove them from the computer.

Changing a Jumper Setting

The dual-serial/EMS adapter has a number of settings on it. These settings control such things as enabling or disabling the expanded memory. Most of these settings are made by *jumper*s.

Jumper cap covering pins (shown as)
Uncovered set of pins (shown as)



In this manual, the jumper locations are represented by tables.

For example, the table below shows that the jumper cap is sitting over the set of pins that correspond to Setting 2. The settings for each set of pins are marked on the adapter.

Setting	Meaning
<input type="radio"/> <input type="radio"/>	Setting 1
<input type="checkbox"/>	Setting 2

Most people can leave the jumpers where they are — their default settings. Chapters 1 and 2 explain the meaning of the default jumper settings, and appendix A shows other settings.

To change the jumper setting:

1. Grasp the jumper cap by its edges.
2. Pull the jumper cap straight up.
3. Position the jumper cap over the new location.
4. Push the jumper cap straight down.
5. Record the new setting in the Configuration Inventory Sheet in the *Setting Up* manual for your computer.

README.DOC File

To provide you with the most up-to-date information on the adapter, we have included a file named README.DOC on the EMS Software disc. This file contains information that was not available when this manual was printed.

Examine README.DOC with any text editor that reads ASCII text files or by using the MS®-DOS TYPE command.



Installing the Dual-Serial/ EMS Adapter

This chapter shows you how to install the dual-serial/EMS adapter in your Portable Vectra CS computer. There are three main steps involved:

- 1.** Configuring the adapter.
 - a.** Changing the serial configuration settings, if necessary (page 1-2.)
 - b.** Installing expanded memory chips, if desired (page 2-6.)
 - c.** Changing the expanded memory settings, if expanded memory was added (page 2-4).
- 2.** Physically installing the adapter in the computer (page 1-4.)
- 3.** Loading the expanded memory software, if expanded memory was added (page 2-10.)

Before You Start

You need the following items to install the adapter:

- A Portable Vectra CS computer.
- The D1004A Dual-Serial/EMS adapter.
- A small flat-blade or T15 Torx screwdriver.

Also have available:

- Connector labels.
- The Configuration Inventory Sheet in the *Setting Up* manual for your computer.
- The System Checklist that came with your computer.

If you are adding expanded memory by adding memory to an existing adapter, you will also need:

- 256K × 4, 120 nanosecond, dynamic RAM chips, such as HP D1008A 1M byte EMS RAM Kit.
- EMS software disc. If the adapter was installed in your computer at the factory, this disc is the Setup disc. If you received your adapter separately from the computer, it is the disc that was shipped with the adapter.
- System disc. Either the operating system work disc or hard disc (if you have one.)

If you are installing an adapter containing memory, you won't need the RAM kit, but you will need the disc with EMS software disc.

These instructions assume that you are familiar with how to do the following tasks:

- Removing and replacing the battery module.
- Setting the time and date.

Configuring the Adapter

Before you put the adapter into your computer, you may need to change settings or add expanded memory chips.

Warning

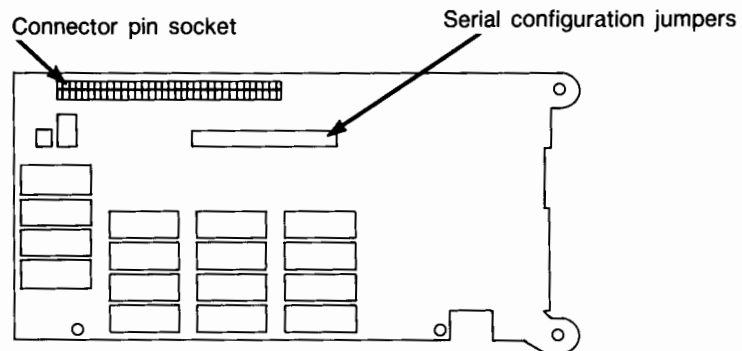


Before you remove the adapter from its protective wrapping or open the computer, read the section "Handling Adapters and Chips Safely" on page 3 in the "Before You Begin" section of this manual. If you do not take the proper precautions, you could damage your computer, adapter, or chips.

1

To prepare the adapter for installation:

1. Remove the adapter from the antistatic bag.
2. Take a minute to locate the items marked in the illustration. You'll need to know where they are later.



3. Most of the time you can leave the serial configuration settings as they are. *Unless the System Checklist that came with your computer indicates otherwise*, the factory default settings are:
 - Serial Enable.
 - 9-pin connector (port A): COM1, IRQ4 interrupt, I/O address 3F8-3FF.
 - 25-pin connector (port B): COM2, IRQ3 interrupt, I/O address 2F8-2FF.
 - XT.

If you do need to change these settings, for example, if you have more than one dual-serial/EMS adapter or are adding a dual-serial/EMS adapter to a computer that already contains a modem, refer to appendix A for information.

4. Record the settings you have chosen on the Configuration Inventory Sheet for future use.
5. If you are adding EMS memory chips to your adapter, do it now. Refer to the instructions in "Installing Expanded Memory" on page 2-1. Then continue with the next section in this chapter, "Placing the Adapter in the Computer."

The adapter is now ready to be put into your computer.

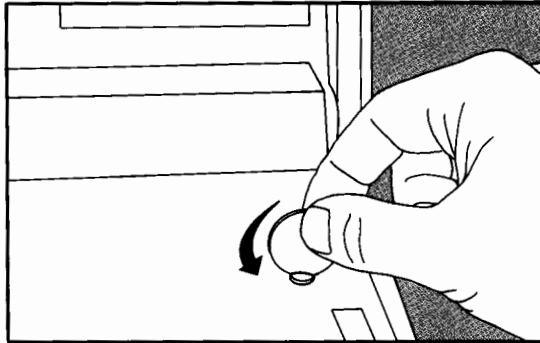
Placing the Adapter in the Computer

Removing the Battery

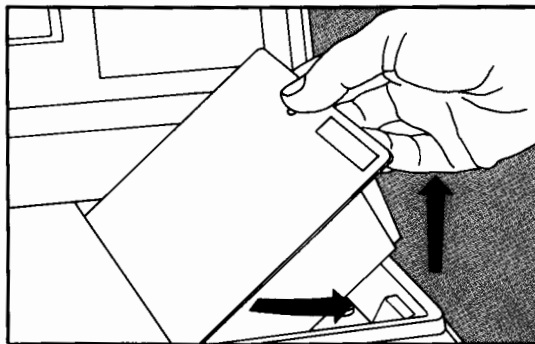
To remove the system battery module:

1. Make sure the computer and any connected peripheral equipment are turned off. Also make sure the recharger is disconnected from the computer.

2. Use a coin to turn the battery holding screw counter-clockwise to loosen the battery module. It will spring up slightly.



3. Raise the right side of the battery module up and then slide it out of the slot.

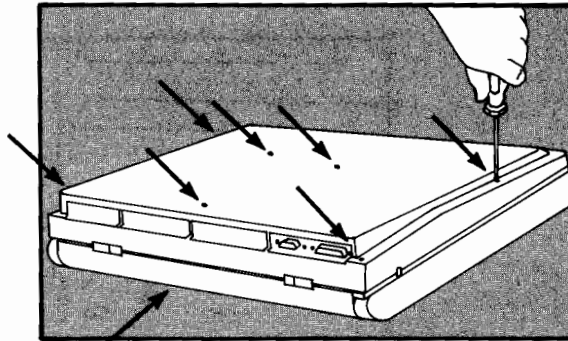


Opening the Bottomcase

Follow these instructions to open the back of the computer:

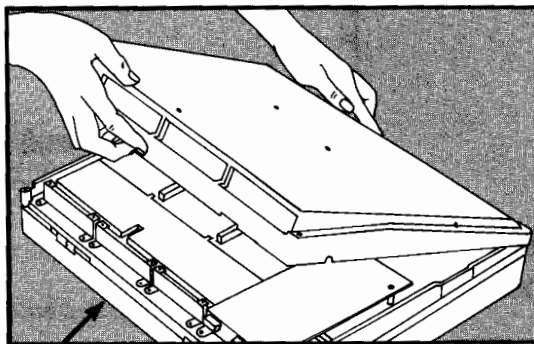
1. Close the computer so that it is securely latched.

2. Turn the computer over so the back is toward you. Notice the seven screws that hold the bottom plate in place.



Back of computer

3. Remove the seven screws shown in the previous illustration using a flat-blade or T15 Torx screwdriver. Save the screws, you'll need them to put the bottom plate back on.
4. Hold the bottomcase as shown below. Lift the bottomcase up and off.



