User Programs Reference

Programs to enhance the performance of your computer

COMPAQ

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OVERVIEW

The *User Programs Reference* contains information on software utilities and device drivers that enhance the performance of your COMPAQ personal computer or computer system. A utility program supports the operation of the computer by providing system management capabilities and diagnostic routines. For example, you might use a file-management utility to monitor and change the organization of your files and directories. A device driver is software that controls and communicates with system hardware. For example, a mouse driver lets you use a mouse with your system.

With the User Programs software, you can do the following:

- Customize and enhance your system.
- Take advantage of special video features that come standard with many COMPAQ personal computers and computer systems.
- Improve the performance of your operating system or application programs.
- Configure your system for optimum performance.

ABOUT THE SOFTWARE

The User Programs utilities and drivers are included on four diskettes. These diskettes contain the utilities and drivers available for different operating environments. The operating environments supported include the following:

- Microsoft MS-DOS Version 3.1 or later as published by Compaq Computer Corporation
- Microsoft Windows Version 3.0 or later
- Microsoft Operating System/2 (MS OS/2) Standard Version 1.21 as published by Compaq and IBM Operating System/2 (OS/2) Version 1.2 or later
- Novell NetWare Version 2.1*x* and Novell NetWare Version 3.1*x*.

User Programs comes with four diskettes. The first diskette contains software for MS-DOS. The second diskette contains additional software for MS-DOS and the software for Novell NetWare. The third diskette contains software for Microsoft Windows, and the fourth diskette contains software for MS OS/2.

NOTE: If you are operating in a Windows environment, you can use the drivers and utilities for MS-DOS.

HOW TO USE THIS BOOK

The *User Programs Reference* is divided into the following sections:

- Part 1 – MS-DOS – contains information about utilities and drivers designed for the MS-DOS environment.
- Part 2 – WINDOWS – contains information about drivers designed for the Microsoft Windows 3.0 or later environment.
- Part 3 – MS OS/2 – contains information about utilities and drivers designed for the MS OS/2 environment.
- Part 4 – Novell NetWare – contains information about utilities and drivers designed for the Novell NetWare environment.
- Appendix A – System Messages – lists messages you may see displayed and their meanings.
- Glossary – defines terms used in this guide.
- Index – assists you in locating important terms in this guide.

Notational Conventions

This guide uses the following conventions to distinguish elements of text:

Notational Conventions

Convention	Use
KEYS	Keys appear in uppercase and boldface. A plus sign (+) between two keys indicates that they should be pressed simultaneously.
variables	Variables appear in lowercase italics.
USER INPUT	User input appears in a different typeface and in uppercase.
FILENAMES	Filenames appear in uppercase italics.
COMMANDS, DIRECTORY NAMES, and DRIVE NAMES	These always appear in uppercase.
! **IMPORTANT**	Presents clarifying information or specific instructions.
NOTE	Notes present commentary, sidelights, or interesting points of information.
Type	When instructed to type information, do so without pressing the **ENTER** key.
Enter	When instructed to enter information, type the information and press the **ENTER** key.

Syntax Conventions

Sections of the *User Programs Reference* include command lines and device driver statements. Both command lines and device driver statements often have one or more parameters that you can use to customize a utility or driver. This guide uses specific syntactical conventions to help you use the command line or device driver statement. These conventions are explained in the following tables:

Syntax Conventions

Convention	Use
UPPERCASE	Type the exact text of elements in uppercase. You can use uppercase or lowercase letters.
lowercase italics	Elements in lowercase italics are variables. For example, if you see *filename* on a command line, type the name of your file.
[ ]	Items in brackets are optional. Do not type the brackets.
|	Select from the options on either side of a vertical bar. For example: ON | OFF means that you should type either ON or OFF.
{ }	Items in braces are mandatory for the related option. You must select one of the choices within the braces. Do not type the braces.
...	Repeat an item as many times as necessary.
Δ	Type a space. Do not use spaces anywhere else in the command line or device driver statement.

This guide uses the following terms when discussing commands:

Terminology

Convention	Use
Disk Drive Specifier (*drive:*)	Specifies the drive that should be read from or written to.
Path or Pathname	The list of directories and subdirectories the system must search to find the file to be used. The exact location of a file.
Parameter or Switch	The options that can be added to a command line.

Syntax Examples

An example of command line syntax:

CACHEΔ[ON|OFF|QUEUE|NOQUEUE|CLEAR|LOCK|
UNLOCK|+sss|–sss|HELP|/?]

An example of a possible command line that you can enter, based on the command syntax above:

CACHE ON

An example of device driver syntax:

DEVICE = [*drive:*] [*path*]CACHE.EXEΔ[*size*]Δ[*min*]Δ[ON|OFF]Δ
[/BAS|/EXT|/EXP]Δ[/Q]Δ[/T]

An example of a possible device driver statement that you can enter, based on the device driver syntax above:

DEVICE = C:\DOS\CACHE.EXE /EXT

NOTE: Do not press the **ENTER** key until you have finished entering a command line or device driver statement. Although some statements take up more than one line in this guide, enter them as though they are to be on one line.

THE HELP UTILITIES

User Programs provides you with two kinds of help utilities: HELP and README. You can run HELP from diskette, however, it is recommended that you install the User Programs files on the fixed disk. Running the User Programs HELP from the fixed disk is faster and easier. You can find the instructions for installing the User Programs files in "Part 1 – MS-DOS."

HELP

The online HELP program features *hypertext* within a graphical interface and can be used with either a mouse or keyboard. Hypertext provides a link that allows you to move from a current topic to a related topic. Hypertext is indicated in a different color or intensity from the rest of the text on the screen.

There are two ways to access HELP:

- To access the HELP Table of Contents, enter the following from the system prompt:

  ```
  HELP
  ```

- To access the HELP information on a particular command, include the command name. For example, to view help on CEMM, enter

  ```
  HELP CEMM
  ```

The Table of Contents shows a list of topics. To choose a topic, click on the title with the mouse, or use the **TAB** key or **ARROW** keys to highlight the topic and press the **ENTER** key. When you choose a topic followed by an ellipsis (...), an expanded list displays.

The following table describes the function keys that can be used throughout the HELP program:

HELP Function Keys

Function	Action
F1	Lets you view information on using HELP.
F2	Lets you return to the HELP Table of Contents.
ESC	Lets you return to the previous screen.
F3	Lets you exit to MS-DOS.