Back of computer

1-6 Installing the Dual-Serial/EMS Adapter

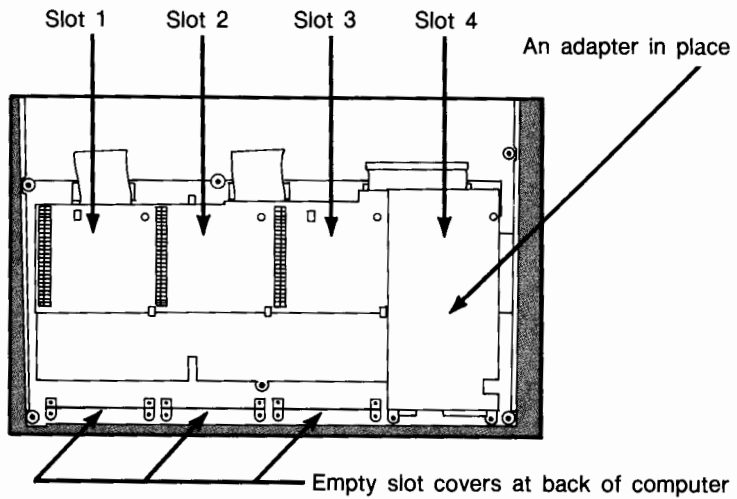
Caution



The components inside the computer are extremely sensitive and can be permanently damaged by static electricity. Avoid touching anything inside the computer except that which is expressly described in this procedure.

1

5. Select an accessory adapter slot in which to install the adapter. You may choose any empty slot except slot 4.

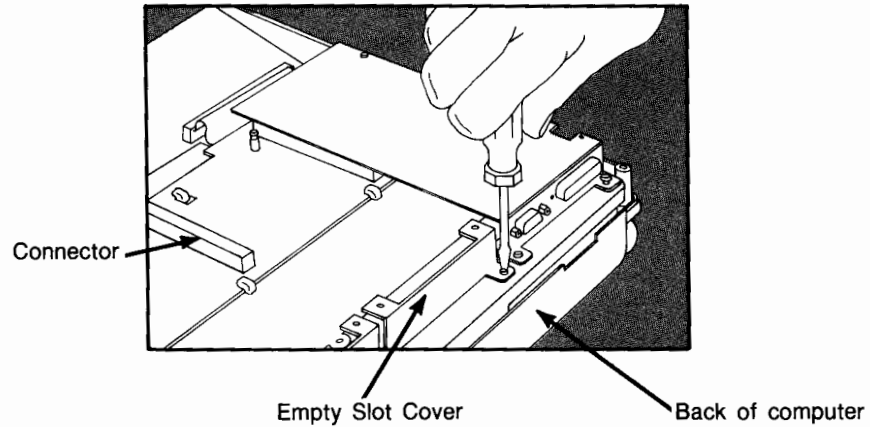


6. Turn to the Configuration Inventory Sheet in the back of the computer *Setting Up* manual, and record the information requested there for the slot you chose.

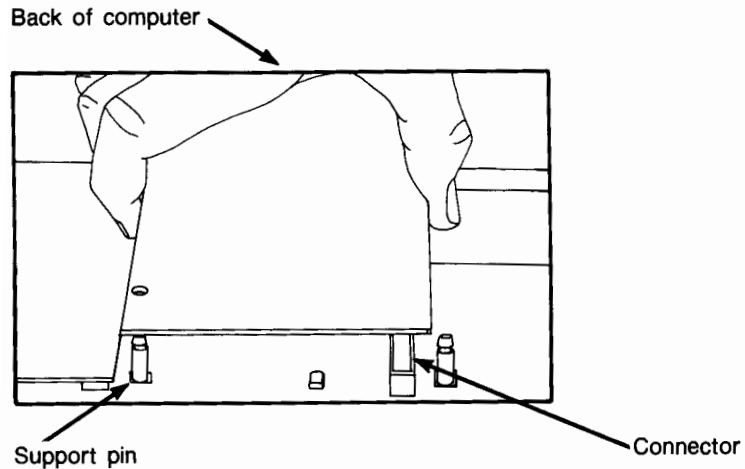
Inserting the Adapter

Follow these directions to install the adapter in your computer.

1. Unscrew the two screws holding the empty-slot cover in place. Keep the screws for later use. Remove the empty-slot cover and save it in case you ever remove the adapter.

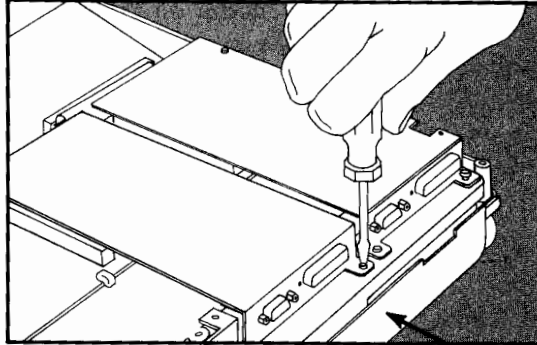


2. Handling the adapter only by its edges, align the adapter with the slot you have chosen. To do this:
 - Line up the connector on the adapter with the connector on the computer.
 - Line up the plastic support pin on the computer with the support-pin hole on the adapter.



3. Firmly and evenly press the aligned adapter into place. The adapter is properly seated when the connector on the adapter is fully inside the connector on the computer and when the support pin snaps through the support hole on the adapter. If the pins are showing through the cutout on the side of the connector, the adapter isn't fully seated.

- Secure the adapter by inserting the two screws you removed when you took out the empty-slot cover.



Back of computer

Replacing the Bottomcase

Replacing the bottomcase is the reverse of removing it.

- Line up the hinges on the front of the bottomcase.
- Rotate the bottomcase down and in.
- Replace the seven screws to hold the bottomcase in place.
- Turn the computer right side up.

Labeling the Connectors

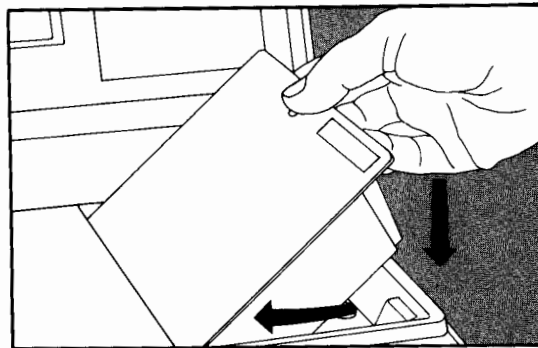
A sheet of self-sticking labels was provided in the box with your computer or adapter to help you identify the communication ports that you have assigned. For example, if you assign the 9-pin connector to COM1, pull off the COM1 label and stick it on the plastic case above the connector.

Replacing the Battery

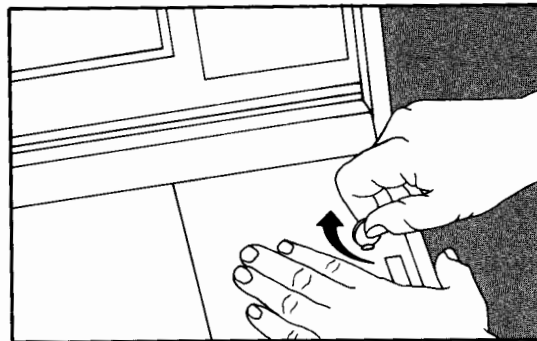


To replace the battery module:

1. Insert the left side of the battery module into the slot first; then lower the right side into the slot.



2. While holding the battery module firmly in place, tighten the holding screw with a coin by turning it clockwise.



Returning the Computer to Use

To make the computer ready for use:

1. Turn the computer on.
2. Run the Setup program to reset the system clock and re-specify any relevant configuration information. (With the battery out, the computer lost all setup information.)

Applying Power to the Adapter

When the computer is turned on, power is automatically applied to the adapter as well.

Completing the Adapter Installation

If you have no expanded memory, you are finished now. "Using the Serial Interface" on page 3-1 gives more information about the serial interfaces.

If you have added expanded memory to your computer, either by adding memory chips to an existing adapter or by adding a new adapter containing expanded memory, you need to tell your computer how to use that memory. Turn to "Loading Expanded Memory Software" on page 2-9, and follow those instructions to the end of chapter 2.

Installing Expanded Memory

The dual-serial/EMS adapter contains 16 sockets in which to add expanded memory chips (the integrated circuit containing the memory). You can add up to 2M bytes of expanded memory on the adapter in 256K byte increments.

Adding memory involves six steps:

1. Getting the adapter.
2. Configuring the adapter for expanded memory
3. Installing the memory chips onto the adapter.
4. Installing the adapter into your computer.
5. Running a diagnostic program to verify that everything is working right.
6. Loading the expanded memory software.

Before You Start

You need the following items to install memory chips:

- A Portable Vectra CS computer.
- The D1004A Dual-Serial/EMS adapter.
- 256K x 4, 120 nanosecond, dynamic RAM chips, such as HP D1008A 1M byte EMS RAM Kit.

- A small flat-blade or T15 Torx screwdriver.
- EMS software disc. If the adapter was installed at the factory, this disc is the Setup disc. If you received your adapter separately from your computer, it is the disc that was shipped with the adapter.
- System disc. Either the operating system work disc or the hard disc (if you have one.)

Also have available:

- The System Checklist that came with your computer.
- The Configuration Inventory Sheet in the computer *Setting Up* manual.

These instructions assume that you are familiar with how to do the following tasks:

- Copy files from a flexible disc to your operating system work disc or hard disc.
- Add a line to the CONFIG.SYS file.

If you don't know how to do either of these tasks, refer to your operating system documentation for more information.

Getting the Adapter

New Adapter

If you are adding memory chips to an adapter before installing the adapter in a computer, you were directed to this chapter from chapter 1. In that case, you have already removed the adapter from its antistatic bag. Go to "Configuring the Adapter for Expanded Memory" on page 2-4.