You can use either a keyboard or a mouse to use HELP. The following tables describe most of the keyboard and mouse functions:

Keyboard Functions

Function	Action
Move through text	Press the arrow keys, **PAGE UP**, **PAGE DOWN**, **HOME** and **END** keys.
Move forward through buttons, or hypertext	Press the **TAB** key.
Move backward through buttons, or hypertext	Press the **SHIFT+TAB** keys.
Move forward through topics, or hypertext	Press the **RIGHT** or **DOWN** arrow keys.
Move backward through topics, or hypertext	Press the **LEFT** or **UP** arrow keys.
Choose a topic, button, or hypertext	Use the **TAB** or arrow keys to highlight the item. Then, press the **ENTER** key.

Mouse Functions

Function	Action
Move through text	Click on the scroll bar arrow keys or drag the scroll bar box in the direction you wish to move.
Choose a topic, button, or hypertext	Place the mouse cursor over the item and click the left mouse button.

README

README files contain information about new software or software upgrades not included in the *User Programs Reference.* To access the README files, complete the following steps:

1. Insert the first User Programs diskette for the operating system you are using into drive A.

   NOTE: If you are running MS OS/2, switch to the DOS session to use this utility.

2. At the system prompt, enter

   A:

3. Then, enter

   README

   A list of all README files for that diskette displays. The name of the first file is highlighted.

4. Use the arrow keys to highlight the file you want to view; then press the **ENTER** key to view that file.
5. Use the arrow keys, the **PAGE UP** and **PAGE DOWN** keys, or the **HOME** and **END** keys to scroll through the text.
6. To return to the list of README files, press the **ESC** key.
7. To exit the README utility and return to the system prompt, press the **F3** key or the **ESC** key.

If you wish to print a README file, either highlight the name of the file you want to print, or open the file you want to print. Then, press the **F7** key.

Chapter 1

LEARNING ABOUT MS-DOS SUPPORT SOFTWARE

This section contains information about utilities and drivers for MS-DOS. The utilities and drivers are divided into the following categories:

- Memory support software
- Display Option support software
- Keyboard support software
- Other support software

Refer to the "Utility and Driver Summary" section in this chapter for a description of User Programs MS-DOS support software.

For information on installing the User Programs files on your system, refer to Chapter 2, "Installing User Programs Files for MS-DOS."

WHAT YOU CAN DO WITH MS-DOS SUPPORT SOFTWARE

The following list shows what you can do with MS-DOS support software and where you can go to find information.

What You Can Do	Reference
See which utilities and drivers work on your computer.	*Chapter 1*
Install the User Programs support software.	*Chapter 2*
Learn about system memory.	*Chapter 3*
Increase the amount of memory available for running programs on your computer.	*Chapter 3*
Decrease the time it takes your computer to do basic read/write tasks.	*Chapter 3*
Use RUNHI to load terminate-and-stay-resident (TSR) programs and drivers in upper memory.	*Chapter 4*
Change the way text looks on your screen or use a character set other than the one for U.S. English.	*Chapter 5*
Use the screen save feature to protect your screen.	*Chapter 5*
Install a keyboard password or load a keyboard driver that lets you use a keyboard other than the one for U.S. English.	*Chapter 6*
Use an enhanced keyboard with a COMPAQ DESKPRO Personal Computer.	*Chapter 6*
Use the power conservation feature of your battery-operated COMPAQ personal computer.	*Chapter 7*
Change the speed of your operating system.	*Chapter 7*
Update the clock on a COMPAQ DESKPRO Personal Computer.	*Chapter 7*
Load a hexadecimal address for a COM3 or COM4 expansion board installed in your system.	*Chapter 7*

WHAT SUPPORT SOFTWARE WORKS ON YOUR SYSTEM

Table 1-1 shows the User Programs support software available for each computer.

Table 1-1 Computer Utility Cross Reference

Computers / Utilities	ADAPT	CACHE	CEMM	CEMMP	CHARSET	CLOCK	HELP	HIMEM	KEYB	KEYBDP	MODE ADDRCOMx	KP	MODE ATTRIBUTE	MODE CRT	MODE MEMCACHE	MODE SCREENSAVE	MODE SELECT	MODE SPEED	PWRCON	README	RUNHI	VDISK	ADVANCED VGA for Autodesk
COMPAQ SYSTEMPRO	✓	✓	✓		✓		✓	✓	✓		✓	✓		✓	✓			✓		✓	✓	✓	
COMPAQ DESKPRO 486/50L	✓	✓	✓		✓		✓	✓	✓		✓	✓		✓	✓			✓		✓	✓	✓	✓
COMPAQ DESKPRO 486/33L	✓	✓	✓		✓		✓	✓	✓		✓	✓		✓	✓			✓		✓	✓	✓	
COMPAQ DESKPRO 486/25	✓	✓	✓		✓		✓	✓	✓		✓	✓		✓	✓			✓		✓	✓	✓	
COMPAQ DESKPRO 386/33L	✓	✓	✓		✓		✓	✓	✓		✓	✓		✓	✓			✓		✓	✓	✓	
COMPAQ DESKPRO 386/33	✓	✓	✓		✓		✓	✓	✓		✓	✓		✓	✓			✓		✓	✓	✓	
COMPAQ DESKPRO 386/25	✓	✓	✓		✓		✓	✓	✓			✓		✓	✓		✓	✓		✓	✓	✓	
COMPAQ DESKPRO 386/25e	✓	✓	✓		✓		✓	✓	✓		✓	✓		✓	✓			✓		✓	✓	✓	✓
COMPAQ DESKPRO 386/20	✓	✓	✓		✓		✓	✓	✓			✓		✓	✓		✓	✓		✓	✓	✓	
COMPAQ DESKPRO 386/20e	✓	✓	✓		✓		✓	✓	✓		✓	✓		✓	✓			✓		✓	✓	✓	✓
COMPAQ DESKPRO 386s/20	✓	✓	✓		✓		✓	✓	✓		✓	✓		✓	✓			✓		✓	✓	✓	
COMPAQ DESKPRO 386s	✓	✓	✓		✓		✓	✓	✓		✓	✓		✓				✓		✓	✓	✓	
COMPAQ DESKPRO 386N	✓	✓	✓		✓		✓	✓	✓		✓	✓		✓				✓		✓	✓	✓	
COMPAQ DESKPRO 386	✓	✓	✓		✓		✓	✓	✓			✓		✓			✓	✓		✓	✓	✓	
COMPAQ DESKPRO 286	✓	✓			✓		✓	✓	✓			✓		✓			✓	✓		✓		✓	
COMPAQ DESKPRO 286e	✓	✓		✓	✓		✓	✓	✓		✓	✓		✓				✓		✓	✓	✓	
COMPAQ DESKPRO 286N	✓	✓		✓	✓		✓	✓	✓		✓	✓		✓				✓		✓	✓	✓	
COMPAQ DESKPRO		✓			✓	✓	✓		✓	✓		✓		✓			✓	✓		✓		✓	
COMPAQ PORTABLE 386	✓	✓	✓		✓		✓	✓	✓			✓	✓	✓		✓	✓	✓		✓	✓	✓	
COMPAQ SLT 386s/20	✓	✓	✓		✓		✓	✓	✓			✓		✓	✓	✓		✓	✓	✓	✓	✓	
COMPAQ LTE 386s/20	✓	✓	✓		✓		✓	✓	✓			✓		✓	✓	✓		✓	✓	✓	✓	✓	
COMPAQ SLT/286	✓	✓		✓	✓		✓	✓	✓			✓		✓		✓		✓	✓	✓	✓	✓	
COMPAQ PORTABLE III	✓	✓		✓	✓		✓	✓	✓			✓	✓	✓		✓	✓	✓		✓	✓	✓	
COMPAQ PORTABLE II	✓	✓			✓		✓	✓	✓			✓		✓			✓	✓		✓		✓	
COMPAQ LTE/286	✓	✓		✓	✓		✓	✓	✓			✓		✓		✓		✓	✓	✓	✓	✓	
COMPAQ LTE	✓	✓		✓	✓		✓		✓			✓		✓		✓		✓	✓	✓	✓	✓	

UTILITY AND DRIVER SUMMARY

This section contains a brief description of each utility and driver explained in this guide. Refer to Table 1-2 to determine which utilities and drivers can be used on your personal computer or computer system.

Memory Support Software

You can find information about system memory and the memory support software in Chapter 3, "Maximizing System Memory," and Chapter 4, "Using RUNHI."

Table 1-2
Memory Support Software

Utility or Driver	Description
HIMEM	An extended memory manager that lets MS-DOS applications use extended memory.
CEMM	An expanded memory manager that lets MS-DOS applications use up to 32 megabytes of additional memory for 386- and 486-based systems. Also provides upper memory for the RUNHI utility.
CEMMP	An expanded memory manager that lets MS-DOS applications use up to 32 megabytes of additional memory on COMPAQ personal computers with COMPAQ expanded memory hardware. Also provides upper memory for the RUNHI utility.
RUNHI	Lets you load and run drivers and terminate-and-stay-resident (TSR) programs in memory within the 640 to 1024 Kbyte memory range.
MODE MEMCACHE	Lets you turn the hardware cache memory controller on and off.
CACHE	Can improve system performance by decreasing the time it takes for applications to access data from the fixed disk.
VDISK	Creates a disk drive (a virtual disk) in memory.

Display Option Support Software

With the display utilities and drivers, you can change the way your screen displays text and use the screen save feature, which may extend the life of your screen. You can find information about these utilities in Chapter 5, "Customizing Your Video Display."

Table 1-3
Display Option Support Software

Utility or Driver	Description
ADAPT	Lets you change the way text is displayed on a COMPAQ LCD, a COMPAQ VGA display, and a COMPAQ Dual-Mode Plasma Display. Also lets you set up the screen save feature and change the cursor size.
Advanced VGA	Lets applications use a video mode that provides 256 colors at 640x480 resolution. Without these drivers, VGA displays allow only 16 colors at 640x480 resolution.
CHARSET	Lets you select a main and/or an alternate character set (font) for text shown on a COMPAQ LCD, a COMPAQ VGA display, and a COMPAQ Dual-Mode Plasma Display.
MODE ATTRIBUTE	Lets you change the appearance of highlighted text on a COMPAQ Dual-Mode Plasma Display.
MODE CRT	Lets you set the operational mode and format of the display adapters.
MODE SCREENSAVE	Lets you use the screen save feature on a COMPAQ LCD display.
MODE SELECT	Lets you change the emulation of the active video board.

Keyboard Support Software

With the keyboard utilities, you can install a password, use a keyboard driver, and use an enhanced keyboard. You can find information about these utilities in Chapter 6, "Using the Keyboard Support Software."

Table 1-4
Keyboard Support Software

Utility	Description
KEYB	Loads a keyboard driver that lets you use a keyboard other than the one for U.S English.
KEYBDP	Lets you use the COMPAQ Enhanced Keyboard with a COMPAQ DESKPRO Personal Computer.
KP	Lets you install a keyboard password that locks your keyboard to prevent others from using your system. On certain systems, KP also lets you blank your screen to protect data and extend the life of your display.

! **IMPORTANT:** If you do not have a U.S. English keyboard, you must use the KEYB utility from the User Programs diskette for MS-DOS or MS-DOS 3.31 Revision D or later as published by Compaq. For more information on installing this keyboard driver, refer to the "KEYB" section of Chapter 6, "Using the Keyboard Support Software."

Other Support Software

With these utilities and drivers, you can perform a variety of tasks. You can find information about these utilities in Chapter 7, "Other Support Software."

Table 1-5
Other Support Software

Utility or Driver	Description
CLOCK	Updates the clock on the COMPAQ serial board of a COMPAQ DESKPRO Personal Computer.
MODE ADDRCOM*x*	Lets you load a hexadecimal address for COM3 or COM4.
MODE SPEED	Lets you set the operating speed of your COMPAQ personal computer.
PWRCON	Lets you change the power conservation settings of COMPAQ battery-powered personal computers.

Chapter 2

INSTALLING USER PROGRAMS FILES FOR MS-DOS

This chapter provides instructions for installing the User Programs files on your fixed disk or on a working MS-DOS diskette. This chapter also explains configuring User Programs files with the USER PROGRAMS CONFIGURATION Utility (UPCU).

INSTALLATION OPTIONS

How you install the User Programs files depends on whether your computer has a fixed disk and whether or not you have MS-DOS already installed on your system. The installation options are as follows:

- If you have to install MS-DOS 3.31 or later as published by Compaq, refer to the FASTART section of your MS-DOS documentation to install both MS-DOS and the User Programs files.
- If you have MS-DOS Version 3.10 or later already installed on your fixed disk, you can use the UPCU to copy the User Programs files to the MS-DOS directory of the fixed disk. Refer to the "Installing or Upgrading User Programs Files with UPCU" section of this chapter.
- If you have MS-DOS already installed on your fixed disk, and you wish to manually install the User Programs files into the MS-DOS directory of the fixed disk, you can use the REPLACE and COPY commands. Refer to the "Installing User Programs Using MS-DOS Commands" section of this chapter.
- If you have a working MS-DOS diskette, you can copy the User Programs files to the diskette. Refer to the "Copying Files to Your Working MS-DOS Diskette" section of this chapter.