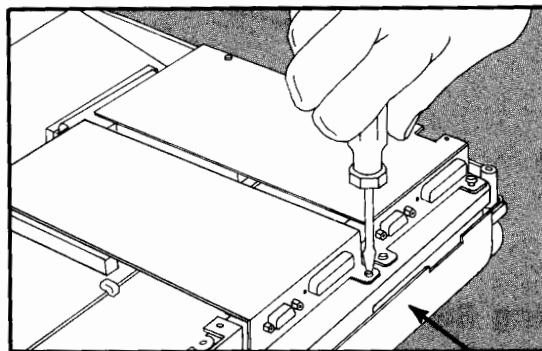
Existing Adapter in Computer

If you have been using the adapter before now, you will first have to remove it from your computer.

To remove the adapter from your computer:

1. Remove the battery and bottomcase. If you don't know how, refer to chapter 1.
2. Find the dual-serial/EMS adapter. If it was installed at the factory, the System Checklist shows you what slot the adapter is in. If you installed it yourself, the Configuration Inventory Sheet should indicate what slot the adapter is in.
3. Remove the two screws at the end of the adapter.

2



Back of computer

4. Handling the adapter by its edges, carefully lift it straight up out of the computer.

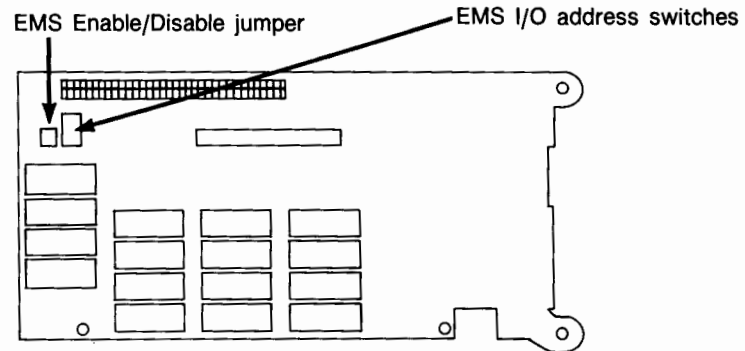
Configuring the Adapter for Expanded Memory

2

Since the adapter can run without any added memory, you must tell it when you have added memory. Only then can the adapter make use of this additional memory. This involves two steps:

- Enabling EMS.
- Setting the EMS I/O addresses.

Take a minute to locate the items marked in the illustration. You'll need to know where they are later.



Enabling EMS

The EMS Enable/Disable jumper in the upper left of the adapter tells the computer whether or not to use the expanded memory on the adapter. Ensure that the EMS Enable/Disable jumper is set to the Enable position as shown in table 2-1.*

Table 2-1. Enable/Disable Jumper

Setting	Meaning
○ ○	Disable EMS
□	Enable EMS

* Refer to "Changing a Jumper Setting" on page 4 in the "Before You Begin" section of this manual if you need directions about how to interpret the table and how to change to another setting.

2-4 Installing Expanded Memory

Setting EMS I/O Addresses

The EMS I/O address is to the computer like your postal address is to the Post Office. The computer uses the address to communicate with the correct adapter. The addresses for the serial portion of the adapter are automatically defined with the communication port selection, but the addresses for the EMS portion of the adapter are set by moving a slider switch.

To set the EMS I/O addresses:

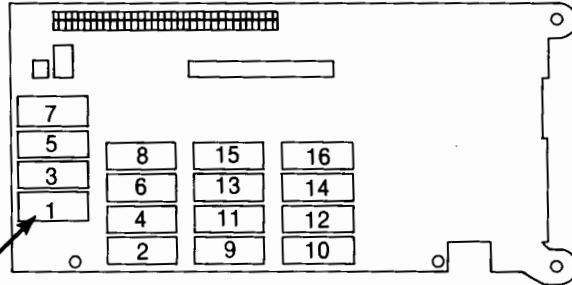
2

1. Determine the EMS I/O address setting to use. Normally, the setting that is already on the adapter will work, and you don't need to change anything. If you can't decide what your setting is from the list below, refer to table A-6 on page A-8. You'll need to know this address when loading the EMS software later in the installation procedure.
 - For adapters that weren't factory-installed, this setting is 258/259.
 - If your adapter was installed at the factory refer to the *System Checklist* for the default setting.
 - If you have other adapters in your computer, especially other dual-serial/EMS adapters, you may need to change the EMS I/O addresses. Refer to "EMS I/O Addresses" on page A-6 for more information.
2. Write the EMS I/O address on the Configuration Inventory Sheet in the *Setting Up* manual for your computer. It will be easy to check what I/O addresses are in use if you want to add another adapter sometime in the future.

Inserting the Memory Chips

2

The dual-serial/EMS adapter contains 16 sockets in which you may insert the memory chips. Chips *must* be inserted in pairs. Each pair of memory chips installed adds 256K bytes to the adapter. Install them starting from the lower left of the adapter, and continuing in the order shown in the illustration (directions are on the next page.)



Begin installing chips here

Caution

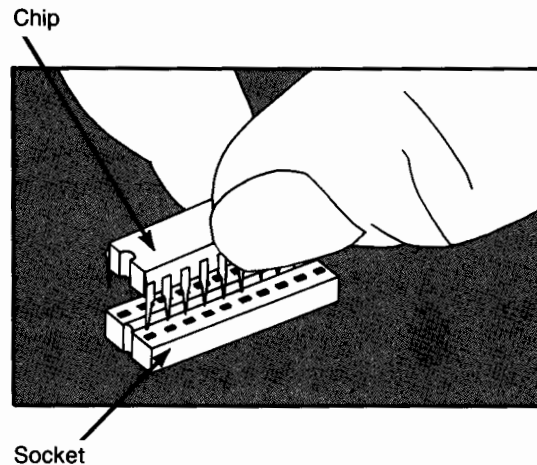


Before you remove the chip from its protective wrapping, read the section "Handling Adapters and Chips Safely" on page 3 in the "Before You Begin" section of this manual. If you do not take the proper precautions, you could damage your computer, adapter, or chips.

To install memory chips:

- 1.** Remove the chips from the antistatic bag.
- 2.** Align the chip with the socket:
 - Notice that one end of the chip is marked in some way, for example, a circle, dot of paint, or notch.
 - Notice that one end of the socket is also marked in some way, although maybe not with the same symbol as the chip.
 - Orient the chip so that the marked end of the chip is over the marked end of the socket.

2



- 3.** Make sure that all the pins on the chip are aligned with the holes on the socket.
- 4.** Press firmly to seat the chip in the socket.
- 5.** Check that all the pins went into the socket holes. If not, carefully lift the chip up, realign it, and reinsert it.

Placing the Adapter in the Computer

2

When you have inserted all the chips, you are ready to insert the dual-serial/EMS adapter into the computer. Follow the directions in "Inserting the Adapter" on page 1-7 through "Applying Power to the Adapter" on page 1-10. Then continue with the next section in this chapter, "Running Diagnostics."

Running Diagnostics

The diagnostic program on the EMS software disc checks the expanded memory chips and reports any problems. It also suggests a page frame address to use later when installing the Expanded Memory Manager (page 2-10.)

You may run this diagnostic program at any time. We recommend that you run it every time you add new memory chips.

Caution



The diagnostic program could destroy files in expanded memory. Save any important files to disc before running the diagnostic program.

To run the diagnostic program:

1. Make sure that your computer is on and the operating system is loaded.
2. Insert the EMS software disc into drive A.
3. Type:
A:EMDIAG
4. Press .

The program warns you that files in expanded memory might be ruined and asks if you want to continue.

5. Press Y to continue the diagnostic program. Press any other key if you want to stop the diagnostic program at this point.
6. If you have more than one dual-serial/EMS adapter in your computer, the program asks you which one you want to check. Type the number.
7. The program determines how much expanded memory is on the adapter, suggests a page frame address to use later in the installation process (page 2-12), and asks if you want to check that all the memory is functional.
8. Type Y if you want to continue. Type any other character if you want to stop without checking that all the expanded memory is functional.
9. Press .

A gauge appears on the display, showing how much memory has been checked. If you want to leave the diagnostic program partway through checking the memory, press . (It may take the computer a few seconds to respond.)

When the program is finished, it displays a map of the memory chip locations on the adapter and a description of how each passed the diagnostic tests.

Table 2-2. Memory Chip Results

Result	Action
GOOD	Chip passed diagnostic. No action necessary.
EMPTY	There is no memory chip in this location. No action necessary.
BAD	The chip failed the diagnostic test. Remove the bad chip from the adapter, move other chips so that all unused sockets are after all used sockets, according to the order shown on page 2-6. Since chips must be in pairs, you may have to remove a good chip if there aren't an even number of chips on the adapter. Re-run the diagnostic program.
MISSING	Chips must be added in pairs in the order shown on page 2-6. Any unused sockets must be after all used sockets.

If you want to check another dual-serial/EMS adapter, you must start the program over again.

Loading Expanded Memory Software

Loading the expanded memory software consists of two parts:

- Copying the software from the EMS software disc (or Setup disc if the adapter was factory-installed.)
- Adding an entry to your CONFIG.SYS file to direct the computer to use the expanded memory software.