INSTALLING OR UPGRADING USER PROGRAMS FILES WITH UPCU

If you have MS-DOS Version 3.1 or later already installed, you can use UPCU to install or upgrade the User Programs files on the fixed disk. To use UPCU to either install or upgrade User Programs files, complete the following steps:

1. Insert the User Programs diskette for MS-DOS support into drive A.
2. Enter

   ```
   A:\UPCU
   ```

3. Follow the instructions provided on the screen.

If you do not have User Programs files installed, UPCU leads you through installing them. If you do have User Programs files installed, UPCU leads you through upgrading the files. If required, UPCU automatically updates the *CONFIG.SYS* and *AUTOEXEC.BAT* files.

Once the User Programs files are installed, you can use UPCU to configure the memory utilities. See Chapter 3, "Maximizing System Memory," for information on the memory utilities.

UPCU also provides a text editor specifically designed for manually modifying the *CONFIG.SYS* and *AUTOEXEC.BAT* files manually. Refer to the following section, "Configuring User Programs with UPCU."

CONFIGURING USER PROGRAMS WITH UPCU

Once User Programs is installed, you can use UPCU to examine and modify the configuration of the memory utilities at any time. You can also use the built-in text editor to make changes to the *CONFIG.SYS* or *AUTOEXEC.BAT* files.

To configure User Programs utilities with UPCU, complete the following steps:

1. Enter

   ```
   UPCU
   ```

   The main menu appears with a list of various operations you can perform.

2. Select the operation you want, and follow the instructions on the screen.

INSTALLING USER PROGRAMS USING MS-DOS COMMANDS

If you have MS-DOS already installed on your fixed disk, and you wish to manually copy the User Programs files to the MS-DOS directory of the fixed disk, you can use MS-DOS commands.

In the following instructions, the MS-DOS directory is represented by \DOS. If your MS-DOS files are in a directory with a name other than \DOS, use the name of your directory instead of \DOS when entering the following commands.

For each User Programs diskette for MS-DOS support, complete the following three steps:

1. Insert the User Programs diskette for MS-DOS support in drive A.
2. Enter

   ```
   C:\DOS\REPLACE A:*.* C:\DOS/A
   ```

3. Enter

   ```
   C:\DOS\REPLACE A:*.* C:\DOS/U
   ```

If you have MS-DOS Version 3.31 or earlier, you must also copy the \DOS331 subdirectory from the User Programs diskette with MS-DOS support. If you have MS-DOS Version 4.01, you must copy the \DOS4 subdirectory from the User Programs diskette with MS-DOS support.

To copy these files, complete the following steps:

1. Insert the last User Programs diskette for MS-DOS support in drive A.
2. At the MS-DOS prompt, enter

```
COPY A:\DOS331\*.* C:\DOS
```

Or

```
COPY A:\DOS4\*.* C:\DOS
```

COPYING FILES TO YOUR WORKING MS-DOS DISKETTE

To copy the User Programs files to a working MS-DOS diskette, complete the following steps:

1. Insert the User Programs diskette for MS-DOS support in drive A and the working MS-DOS diskette in drive B.

   If your system has only one diskette drive, insert the working MS-DOS diskette when the system prompts you to insert a diskette in drive B.

2. Enter

```
A:REPLACE A:*.*B:/A
```

3. Enter

```
A:REPLACE A:*.*B:/U
```

If you have MS-DOS Version 3.31 or earlier, you must also copy the \DOS331 subdirectory. If you have MS-DOS Version 4.01, you must copy the \DOS4 subdirectory. To copy these files, complete the following:

1. Insert the User Programs diskette for MS-DOS support in drive A and your MS-DOS working diskette in drive B.

   If your system has only one diskette drive, insert the MS-DOS working diskette when the system prompts you to insert a diskette in drive B.

2. At the MS-DOS prompt, enter

   ```
   COPY A:\DOS331\*.* B:
   ```

   Or

   ```
   COPY A:\DOS4\*.* B:
   ```

Chapter 3

MAXIMIZING SYSTEM MEMORY

This chapter gives a brief overview of system memory and provides information about the memory support software available on the User Programs diskettes for MS-DOS support. Refer to Table 1-1 in Chapter 1, "Learning About MS-DOS Support Software," to see which utilities and drivers work on your computer.

This chapter contains information about the following:

- System Memory – This information will help you learn more about system memory and the utilities and drivers explained in this chapter.
- HIMEM – Manages extended memory by implementing the eXtended Memory Specification (XMS) Version 2.0.
- CEMM and CEMMP – Provide and manage expanded memory by implementing the Expanded Memory Specification (EMS). CEMM and CEMMP also create upper memory blocks (UMBs) for RUNHI.
- RUNHI – Loads drivers and terminate-and-stay-resident (TSR) programs (such as a pop-up calendar or calculator) in upper memory (640 to 1024 Kbytes). This frees base memory (0 to 640 Kbytes) for use by other programs.
- CACHE – Decreases the amount of time it takes your system to access data from a fixed disk. CACHE can speed up system performance when running programs that require several disk-reads or disk-writes from the fixed disk.
- VDISK – Creates a disk drive, called a virtual disk (VDISK), in memory. Using a VDISK makes data retrieval quicker than if you use a diskette or fixed disk drive.

FOR THE NEW USER

Although the utilities and drivers described in this chapter are perhaps the most useful ones in the *User Programs Reference*, they are also the most technical. Additional information has been included in this chapter to help less experienced users use these utilities and drivers. You should read the system memory sections before turning to the information on the utilities and drivers. When you finish reading about system memory, refer to the introductory information and the "Installation and Examples" sections for these utilities and drivers. These sections include the information you should know to use the memory support software.

FOR THE ADVANCED USER

This chapter is the most technical chapter in this guide; therefore, additional information has been included to help less experienced users. You may prefer to skim the system memory sections and the "Installation and Examples" sections, then refer to the driver and command line sections.

USING THE USER PROGRAMS CONFIGURATION UTILITY (UPCU)

The USER PROGRAMS CONFIGURATION Utility (UPCU) can help you install and configure memory drivers. UPCU helps both new and experienced users configure the memory drivers and automatically updates the *AUTOEXEC.BAT* and *CONFIG.SYS* files as necessary. For more information on the UPCU, refer to Chapter 2, "Installing User Programs Files for MS-DOS."

SYSTEM MEMORY

Base, extended, and expanded memory are the three main types of memory. Each type is accessed from a different area of system memory, and different techniques are used to access each type of memory. Figure 3-1 illustrates the system memory.

Two kinds of memory exist: read only memory (ROM) and random access memory (RAM). ROM is permanent memory that you cannot change. Data in ROM will remain in memory even when you turn off your computer. RAM is memory that your computer uses to run applications. All data in RAM is lost when you turn off your computer. To keep this data, you must save it to a diskette or a fixed disk.

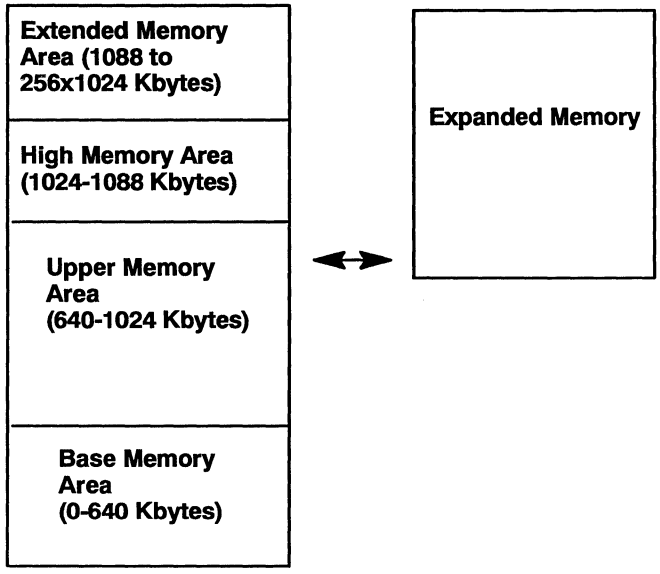

Figure 3-1. Overview of System Memory

The First Megabyte

The first megabyte of memory is important because MS-DOS and system hardware use this memory. The first megabyte consists of two areas: base memory (also called conventional DOS memory) and upper memory. Base memory consists of the first 640 Kbytes. Upper memory ranges from 640 to 1024 Kbytes. MS-DOS applications usually use base memory, while system hardware, such as video buffers, system ROM, and fixed disk drives, use upper memory. However, several sections of upper memory, which can be used by additional hardware, are often unused.

As MS-DOS applications have become more sophisticated, many programs have become too large to run in base memory. Furthermore, the need to run several programs at once has increased. These problems have led to the creation of hardware devices and software, such as the User Programs memory utilities and drivers, that allow MS-DOS to use the available sections of upper memory.

Beyond the First Megabyte

Memory beyond the first megabyte is called extended memory. MS-DOS applications cannot normally use extended memory because it is accessed in a mode different than the one in which MS-DOS applications normally run.

Three modes exist: real, protected, and virtual mode. The modes your system only operates in depend on the type of processor you have. Each mode contains a set of instructions (calls) for system operation that differs from calls in other modes. Applications that do not respond to the calls of a specific mode do not run in that mode.

The 8088/8086 processor can address up to 1 megabyte of memory. This processor operates in real mode. All processors have real mode, which is the mode in which MS-DOS applications normally operate.

The 286 processor, which can address up to 16 megabytes of memory, operates in two modes: real and protected mode. The first megabyte can be addressed in real mode, and extended memory can be addressed in protected mode.

The 386 and 486 processors, which can address several gigabytes of memory, can run in three modes: real, protected, and virtual mode. In virtual mode, a memory manager such as CEMM lets MS-DOS applications use extended memory without additional hardware.

Refer to Figure 3-2 for an illustration of the different memory areas that each processor type can access.

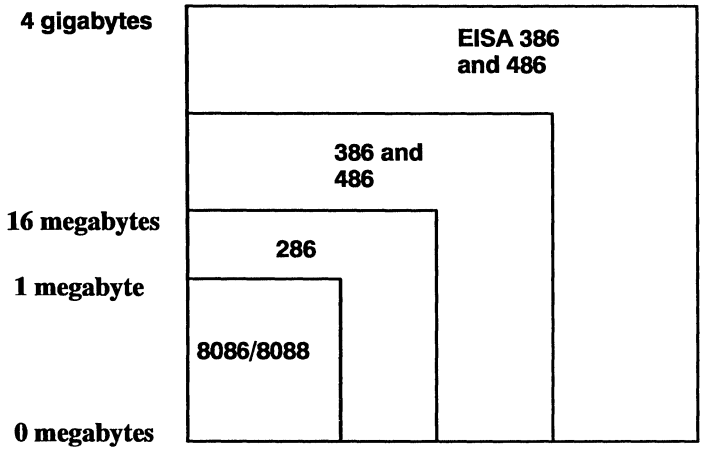

Figure 3-2. Overview of Memory Addressing by Processor

MEMORY TYPES

Base Memory

Base memory, or conventional DOS memory, is memory between 0 and 640 Kbytes. MS-DOS uses some of this memory to operate, and the rest is used to run MS-DOS applications and to store data.

Upper Memory Area

Upper memory is memory between 640 and 1024 Kbytes. Upper memory is used for standard system hardware and contains unused memory sections that may be used for additional hardware, such as network adapters. The available sections may also be used to access additional memory by using one of two interfaces: the Expanded Memory Specification (EMS) or the eXtended Memory Specification (XMS). The User Programs drivers HIMEM, CEMM and CEMMP support these interfaces and let MS-DOS applications use the additional memory.

Using the EMS standard, CEMM and CEMMP can provide expanded memory for MS-DOS applications. Using the XMS standard, HIMEM and CEMM or CEMMP can provide upper memory blocks (RAM-filled sections of upper memory) and extended memory for MS-DOS applications and for RUNHI. EMS, XMS, UMBs, and expanded memory are explained in the following sections. Figure 3-3 shows examples of possible upper memory configurations.

Expanded Memory

Expanded memory is additional memory that MS-DOS applications can use. Expanded memory is accessed through available sections of upper memory using the Lotus/Intel/Microsoft (LIM) Expanded Memory Specification (EMS) Version 3.2 or Version 4.0. To use expanded memory, you need an expanded memory manager that supports the EMS standard, such as CEMM or CEMMP.