Copying Expanded Memory Software

The expanded memory software must be on the disc that you use when you turn on your computer or reboot it. This disc is either the operating system work disc or the hard disc (if you have one.) This manual calls that disc the *system disc*.

To copy expanded memory software:

1. Find the *EMS software disc*. If your adapter was factory-installed, this is the Setup disc. If you received your adapter separately from your computer, this is the disc that came with the adapter.
2. Copy the following files from the expanded memory software disc to the system disc. Refer to your operating system documentation if you aren't familiar with how to copy files.
 - HPEMM.SYS
 - EMDISC.SYS
 - EMSPOOL.COM
3. If you want to run the diagnostic program that you used in the previous section without having to insert the disc every time, you can also copy that program to the system disc. You can then run the program any time by typing EMDIAG and pressing **[Enter]**. The file name to copy to the system disc is:
 - EMDIAG.EXE
4. Leave the system disc in place until told to remove it in the next section, "Loading the Expanded Memory Manager."



Loading the Expanded Memory Manager (EMM)

The Expanded Memory Manager (EMM) is a program that controls the use of the expanded memory. Briefly, EMM divides the expanded memory into 128 16K-byte chunks, called *pages*. EMM accesses the expanded memory pages through 4 16K-byte *windows*. Each of these windows can look at any one of the 128 expanded memory pages. These four windows together are called a *page frame*. The 64K-byte page frame is located in the original (main) computer memory at an address that you specify when you load EMM.

EMM allows other application software to make use of the memory you just added. When application software requests information in the expanded memory, EMM directs one of the four windows to cover the expanded memory page that contains the information that the application software wanted. The application software can then read from and write to that page through the window.

To load the Expanded Memory Manager:

1. Determine the page frame addresses you want to use from table 2-3. Notice the value of x that matches that choice. The diagnostic program described on page 2-9 suggests an address you can use. *If you don't know what address to use, choose a high value of x , such as 6 or 7.*

Table 2-3. Page Frame Addresses

x =	Address Space (in hexadecimal)
0	C4000-D3FFF
1	C8000-D7FFF
2	CC000-DBFFF
3	D0000-DFFFF
4	D4000-E3FFF
5	D8000-E7FFF
6	DC000-EBFFF
7	E0000-EFFFF

2. Using table 2-4, determine the value of z that matches the I/O address that you chose on page 2-5.

Table 2-4. EMS I/O Addresses

z =	EMS I/O Addresses (in hexadecimal)
5	258/259
6	268/269
0	208/209
1	218/219
A	2A8/2A9
B	2B8/2B9

2

3. Add the following line to your CONFIG.SYS file. If you don't know what a CONFIG.SYS file is or how to change it, refer to your MS-DOS documentation.

```
DEVICE=HPEMM.SYS Mx Iz D
```

where:

x = the memory location of the page frame (table 2-3.)
z = the EMS I/O address set on the adapter (table 2-4.)
D = abbreviated diagnostics (optional).

If you have more than one dual-serial/EMS adapter in your computer, use a separate Iz entry for each adapter, as shown in the second example below.

If the D is missing, the computer will perform fairly complete and time-consuming diagnostics every time you turn the computer on or reboot it (press the **Ctrl**, **Alt**, and **Del** keys simultaneously.) If the D is included, some diagnostics will be bypassed during a reboot, thereby saving time.

For example,

```
DEVICE=HPEMM.SYS M5 I5
```

says that you want the page frame addresses D8000-E7FFF and that you set the I/O address switches on the adapter to I/O addresses 258/259.

```
DEVICE=HPEMM.SYS M3 I5 I6 D
```

means that the page frame addresses will be at D0000-DFFFF, that there are two EMS adapters (one using I/O address 258/259 and the other using I/O address 268/269), and that abbreviated diagnostics are desired.

4. If you want to allocate some expanded memory for a print spooler or RAM disc, you should do that now, while you still have the system disc in the computer. If you want to use some memory for a RAM disc, refer to "Using Memory as a RAM Disc" on page 3-3. If you want to use some memory for a print spooler, refer to "Using Memory as a Print Spooler" on page 3-5.
5. Reboot the computer by pressing the **Ctrl**, **Alt**, and **Del** keys simultaneously. EMM is now ready for use.
6. Remove the system disc.

You have now finished installing EMM. It is available for use until your computer is turned off. Since you added the `DEVICE=HPEMM` line to `CONFIG.SYS`, EMM will be loaded each time you turn on or reboot your computer.

Finishing the Memory Installation

You have now finished installing the expanded memory on the adapter and checking to see if it works. To learn how to use the adapter, read:

- "Using the Serial Interface" on page 3-1.
- "Using Expanded Memory" on page 3-2.
- "Configuration Settings" on page A-1.

Using the Dual-Serial/EMS Adapter

For information about how to use the serial interface and the expanded memory features of the dual-serial/EMS adapter, refer to:

- "Using the Serial Interface" on this page.
- "Using Expanded Memory" on page 3-2.

Using the Serial Interface

The serial interfaces consist of the serial connectors, the circuitry to support them, and the controller. You use the serial interfaces to enable your computer to communicate with most types of serial peripherals, such as printers or plotters.

The hardware for the serial ports provides the following functions:

- Full double buffering.
- Programmable baud rate from 50 to 19200.
- Programmable data format.
- Modem control.

Application software that uses the serial interface issues the correct commands to the adapter. If you want to use the serial interfaces without application software, use the MS-DOS `MODE` command to set the serial ports to a particular device, such as PRN or LPT1 for a printer, and to specify the functions in the list above. For information about the `MODE` command, refer to your MS-DOS documentation. For additional information about the serial interfaces, refer to the *Portable Vectra CS Technical Reference Manual*.

3 Using Expanded Memory

The expanded memory can be used in three ways:

- Application data memory. Refer to page 3-3.
- RAM disc. Refer to page 3-3.
- Print spooler. Refer to page 3-5.

The application data memory, RAM disc, and print spooler cannot share memory with each other. EMM will not let the total of the memory devoted to a RAM disc plus the memory devoted to a print spooler be greater than the total expanded memory available.

Examples of possible allocations of memory into one or more of these functions are given on page 3-11.

Note



You must load the Expanded Memory Manager (EMM) before you can use the expanded memory for anything, *even if the adapter and memory were factory-installed*. Refer to "Loading Expanded Memory Software" on page 2-10 for directions.

Using Memory as Application Data Memory

In chapter 2, you made the expanded memory available for application programs to use, with the Expanded Memory Manager (EMM) controlling pages and windows.

Not all application programs are able to use expanded memory. The ones that do usually say so on the package or in the program documentation. If the program can use expanded memory, it will determine how much expanded memory is available for its use.

Any expanded memory not allocated to a RAM disc or print spooler can be used for application data memory. You may want to change the RAM disc and print spooler allocations periodically until you find a combination that is best for the application you are using.

3

Using Memory as a RAM Disc

A RAM disc is a part of expanded memory that you allocate for use like a flexible disc or hard disc. A RAM disc is much faster than a flexible disc and about twice as fast as a hard disc. There is a drawback, however. When you turn off the computer, everything in RAM disc memory is lost. You must store any files you want to keep on flexible disc or some other medium.

Use a RAM disc as you would a flexible disc drive to create directories, store files, or store programs.

For example, this MS-DOS command:

```
COPY A:\MYFILE C:\NEWFILE
```

copies a file named MYFILE from a flexible disc to the RAM disc, C. The version of the file on the RAM disc will be named NEWFILE.

Caution

Remember, when you use expanded memory as RAM disc the information stored on the RAM disc is destroyed when you turn off or reboot the computer.

To allocate expanded memory for use as a RAM disc:

1. Ensure that the EMDISC.SYS file is on your system disc (either the operating system work disc or the hard disc if you have one.) If the file is not there, follow the directions in "Copying Expanded Memory Software" on page 2-10 to copy the file onto the system disc.
2. Add the following line to the CONFIG.SYS file in the same manner as you did to load EMM.

```
DEVICE=EMDISC.SYS n
```

where n = the amount (in K bytes) of memory you want to devote to the RAM disc. If the amount you specify is not a multiple of 16, your request will be rounded *up* to the nearest multiple of 16. (For example, both `DEVICE=EMDISC 100` and `DEVICE=EMDISC 112` will allocate 112K bytes of expanded memory for use as a RAM disc.)

Note

To create more than one RAM disc, include an additional line in the CONFIG.SYS file for each RAM disc you want to create. The RAM discs will be assigned drive designations in the order they appear in the file.

3. Make sure any important data in memory is saved, then press `Ctrl` `Alt` `Del` to reboot the computer and execute the new CONFIG.SYS file.

Using Memory as a Print Spooler



A print spooler is a program that lets you continue using your computer when you have directed it to print something. The information to be printed is copied from the computer's main memory into a *buffer* in expanded memory. Main memory is then free to do something else. The print spooler directs the printer to print whatever is in the spooler's buffer.

The action is analagous to an executive (main memory) needing a letter typed. The executive can type the letter, but loses productive time doing it. If the executive gives the letter to a secretary (print spooler), then the executive can resume management activities, while the secretary types the letter.

The print spooler is used with parallel printers (the type that connects to the printer/display adapter.)