Using EMS Version 3.2, MS-DOS applications can access expanded memory through a 64-Kbyte section of upper memory called the EMS page frame. The EMS page frame consists of four 16-Kbyte sections of memory; each section is called an EMS page. Using EMS Version 4.0, the EMS page frame still exists, but MS-DOS applications can also access memory through EMS pages located anywhere in the 1-megabyte address space.

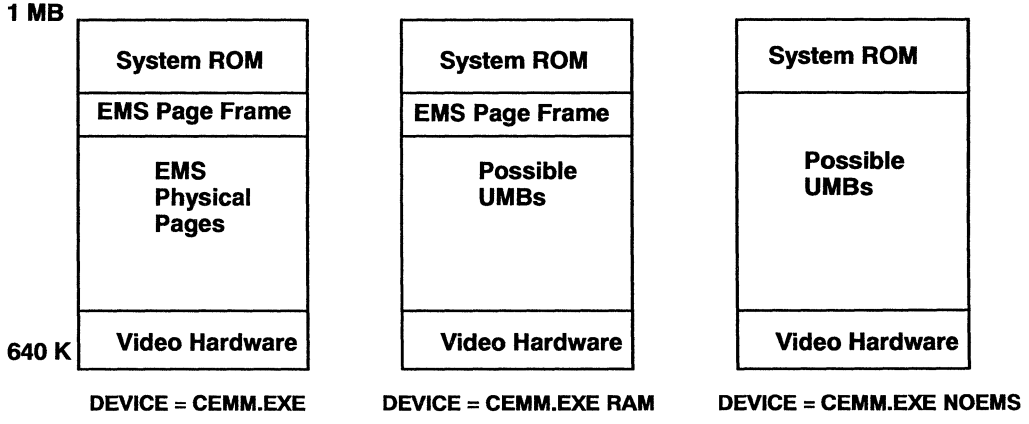

Figure 3-3. Possible Upper Memory Configurations

Both UMBs and expanded memory are accessible to MS-DOS applications; UMBs are created using the XMS standard, and expanded memory is created using the EMS standard.

Extended Memory

As stated before, memory beyond the first megabyte address space is called extended memory. Because extended memory is accessed in a different mode than most MS-DOS applications, these applications cannot normally use extended memory. To access this memory, the system must switch to one of two different modes: protected or virtual mode.

Different methods of accessing extended memory have been created. For instance, many applications use DOS extenders that let MS-DOS applications use extended memory in the protected mode. DOS extenders are often built into MS-DOS applications, such as spreadsheet and desktop publishing programs.

Using certain utilities and drivers, your system can also provide extended memory through the eXtended Memory Specification (XMS) standard. The XMS standard defines three memory areas: the upper memory blocks (UMBs), the High Memory Area (HMA), and the extended memory blocks (EMBs).

The following are brief descriptions of each memory area as defined by the XMS standard:

- Upper Memory Blocks (UMBs) – UMBs are sections of upper memory that have RAM mapped into them by a memory manager. UMBs can be used by MS-DOS and MS-DOS applications.
- High Memory Area (HMA) – The first 64 Kbytes of memory above the 1-megabyte boundary (1024 to 1088 Kbytes).
- Extended Memory Blocks (EMBs) – Extended memory beyond the HMA.

HIMEM, CEMM, and CEMMP let your system provide extended memory. When HIMEM is in your *CONFIG.SYS* file, CEMM and CEMMP can provide UMBs for MS-DOS to use.

HIMEM

HIMEM allows MS-DOS programs to access extended memory using the eXtended Memory Specification (XMS) standard. The XMS standard lets MS-DOS applications use the upper memory blocks (UMBs), the High Memory Area (HMA), and the extended memory blocks (EMBs). Refer to Table 1-1 in Chapter 1, "Learning About MS-DOS Support Software," to see if HIMEM works on your system.

Installation and Examples

To use HIMEM, you must install the HIMEM driver. Use UPCU or a text editor to modify your *CONFIG.SYS* file and add HIMEM before adding any other drivers that use extended memory. For more information on the UPCU, refer to Chapter 2, "Installing User Programs Files for MS-DOS."

When you add the HIMEM device driver statement to the *CONFIG.SYS* file, you may include parameters to customize HIMEM. However, because many of the parameters are very technical, you may not want or need to use them. Each parameter has a default setting that HIMEM uses if you do not specify any parameters.

The following examples show two ways to use HIMEM.

Example 1:

```
DEVICE = C:\DOS\HIMEM.EXE
```

This example illustrates the most basic way to add HIMEM to your *CONFIG.SYS* file. This driver statement lets MS-DOS applications access extended memory.

Example 2:

```
DEVICE = C:\DOS\HIMEM.EXE /ISAONLY
```

This sample driver statement lets HIMEM manage up to 16 megabytes of memory on a COMPAQ EISA-based system. Because some applications can only handle 16-megabytes of memory, use the /ISAONLY parameter to avoid software conflicts with certain applications on a COMPAQ EISA-based system.

NOTE: Microsoft Windows Version 3.0 does not support memory above 16 megabytes. If you are using Windows Version 3.0, add the /ISAONLY option to the HIMEM statement in your *CONFIG.SYS* file.

The HIMEM.EXE Driver

Before using the HIMEM command, add the HIMEM driver to the *CONFIG.SYS* file. You can then load any driver that uses XMS calls. HIMEM lets MS-DOS programs access extended memory using the XMS standard.

Syntax:

DEVICE = [*drive:*] [*path*]HIMEM.EXE Δ [/HMAMIN[=]*n*] Δ [/SHADOW] Δ [/NUMHANDLES[=]*n*] Δ [/ISAONLY] Δ [/LEAVE[=]*n*]

Parameters:

/HMAMIN = *n*

This parameter sets the minimum amount of the High Memory Area (HMA) that an application can use. If an application that can use the HMA is too small to meet the minimum requirement set by this parameter, it cannot use memory from the HMA. Acceptable values for the HMA are between 0 and 64 Kbytes. Without this parameter, the first application loaded on your system that can access the HMA is the only program that will be able to access it.

/SHADOW

This parameter frees extended RAM memory used for ROM BIOS execution. This parameter can only be used on 386- and 486-based systems.

NOTE: Do not use the /SHADOW parameter on a COMPAQ DESKPRO 386 or a COMPAQ PORTABLE 386 Personal Computer.