A print spooler is *not* useful for:

- Serial printers (the type of printer that connects to the serial connectors on the dual-serial/EMS adapter.)
- Application software that creates a print buffer for itself, such as some word processing programs.
- Printers that have large buffers, such as Hewlett-Packard LaserJet printers. Most printers have buffers, but generally they are too small to hold an entire file at once.
- Computers connected to a LAN (local area network.)

Other Printer Commands

Multiple Character Set Utilities (MCS) are programs from Hewlett-Packard that convert from the PC-8 character set that your computer uses to the Roman-8 character set that some Hewlett-Packard printers use. Refer to *Using the Multiple Character Set Utilities* for more information.

If you want to use the print spooler in connection with the MCS command or the PRINT or GRAPHICS commands in MS-DOS, be sure the commands are issued in this order:

Allocating a Print Spooler

3

1. PRINT command.
2. MCS commands or GRAPHICS command.
3. EMSPOOL (spooler allocation) command.

For more information about the PRINT and GRAPHICS commands, refer to the MS-DOS *User's Reference* manual

Before you allocate expanded memory for a print spooler, you must determine the size of the buffer you want. A print spooler is most useful when the buffer size is about 10K or 10% larger, whichever is bigger, than the file you want to print. If the buffer size is smaller than the file to be printed, you lose most of the benefits of the spooler, because main memory must wait to move parts of the file into the buffer as it becomes free. If later on you find that you have underestimated the memory needed, you can remove and reallocate the buffer.

You can use the MS-DOS DIR command to see the size of files you already have (divide the number shown by 1024* to get K bytes.) A rough estimate is that one full page of text takes about 5K bytes.

To allocate expanded memory for use as a print spooler:

1. Ensure that the EMSPOOL.COM file is on the system disc (either the operating system work disc, or the hard disc if you have one.) If the file is not there, copy it from the EMS software disc to the system disc. Refer to page 2-9 if you need directions.
2. Type the following line at the DOS prompt:

```
EMSPOOL n
```

where n = the amount (in K bytes) of memory you want to devote to the print buffer.

If the amount you specify for the size parameter is not a multiple of 16, EMSPOOL will round the number *up* to the nearest multiple of 16. (For example, both EMSPOOL 110 and EMSPOOL 112 will allocate 112K bytes of expanded memory as the print buffer.)

* 1K bytes = 1024 bytes. However, many people use 1K = 1000 bytes for easier arithmetic.

3. Press `Enter`.

The print spooler is now available for use, but will be lost when you turn off or reboot your computer.

If you want the print spooler to be available every time you reboot or turn on your computer, add the line described in step 2 to the AUTOEXEC.BAT file. Any MCS installable device drivers you use should appear *before* the print spooler line in the AUTOEXEC.BAT file. If you don't know what a AUTOEXEC.BAT file is or how to change it, refer to your MS-DOS documentation.

Caution



Make sure that any important data in memory is saved before you reboot the computer.

3

Using the Print Spooler

If you have allocated expanded memory space for a print spooler, the print spooler will automatically run whenever you issue a print command or press a key to print anything.

The access light on the drive containing the file to be printed will turn on and will blink on and off until all the data is in the print spooler's buffer. When the light finally stays off, the spooler has copied the whole file into its buffer and you can continue with other activities. In some cases, your other activities might run slower while the spooler is working.

Caution



If you are using Microsoft Windows, DO NOT press `Print Screen` to summon the print spooler function keys unless you are using a particular application. If you press `Print Screen` while you are in Windows, your keyboard will be completely disabled and you will be forced to restart your computer.

Note

If you have more than one printer, the spooler will be assigned to the *first* parallel printer you use after allocating the buffer. Other printers remain unaffected.

Using the Spooler Function Keys

To display the print spooler function keys:

1. Press the **Print Screen** key.

If your computer is in alphanumeric mode, in most cases the spooler displays eight function keys, which are described in table 3-1, at the bottom of the display.

If your computer is in graphics mode, the spooler does not display the function keys, but the functions are still available.

2. Select the function you want and press the matching key (**F1** - **F8**). Refer to table 3-1 if the functions are not displayed.

The only function not available in graphics mode is **Printer Status** (**F4**). In both alphanumeric and graphics modes, pressing any key other than **F1** through **F8** will cause the computer to leave the print spooler.

3. Press **Exit Spooler** (**F8**) to leave the print spooler and return to what you were doing before you summoned the spooler function keys.

Table 3-1. Print Spooler Function Keys

Function Key	Title	Description of Function
F1	Print Screen	Causes the printer to skip to a new page and print what you have requested.
F2	Send a Form Feed	Causes the printer to skip to a new page.
F3	Pause/ Resume	Stops the printer after the contents of the printer's buffer are printed, but the spooler's buffer remains unaffected. An * beside Pause shows that the printer is paused. Press this key again to remove the * and resume printing.
F4	Printer Status	Shows the printer the spooler has selected and its status. If you have directed the spooler to print and nothing happened, use this function to help find out what is wrong. Press any key to redisplay the spooler function keys.
F5	Reset Printer	Acts the same as turning the printer off and back on again. Any special fonts or commands you have sent to the printer will be lost.
F6	Erase Buffer	Clears the spooler buffer and stops printing. Printing cannot be restarted since the information is gone from the buffer.
F8	Exit Spooler	Leaves the print spooler and returns to what you were doing before calling the spooler.

3

Deleting a Print Spooler

The print spooler is deleted whenever you turn off or reboot your computer. Remember, if you want to delete the spooler and you have the EMSPOOL command in your AUTOEXEC.BAT file, you must first remove the EMSPOOL entry in the AUTOEXEC.BAT file, then reboot the computer.

Changing Buffer Size

To change the buffer size, delete the buffer by turning off the computer, then reissue the EMSPOOL command with the new size parameter. Remember to change the EMSPOOL command in AUTOEXEC.BAT (if you have one) if you want the change to be permanent.

Customizing Your Print Spooler

You can customize your print spooler by using options available with the EMSPOOL command. The EMSPOOL command has the following syntax:

EMSPOOL *size option(s)*

A space should be used between EMSPOOL and *size* and between *size* and *option(s)*. *Size*, or buffer size, is the amount (in K bytes) of memory you want to devote to the print buffer.

Option(s) can be one or more of the following:

/a = No form feed after printing screen.

/b = No form feed before printing screen.

/g = Beep when finished with loading the screen into the print buffer.

/h = Send the character sequence `[Esc] [E]` to an HP printer when the `Reset Printer` (`[F5]`) key is pressed. This option may be needed with some Hewlett-Packard printers.

/r# = Specifies the number of characters to send to the print buffer every second (1-65535, default is 360).

A backslash (\) or a hyphen (-) may be substituted for any slash (/) shown above.

Options can be combined by listing them, separated by a space or a comma. For example,

```
EMSPOOL 160 /a /g
```

will allocate a print spooler with a 160 K byte buffer. When you press the `Print Screen` key (`[F1]`), the computer will beep after the screen has been loaded into the spooler buffer and you can continue. The printer will move to a new form before printing but not afterward.

If you don't specify */a* or */b*, the print spooler will insert a form feed both before and after each screen printed.

The *r#* parameter is used to speed or slow the transfer from the print buffer to the printer. Check the manual that came with your printer to find the number of characters per second it can print. There is no point in sending data any faster than that speed, and sending data too fast could cause the computer to produce an error. For example, if a printer can process 300 characters per second, the command to set the transfer rate would be:

```
EMSPool 160 /r300
```

If you have some of the options in place and want to change them, you have the following ways to do that:

- If you selected options by typing the EMSPool command from the keyboard, you must restart your computer and then reenter the EMSPool command.
- If you selected options from your AUTOEXEC.BAT file, you must modify the EMSPool command line in the file and then restart your computer.



Memory Allocation Examples

Example 1. Marie manages her many investments with several spreadsheets. None exceed 300K bytes (307,200 bytes*) in size, but she moves information back and forth between them often. She prints her results only at the end of a session, just before turning off her computer. The manual for her spreadsheet program states that it can use expanded memory.

Since she only uses the printer just before she's ready to turn off the computer, she doesn't need a print buffer at all. She doesn't include the line for the print buffer in AUTOEXEC.BAT. Since the spreadsheet manual doesn't specify how it uses expanded memory, it probably uses it as program data memory. So she doesn't allocate a RAM disc either.

* 1K byte = 1024 bytes. However, many people use 1K byte = 1000 bytes for easier arithmetic.

Marie has one dual-serial/EMS adapter with 1M byte* of expanded memory.

She makes these entries in the following files:

■ CONFIG.SYS:

```
DEVICE=HPEMM.SYS M5 I5 D
```

■ AUTOEXEC.BAT:

(no entry)

Her memory allocation is:

- Expanded memory page frame address D8000-E7FFF, EMS I/O address switches 258/259, abbreviated diagnostics.
- 0K bytes RAM disc.
- 0K bytes print spooler.
- 1M byte program data memory.

In the rare cases when she wants to do something else on her computer after finishing her investments, she allocates the print buffer by typing the print buffer line at the DOS prompt: `EMSP00L 300` before directing the spreadsheet to print results. That leaves 700K bytes of expanded memory free for other uses, until she turns the computer off. Then the whole 1M byte of expanded memory is available for program data memory again.

Example 2. John is a writer, working on a novel. Each chapter is about 50K bytes (51,200 bytes) long. The word processor he uses has a spelling checker, help functions, and special utilities totaling 500K bytes that are normally run from discs. He wants to have the word processor run from RAM disc because it's faster. He also wants the file he is working on to be in RAM disc for quick access.

John has two dual-serial/EMS adapters, with a total of 4M bytes of expanded memory.

* 1M byte = 1,048,576 bytes. However, many people use 1,000,000 bytes for easier arithmetic.

He makes these entries in the following files:

■ CONFIG.SYS:

```
DEVICE=HPEMM.SYS M5 I5 I6 D
```

```
DEVICE=EMDISC.SYS 600
```

■ AUTOEXEC.BAT:

```
EMSPPOOL 100
```

The memory allocation that results is:

- Expanded memory page frame addresses D8000-E7FFF, I/O addresses on the first adapter 258/259, I/O addresses on the second adapter 268/268, abbreviated diagnostics. **3**
- 608K bytes for a RAM disc. 500K bytes for the word processor and 100K bytes for text files (more than enough for the 50K-byte chapters.) The RAM disc allocator rounds up from the requested 600K bytes to the next multiple of 16.
- 112K bytes for a print spooler. The spooler is larger than his current largest chapter. The print spooler rounds up from the requested 100K bytes to the next multiple of 16.
- 3,280K bytes are left for application data memory.

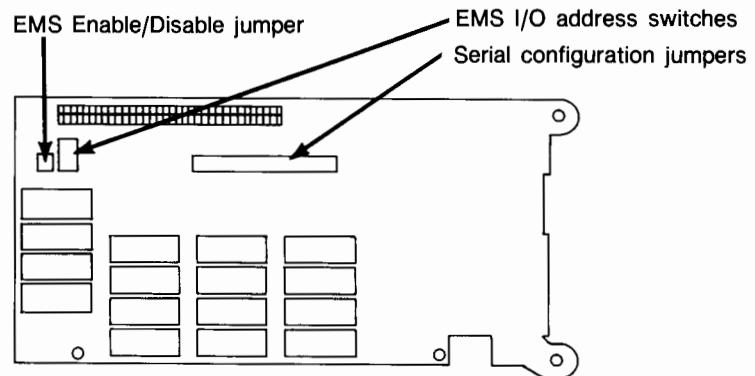
Because whatever is in RAM disc is lost when the computer is turned off, he loads the word processor and text files from disc each time he turns the computer, and stores the text onto disc at the end of each session.

A

Configuration Settings

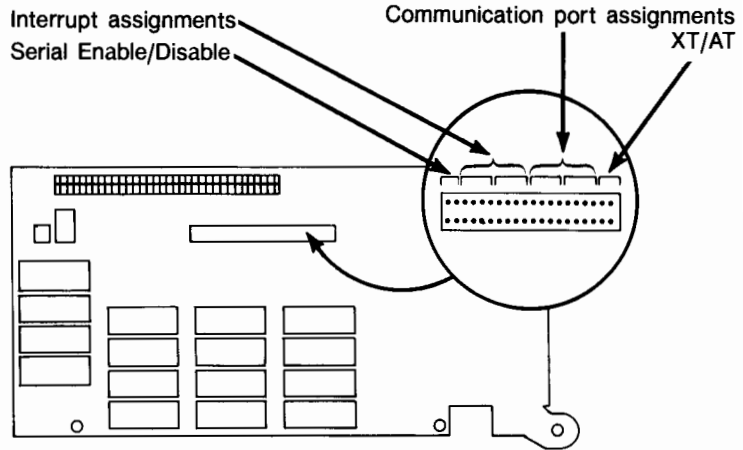
There are several places on the adapter where you set certain values. Since these can't be changed easily once the adapter is in the computer, they represent values that don't need to change often (if at all).

Notice where the different settings are located on the adapter.



Serial Configuration Settings

The serial configuration jumpers are located in a line at the center top of the adapter. There are four major groups as shown in the illustration. Each group is described following the illustration.



A

Serial Enable/Disable

To be able to use the serial interfaces on the adapter, you must set the serial Enable/Disable jumper to Enable, as shown in table A-1. If you have more than one dual-serial/EMS adapter in your computer, you may want to disable the serial interfaces on all but one of them.*

* Refer to "Changing a Jumper Setting" on page 4 in the "Before You Begin" section of this manual if you need directions how to interpret the table and how to change to another setting.

Table A-1. Serial Enable/Disable Jumpers

Setting	Meaning
○ ○	Disable serial
□	Enable serial

XT/AT Setting

Normally, this setting is left at XT, as shown in table A-2. Refer to the *Technical Reference Manual* if you need more information.

Table A-2. XT/AT Setting

Setting	Meaning
□	XT Mode
○ ○	AT Mode

Communication Port Assignments

If serial interfaces are enabled, they must be assigned to a communication (COM) port. These ports are names used by the operating system to refer to the serial interfaces you have enabled. Keep the following in mind when assigning communication ports:

- You cannot assign one serial interface to two different COM ports.
- You cannot assign both serial interfaces to the same COM port.
- If COM1 or COM2 is being used, then any jumper in the interrupt section is ignored.
- COM3 and COM4 may not be supported by some application programs. Refer to the owner's manual for that application. If you select COM3 or COM4, read the next section "Interrupt Assignments" to set the appropriate interrupt.



- The COM ports should be assigned in numerical order to avoid confusion between the application and the adapter. The interfaces assigned to the ports may be scattered among several adapters as long as one of them is assigned to COM1, another to COM2, and so on for as many ports as you need.

Table A-3 shows the default settings of COM1 for port A and COM2 for Port B.

Table A-3. Communication Ports

Setting	Meaning	I/O Addresses (in hexadecimal)
Port B (25-pin)		
○ ○	COM4	2E8-2EF
○ ○	COM3	3E8-3EF
□	COM2	2F8-2FF
○ ○	COM1	3F8-3FF
Port A (9-pin)		
○ ○	COM4	2E8-2EF
○ ○	COM3	3E8-3EF
○ ○	COM2	2F8-2FF
□	COM1	3F8-3FF

Interrupt Assignments

An interrupt is a signal from the adapter to the computer. Each adapter uses one or more interrupts uniquely, that is, no other adapter can use that interrupt. If you selected COM1 as your communication port assignment, then the interrupt IRQ4 is automatically used. If you selected COM2 as your communication port assignment, then the interrupt IRQ3 is automatically used.

- However, if you selected COM3 or COM4 as your communication port assignment, then you must specify which interrupt you want to associate with that port.

Don't use an interrupt that is already assigned to another port. Refer to the System Checklist or the Configuration Inventory Sheet for information about what interrupts are already assigned. The ones shown in table A-4 are generally unused by other adapters.

Table A-4 shows both COM3 and COM4 set to NONE. This is the default setting, since COM3 and COM4 aren't the default settings for either the 9-pin or the 25-pin connector.

Table A-4. Interrupt Assignments

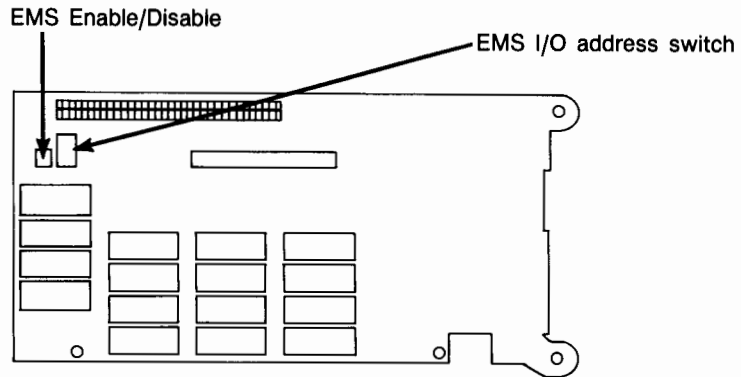
Setting	Meaning
COM4	
○ ○	IRQ7
○ ○	IRQ5
○ ○	IRQ2
<input type="checkbox"/>	NONE
COM3	
○ ○	IRQ7
○ ○	IRQ5
○ ○	IRQ2
<input type="checkbox"/>	NONE

A



EMS Settings

There are two EMS settings as shown in the illustration. Each setting is discussed following the illustration.



A EMS Enable/Disable Jumper

To be able to use expanded memory at all, the setting *must* be Enable, as shown in table A-5. If this is set to Disable, expanded memory won't be used, even if it is on the adapter.*

Table A-5. EMS Enable/Disable

Setting	Meaning
○ ○	Disable EMS
□	Enable EMS

EMS I/O Addresses

Most adapters require at least one I/O address (some require more.) The dual-serial/EMS adapter requires a pair for the expanded memory circuitry. The I/O addresses that you must use for the memory on this adapter depends on what other adapters are in your computer.

* Refer to "Changing a Jumper Setting" on page 4 in the "Before You Begin" section of this manual for directions how to interpret the table and how to change to another setting.

The main point to remember is that two adapters can't use the same address.

- If you have only one dual-serial/EMS adapter, leave it on the default setting.
- If you have other adapters, select a setting that isn't already in use by another adapter.