/NUMHANDLES = *n*

This parameter sets the maximum number of Extended Memory Block (EMB) handles that can be used at any given time. Acceptable values for an EMB handle are from 1 to 128. The default is 32. Each additional handle increases the size of resident memory used by the XMS manager.

Continued

/ISAONLY

This parameter lets HIMEM manage only 16 megabytes of memory on a COMPAQ EISA-based system. COMPAQ EISA-based systems must occasionally work within the ISA 16-megabyte memory boundary, because some application software can only handle a maximum of 16 megabytes of memory. Use this parameter when you use software that cannot handle more than 16 megabytes.

NOTE: Microsoft Windows Version 3.0 does not support memory above 16 megabytes. Use the /ISAONLY parameter if you are using Microsoft Windows Version 3.0.

/LEAVE = *n*

This parameter specifies the amount of extended memory left behind; the rest of the extended memory will be managed by HIMEM. Specify an amount which is smaller than the total number available on your system. The HMA does not exist when this parameter is used.

Comments:

If you plan to use other extended memory software, be sure to keep at least 64 Kbytes of extended memory free for their use.

If you have an expanded memory (EMS) board, you can usually configure the board to have part of the memory allocated to extended memory and the remaining memory allocated to expanded memory.

HIMEM does not work on COMPAQ LTE Personal Computers.

THE HIMEM COMMAND

After you install the HIMEM driver, you may use the HIMEM command to display a screen that contains information about the way HIMEM allocates your memory. HIMEM displays the status of the currently installed HIMEM driver.

Syntax:

HIMEMΔ [/HELP | /?]

Parameter:

/HELP | /?
This parameter displays command line help on HIMEM.

CEMM

The COMPAQ Expanded Memory Manager (CEMM) extends the 640-Kbyte memory limit imposed by MS-DOS and allows MS-DOS applications to use more memory on COMPAQ 386- and 486-based systems. CEMM is useful when you want to load a large program or run more than one program simultaneously. Refer to Table 1-1 in Chapter 1, "Learning About MS-DOS Support Software," to see if CEMM works on your system.

Installation and Examples

To use CEMM, you must install the CEMM driver. Use UPCU or a text editor to modify your *CONFIG.SYS* file and add CEMM before adding any other drivers that use expanded or upper memory. To install CEMM using UPCU, refer to Chapter 2, "Installing User Programs Files for MS-DOS."

When you add the CEMM driver to the *CONFIG.SYS* file, you can include parameters that customize CEMM. Because many of the parameters are very technical, you may not want or need to use them. Each parameter has a default setting that CEMM uses if you do not specify any parameters.

Example 1:

```
DEVICE = C:\DOS\CEMM.EXE
```

Entering this device driver statement provides up to 256 Kbytes of expanded memory, and CEMM is set to AUTO, which means that CEMM provides expanded memory only when applications request it. You can access even more expanded memory by using the *size* parameter, explained in the driver section which follows this section.

If you plan to use RUNHI, you need to use one of three parameters when installing CEMM: RAM, NOEMS, or FRAME = NONE. For more information on RUNHI, refer to Chapter 4, "Using RUNHI."

The following examples show different ways you may want to add the CEMM driver to the *CONFIG.SYS* file.

Example 2:

```
DEVICE = C:\DOS\CEMM.EXE ON 1024
```

With this sample device driver statement, CEMM provides 1 megabyte of expanded memory. CEMM is set to ON, which means CEMM provides expanded memory at all times.

Example 3:

```
DEVICE = C:\DOS\CEMM.EXE ON 1024 RAM
```

With this sample device driver statement, CEMM provides 1 megabyte of expanded memory. CEMM is set to ON, which means CEMM provides expanded memory at all times. CEMM also fills available upper memory with UMBs. When you use the RAM, NOEMS, or FRAME = NONE parameter, CEMM creates UMBs that may be used by MS-DOS applications and RUNHI.

The CEMM.EXE Driver

Syntax:

DEVICE = [*drive:*] [*path*]CEMM.EXE Δ [ON|OFF|AUTO] Δ [*size*] Δ [RAM] Δ
[W = ON|W = OFF] Δ [FRAME = *mmmm*|FRAME = NONE] Δ
[I= *mmmm-nnnn*] [...] Δ [P*n* = *mmmm*] [...] Δ [X = *mmmm-nnnn*] [...] Δ
[B = *mmmm*] Δ [L = *x*] [A = *x*] Δ [/H*xxx*] Δ [D = *nnn*] Δ [NOEMS] Δ [HMAON = *x*]
Δ [ROMCOMPRESS]

Parameters:

ON|OFF|AUTO

This parameter specifies whether CEMM provides expanded memory. If you do not specify a parameter, CEMM is set to AUTO. ON specifies that expanded memory is available. OFF specifies that expanded memory is not available. AUTO specifies that CEMM provides expanded memory when it is requested by an application.

NOTE: If you use the RAM, FRAME = NONE, NOEMS, or HMAON parameters, you cannot turn CEMM OFF.

size

This parameter sets the amount of memory that CEMM provides. Choose a value from 64 through 32768 Kbytes. The default is 256. If you enter a value that is not a multiple of 16 Kbytes, the value is rounded down to the nearest multiple of 16 Kbytes.

NOTE: If you use the NOEMS parameter, the *size* parameter is ignored.

RAM

This parameter causes CEMM to create UMBs in upper memory. The RAM parameter does not affect the EMS page frame.

Continued

W = ON|OFF

This parameter lets CEMM translate the physical address space of the Weitek coprocessor to an address space accessible by MS-DOS applications. To use this parameter, make sure CEMM is turned on. W = ON enables the Weitek coprocessor. W = OFF disables the Weitek coprocessor. The default is OFF.

NOTE: If you specify W = ON and the HIMEM driver is installed, the High Memory Area (HMA) must be available. If you do not have a Weitek coprocessor, you do not need to use this parameter.

FRAME = NONE

This parameter lets CEMM create UMBs in upper memory. EMS pages in base memory are not affected by this parameter.

FRAME = *mmmm* (also P*nnnn* or M*x*)

This parameter sets the hexadecimal address of the EMS page frame. It is recommended that you do not use this parameter and instead allow CEMM to select an available page frame address.

NOTE: FRAME = *mmmm* can also be entered as P*nnnn* or M*x*. The P*nnnn* and M*x* parameters provide compatibility with older versions of CEMM. The following table has values you can use for these parameters and the P*n* = *mmmm* parameter. If you have page frame address conflicts, you can select a value that does not conflict with any applications that you are using.