You should change the address if:

- You are adding a second or third dual-serial/EMS adapter.
- The dual-serial/EMS adapter worked before you added another adapter, but doesn't after the new adapter was installed.
- Another adapter worked before you installed the dual-serial/EMS adapter, but doesn't now.
- You know specifically what you want the setting to be.

Table A-6 lists recommended I/O addresses that are least likely to conflict with other adapters. Use the first address pair in table A-6 that isn't already assigned to another adapter. Once you have selected an EMS I/O address, mark it on the Configuration Inventory Sheet in the *Setting Up* manual for your computer. It will be easy to check what I/O addresses are in use if you want to add another adapter sometime in the future.

A



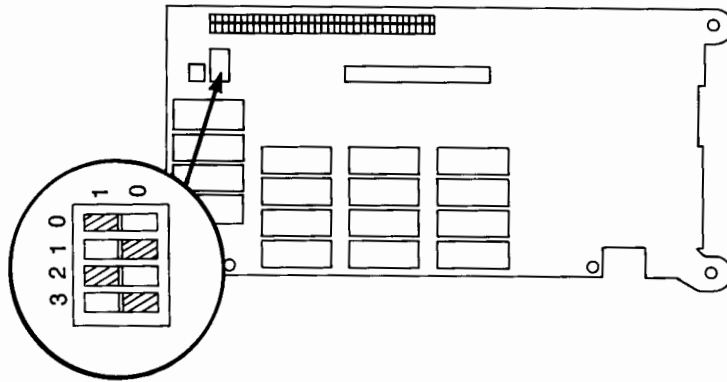


Table A-6. EMS I/O Addresses

EMS I/O Addresses (in hexadecimal)	Switch Setting			
	3	2	1	0
258/259	0	1	0	1
268/269	0	1	1	0
208/209	0	0	0	0
218/219	0	0	0	1
2A8/2A9	1	0	1	0
2B8/2B9	1	0	1	1

To set the EMS I/O addresses:

1. Determine what address you want from the preceding discussion.
2. Slide each switch so that the raised part is at the appropriate settings as shown in table A-6.

B

Messages

This appendix lists the messages that may be displayed if you run one of the four programs on the EMS software disc.

Some of the messages refer to the dual-serial/EMS adapter as the "Expanded Memory Card" or the "board".

Diagnostic Program Messages

Chapter 2 describes the use of the diagnostic program. The following messages may be encountered if you run the diagnostic program EMDIAG.SYS.

```
***** CAUTION *****
```

```
Your expanded memory has been corrupted. Make sure  
you restart your computer.
```

Condition: A test or partial test caused data in expanded memory to be overwritten.

Remedy: Restart your computer.

There are no Expanded Memory Cards installed

Condition: No Expanded Memory adapters are present in your computer.

Remedy: Install the adapter in the computer (refer to chapter 1).

There was no RAM found on the Expanded Memory Card(s)

Condition: The diagnostic program found no memory chips on the EMS adapter.

Remedy: Insert chips onto the EMS adapter (refer to chapter 2).

The EMS gate array chip test failed. An integrated circuit (IC) is not working properly. Please contact Hewlett-Packard.

Condition: An IC is not working properly or is not properly seated.

Remedy: Contact Hewlett-Packard service personnel.

Memory Manager Program Messages

The following messages may be encountered when the memory manager program HPEMM.SYS is used.



HPEMM is already installed.

Condition: You may have an extra `DEVICE=HPEMM.SYS` line in your `CONFIG.SYS` file.

Remedy: Modify your `CONFIG.SYS` file so that `DEVICE=HPEMM.SYS` appears only once, then restart your computer.

DEVICE=HPEMM.SYS option not 'M', 'I', or 'D'.

Condition: An option other than *M*, *I*, or *D* was used.

Remedy: Modify your `CONFIG.SYS` file so that only options *M*, *I*, or *D* are used, then restart your computer.

Bad or missing Expanded Memory Card

Condition: Either the I/O address you specified is incorrect, the EMS adapter is not functioning properly, or the adapter is not plugged in securely.

Remedy: An I/O address that you specified may be wrong. First, try specifying a new I/O address (refer to "Loading the Expanded Memory Manager" in chapter 2). If that doesn't work, make sure that the adapter is securely installed in the computer (chapter 1). Then restart your computer.

EMM system memory space is in use by some other board.

Condition: Another adapter is using the memory space.

Remedy: Select a different page frame address (refer to "Loading the Expanded Memory Manager" in chapter 2) and restart the computer.

No usable expanded memory pages found.

Condition: The page frame addresses specified are invalid.

Remedy: Use the page frame addresses recommended when you ran the diagnostic program.

DEVICE=HPEMM.SYS has more than one 'M' option.

Condition: More than one page frame address was specified.

Remedy: Modify the line in your CONFIG.SYS file so that it contains only one *M* option, then restart your computer.

DEVICE=HPEMM.SYS line has more than four 'I' options.

Condition: As stated in the message.

Remedy: Modify the DEVICE=HPEMM.SYS line in your CONFIG.SYS file so that it contains only one *I* option for each EMS adapter in your computer, then restart your computer.

B-4 Messages

DEVICE=HPEMM.SYS line contains a bad 'I' option.

Condition: One of the *I* option(s) was incorrect.

Remedy: Modify the DEVICE=HPEMM.SYS line in your CONFIG.SYS file so that it contains a valid *I* option for each EMS adapter in your computer, then restart your computer.

DEVICE=HPEMM.SYS line contains a bad 'M' option.

Condition: As stated in the message.

Remedy: Modify the DEVICE=HPEMM.SYS line in your CONFIG.SYS file so that it contains a valid *M* option, then restart your computer.

A required DEVICE=HPEMM.SYS option ('M' or 'I') is missing.

Condition: As stated in the message.

Remedy: Modify the DEVICE=HPEMM.SYS line in your CONFIG.SYS file so that it contains both *M* and *I* options, then restart your computer.

DEVICE=HPEMM.SYS line contains a duplicate 'I' option.

Condition: As stated in the message.

Remedy: Modify the DEVICE=HPEMM.SYS line in your CONFIG.SYS file so that it contains valid *I* options, then restart your computer.

HPEMM installation failed.

Condition: A bad I/O address or page frame address was specified.

Remedy: Modify the `DEVICE=HPEMM.SYS` line in your `CONFIG.SYS` file so that it contains valid *M* and *I* options, then restart your computer.

RAM Disc Program Messages

The following messages may be encountered when the RAM disc program (`EMDISC.SYS`) is used.

Expanded memory driver not installed

Condition: The expanded memory software must be loaded before you can allocate space for a RAM disc.

Remedy: Load the expanded memory software as described in chapter 2. Then you can allocate a RAM disc as described on page “Using Memory as a RAM Disc” in chapter 3.

Invalid size option.

Condition: You probably entered a non-digit character.

Remedy: Modify the `DEVICE=EMDISC.SYS` line in your `CONFIG.SYS` file so that it contains a valid size option, then restart your computer.

Can't allocate requested amount of expanded memory.

Condition: The amount specified was larger than the amount available.

Remedy: Modify the `DEVICE=EMDISC.SYS` line in your `CONFIG.SYS` file so that a smaller amount of memory is requested, then restart your computer.

Size option must request at least 16K.

Condition: As stated in the message.

Remedy: Modify the `DEVICE=EMDISC.SYS` line in your `CONFIG.SYS` file so that a larger amount of memory is requested, then restart your computer.

Size too small to support requested special options.

Condition: As stated in the message.

Remedy: Modify the `DEVICE=EMDISC.SYS` line in your `CONFIG.SYS` file so that a larger amount of memory is requested, then restart your computer.

Print Spooler Messages

The following messages may be encountered if you use the print spooler program EMSPOOL.COM.

```
Another print spooler buffer has previously been
installed. Only one print spooler buffer can be installed
at a time.
```

Condition: As stated in the message.

Remedy: Modify the EMSPOOL line in your AUTOEXEC.BAT file so that only one print spooler buffer is specified.

```
The Expanded Memory Manager has not been installed.
You must include a DEVICE=HPEMM.SYS statement in your
CONFIG.SYS file.
```

B **Condition:** As stated in the message.

Remedy: Load the expanded memory software as described in "Loading the Expanded Memory Manager (EMM)" in chapter 2.

You need to specify a buffer size larger than 0.
For example, EMSP00L 96 will create a 96K print buffer.

Condition: As stated in the message.

Remedy: As stated in the message.



There isn't enough expanded memory to satisfy your
size request. Try making the requested buffer size smaller.

Condition: As stated in the message.

Remedy: As stated in the message.

Your buffer size request contains a bad digit, or it
was too large. Every character in the size parameter must be a
digit.

Condition: As stated in the message.

Remedy: Make every character in the size parameter a digit.

Your rate request contains a bad digit, or it was too
large. Every character in the rate parameter must be a digit.

Condition: As stated in the message.

Remedy: Make every character in the rate parameter a digit.

Can't allocate expanded memory for your buffer. You will need to reinstall HPEMM.SYS.

Condition: As stated in the message.

Remedy: Restart your computer and reinstall HPEMM.SYS as described in "Loading the Expanded Memory Manager (EMM)" in chapter 2.

The print spooler buffer was not installed.

Condition: As stated in the message.

Remedy: Allocate a print spooler as described in "Allocating a Print Spooler" in chapter 3.

B

Index

Page numbers in **bold type** indicate primary references; entries in normal type indicate secondary references.

Special Characters

9-pin connector, 1, 1-3, 1-10, 3-1, A-5
25-pin connector, 1, 1-3, 3-1, A-5

A

Abbreviated diagnostics, 2-13
Accessory adapter slot, 1-7
Adapter
 adding memory chips, 2-2
 configuration, 2-4
 configuring serial, 1-2 thru 1-4
 features, 1
 handling, 2
 installing, 1-1, 1-2, 1-4 thru 1-12
 multiple, 2-9, A-2, A-7
 number in computer, 1
 settings, 4
 slot, 1-6
 using with modem, 1-4
Adding bits, 3-1
Adding memory chips, 2-2, 2-6
Address
 changing, A-7
 conflict, A-7
 EMS I/O, **2-5, 2-13**, A-1, **A-6 thru A-8**
 page frame, 2-11
 serial, 1-3
Allocating memory, 2-14, 3-2
Application data memory, 1, **3-2 thru 3-3**, 3-12, 3-13

Application software, 2-12, **3-2 thru 3-3**
AUTOEXEC.BAT, 3-7, 3-9 thru 3-13

B

Battery module
 removing, 1-4 thru 1-5
 replacing, 1-11
Baud rate, 3-1
Buffer, 3-5 thru 3-13
Buffering, 3-1

C

Changing a jumper setting, 4, 5
Changing I/O address, reasons, A-7
Chips. See *Memory chips*.
Clock, system, 1-11
COMn. See *Communication port*.
Communication port, 1-3, 1-10 **A-2 thru A-5**,
CONFIG.SYS, 2-2, 2-10, 2-13, 2-14, 3-4, 3-5,
3-12, 3-13
Configuration
 default serial, 1-3
 expanded memory, 2-4 thru 2-5
 jumpers, A-1
 serial, A-1 thru A-5
 settings, A-1 thru A-8
Configuration Inventory Sheet, 1-2, 1-4, 1-7, 2-2,
2-5, A-5

- Configuring adapter
 - default, 1-3
 - for memory, 2-4
 - serial, 1-3, 1-4
- Conflict, address, A-7
- Connectors
 - 9-pin, 1, 1-10, 3-1, A-5
 - 25-pin, 1, 1-3, 3-1, A-5
 - HP-422, 1
 - RS-232-C, 1
- Copying files, 2-2, 2-10, 2-11
- Customizing spooler, 3-10, 3-11

D

- Data format, 3-1
- Default
 - adapter configuration, 1-3
 - expanded memory, 2-4, 2-5
 - serial configuration, 1-3
 - serial interrupts, 1-3
- Diagnostic program, 2-8 thru 2-10, B-1 thru B-2
- Diagnostics, abbreviated, 2-13
- Disc
 - EMS software, 1-2, 2-2, 2-8, 2-11
 - RAM, 1, 2-14, 3-3 thru 3-4
 - setup, 1-11, 2-1, 2-9
 - system, 1-2, 2-11, 2-14, 3-4, 3-6

E

- EMDIAG, 2-8, 2-11
- EMDISC.SYS, 2-11, 3-4
- EMM. See *Expanded Memory Manager*.
- Empty slot cover, 1-7, 1-8
- EMS. See *Expanded memory*.
- EMS Enable/Disable jumper, 2-4, A-6
- EMS I/O address, 2-5, 2-13, A-6 thru A-8
- EMSPPOOL.COM, 2-11, 3-6, 3-9 thru 3-11
- Enable/Disable
 - EMS, 2-4, A-1, A-6
 - serial, 1-3, A-1, A-2 thru A-3
- Error messages, B-1 thru B-10
- Expanded memory
 - allocating, 3-2

- disc, 2-8, 2-11
- Enable/Disable, 2-4, A-1, A-6
- error messages, B-1 thru B-10
- examples, 3-11 thru 3-13
- I/O address, 2-5, 2-10, A-1, A-6 thru A-8
- settings, 2-4 thru 2-5, A-6 thru A-8
- software, 2-1, 2-10 thru 2-14, 3-2
- total, 1
- using 1, 3-2 thru 3-13
- Expanded Memory Manager (EMM), 2-8, 2-11 thru 2-14, 3-2, 3-3, B-3 thru B-6

F-H

- Features, adapter, 1
- Features, serial, 3-1, 3-2
- Files, copying, 2-2, 2-10, 2-11
- Function keys, 3-8, 3-9
- Graphics command, 3-6, 3-9
- Handling adapters, 3
- Handling memory chips, 3
- HP-422 connector, 1
- HPPEMM.SYS, 2-11, 2-13

I

- I/O address
 - changing, A-7
 - conflict, A-7
 - EMS, 2-5, 2-13, A-6 thru A-8
 - serial, 1-3
- Installing adapter
 - equipment, 1-1, 1-2
 - in computer, 1-4 thru 1-12
- Installing chips. See *Installing memory chips*.
- Installing memory chips
 - equipment, 1-2, 2-1
 - order, 2-6
- Interrupts, 1-3, A-2 thru A-5
- IRQn. See *Interrupts*.

J-L-M

- Jumper, changing, 4, 5
- Labels, 1-1, 1-10
- LAN, 3-5
- LPT1, 3-2
- Map of chips, 2-9
- Memory, allocating, 2-14
- Memory, total expanded, 1
- Memory chips
 - capacity, 2-6
 - definition, 1
 - equipment, 2-1
 - handling, 3
 - installing, 1-2, 1-4, 2-1, 2-6 thru 2-8
 - map, 2-9
 - type to use, 1, 1-2
- Memory sockets, 1
- Messages, B-1 thru B-10
- MODE command, 3-2
- Modem, using with, 1-4
- Modem control, 3-1
- MCS, See *Multiple character set*.
- Multiple adapters, 1, 2-5, 2-9, A-2, A-7
- Multiple character set, 3-5, 3-6

N-O-P

- NONE, A-5
- Number of adapters in computer, 1
- Opening bottomcase, 1-5 thru 1-7
- Options, spooler, 3-10, 3-11
- Page frame, 2-8, 2-11
- Pages, 2-11
- Parallel printer, 3-5
- PC-8 character set 3-5
- Ports, communication, A-2
- Print command, 3-5, 3-6
- Print spooler, 1, 2-14, **3-5 thru 3-11**
- Print spooler
 - allocating, 2-14, 3-6
 - assignment, 3-7
 - changing, 3-10
 - deleting, 3-9
 - definition, 3-5
 - error messages, B-8 thru B-10
 - example, 3-10, 3-11

- function keys, 3-8, 3-9
- not used, 3-5

- Printers
 - buffer, 3-5, 3-10
 - multiple, 3-8
 - parallel, 3-5
 - serial, 3-5
- PRN, 3-2
- Program
 - application, 3-2
 - diagnostic, 2-8, 2-9
 - setup, 1-11

R

- RAM. See *Memory chips*.
- RAM disc
 - allocating, 3-3, 3-4
 - definition, 1, 3-3
 - difference from flexible discs, 3-3
 - error messages, B-6 thru B-7
 - example, 3-3, 3-10, 3-11
 - losing data, 3-3, 3-4
 - multiple, 3-4
 - uses, 1, 3-3
 - when computer off, 3-3
- README.DOC, 5
- Rebooting computer, 2-13, 2-14, 3-4, 3-7, 3-9
- Removing battery module, 1-4 thru 1-5
- Replacing battery module, 1-11
- Replacing bottomcase, 1-10
- Returning computer to use, 1-11
- RS-232-C connector, 1
- Running diagnostic program, 2-8

S

- Serial
 - configuration, 1-2, A-1, A-2 thru A-5
 - connectors, 3-1
 - Enable/Disable, 1-3, A-2 thru A-3
 - features, 3-1
 - interface, 1, 3-1 thru 3-2
 - interrupts, 1-3
 - printer, 3-5
 - settings, 1-3,

Settings

- definition, A-1 thru A-8
- EMS, 2-4, A-6 thru A-8
- jumper, 4
- serial, 1-3
- Setup disc, 1-11, 2-1, 2-9
- Setup program, 1-9
- Slot. See *Accessory adapter slot*.
- Slot cover, 1-7, 1-8
- Software
 - application, 2-12
 - copying, 2-11
 - disc, 1-2, 2-2, 2-8, 2-9
 - expanded memory, 2-1
- Spooler, print, 1, 2-14, **3-5 thru 3-11**
- System Checklist, 1-2, 1-3, 2-2, 2-3, 2-5, A-5
- System clock, 1-11
- System disc, 1-2, 2-1, 2-11, 2-12, 3-4, 3-6

U-W-X

- Using adapter with modem, 1-4
- Using Expanded Memory Manager, 2-11 thru 2-14
- Using expanded memory, 1, **3-2 thru 3-13**
- Using serial interface, 3-1 thru 3-2
- Windows, 2-11, 3-7
- XT/AT, 1-3, A-2, **A-3**

Before You Begin

1

**Installing the Dual-Serial/EMS
Adapter**

2

Installing Expanded Memory

3

Using the Dual-Serial/EMS Adapter

A

Configuration Settings

B

Messages

I

Index



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