Continued

Table 3-1
Page Frame Base Addresses

x	Memory Address *(mmmm)*	*x*	Memory Address *(mmmm)*
1	0C0000	8	0DC000
2	0C4000	9	0E0000
3	0C8000	10	080000
4	0CC000	11	084000
5	0D0000	12	088000
6	0D4000	13	08C000
7	0D8000	14	090000

NOTE: For addresses M10, M11, M12, M13, and M14, base memory must be set to 512 Kbytes or less by setting the appropriate system board switches.

I = *mmmm-nnnn*
This parameter specifies a section of memory that CEMM may use. The value you enter should be a hexadecimal number. Usually, you would not want to use this parameter. It should be used only if you want to use a specific section of memory, such as an available video area.

P*n* = *mmmm*
This parameter sets the hexadecimal segment address (the *n*th physical EMS page). P0, P1, P2, and P3 are physical EMS pages that correspond to EMS page frame. You can use this parameter as many times as necessary. The *n* variable may have values of 0, 1, 2, 3, 254, and 255. The *mmmm* variable may have values between 8000 and 9C00 or C000 and EC00 in increments of hexadecimal 0400; for example, 8000, 8400, 8800, 8C00, C400, and C800.

Continued

X = *mmmm-nnnn*
This parameter specifies an address range which may not contain an EMS page or UMB. You should enter a hexadecimal value for this number. You can use this parameter as many times as necessary.

For example, if you add an expansion board that uses an upper memory address, and CEMM cannot detect the RAM/ROM on the board, a conflict may occur. Using the X = *mmmm-nnnn* parameter to exclude the board's memory address prevents this type of conflict.

B = *mmmm*
This parameter specifies the lowest hexadecimal segment address in which an EMS page may reside. The default is B = 4000. The *mmmm* variable may have values from 1000 to the segment address of the end of base memory. (Base memory typically ends at A000.) The values are restricted to increments of hexadecimal 0400; for example, 1000, 1400, 1800, and 1C00.

L = *x*
This parameter specifies the minimum amount of extended memory available after CEMM has been loaded. Enter the value in Kbytes.

A = *x*
This parameter specifies the number of fast alternate register sets in EMS 4.0 function 28. The *x* variable ranges from 0 to 254. The default is 7. Each fast alternate register set increases the work space used by CEMM.

/H*xxx*
This parameter specifies the number of handles available for use. The range is from 2 to 255. The default handle count is 64, which is sufficient for most applications.

D = *nnn*
This parameter specifies the amount of memory to reserve for buffered Direct Memory Access (DMA). The range is from 16 to 256. The default is 16 Kbytes. The value you specify for *nnn* should reflect the maximum number of DMA transfers that can occur while CEMM is active. CEMM automatically handles diskette and fixed disk DMA.

Continued

NOEMS

This parameter causes CEMM to create UMBs in upper memory. The NOEMS parameter disables EMS support.

HMAON = *x*

This parameter lets CEMM create the High Memory Area (HMA). The HMA is the first 64 Kbytes of memory above the first megabyte. You may enter a value for *x* between 0 and 63. When you use *x*, programs which use less than the amount of memory specified by *x* will not be allowed to use the HMA. The default is 0, which indicates that the first program that requests to use the HMA will be the program that gets to use it.

NOTE: You can only use this parameter on a COMPAQ 386-based system with 1 megabyte of memory.

ROMCOMPRESS

This parameter lets CEMM fill available sections of system ROM with RAM. This increases the memory available for CEMM to use. If you experience problems when using this parameter with CEMM, remove this parameter from the CEMM driver statement in your *CONFIG.SYS* file.

Comments:

If you use the M or FRAME parameter, you cannot use P0 to P3 because these physical EMS pages must be contiguous to maintain compatibility with the EMS standard.

CEMM only recognizes adapter ROMs with a conventional ROM header.

Using the NOEMS or FRAME = NONE parameters disables expanded memory.

If you include the X parameter with VDISK, BUFFERS, and/or FASTOPEN, the CEMM driver statement must appear before these commands in your *CONFIG.SYS* file. If you remove CEMM from the *CONFIG.SYS* file, you must remove the X parameter from the respective driver or command. Refer to your MS-DOS documentation for information on BUFFERS or FASTOPEN.

Continued

CEMM is designed to coexist with CACHE and VDISK. Enough extended memory must exist to satisfy both the CEMM expanded memory request and the CACHE or VDISK extended memory request.

If a conflict arises between CEMM and an application that has another expanded memory manager, you should remove one of the expanded memory managers from your system.

If your system uses ENHDISK partitions or contains secondary disk drives, the *ENHDISK.SYS* or *EXTDISK.SYS* device driver statement must appear first in your *CONFIG.SYS* file. For more information about ENHDISK partitions, refer to your MS-DOS documentation.

THE CEMM COMMAND

After you install the CEMM driver, use the CEMM command from the MS-DOS prompt to display memory information and enable or disable the Weitek coprocessor. Sets the status of CEMM to ON, OFF or AUTO and enables or disables the Weitek coprocessor.

Syntax:

CEMMΔ [ON|OFF|AUTO]Δ [W = ON|W = OFF]Δ [HELP|/?]

Parameters:

ON|OFF|AUTO

This parameter controls whether CEMM provides expanded memory. ON lets CEMM provide expanded memory; OFF disables expanded memory. AUTO lets CEMM provide expanded memory when applications request it. The default is AUTO.

NOTE: If you use RAM, NOEMS, HMAON, or FRAME = NONE, you cannot turn CEMM OFF.

Continued

W = ON|OFF
This parameter lets CEMM translate the physical address space of the Weitek coprocessor to an address space accessible by MS-DOS applications.
If you do not have a Weitek coprocessor, you do not need this parameter.
W = ON enables the Weitek coprocessor. W = OFF disables the Weitek coprocessor. The default is OFF.

If HIMEM is installed, the High Memory Area (HMA) must be available for use. To use this parameter, make sure CEMM is turned ON.

/HELP | /?
This parameter displays command line help on CEMM.

Comments:

You may want to turn CEMM off under these conditions:

- If you are running an application that operates in protected mode and does not follow the VCPI specifications.
- If you want better system performance. CEMM may slow down your system.

The following message indicates that CEMM must be turned off:

```
CEMM Privileged operations error # xx
Deactivate CEMM and Continue (C) or
reboot (B) (C/B)?
```

If CEMM is inactive, only handle 0 is allocated, and UMBs are not being provided by CEMM.

When CEMM is active, diskette drive performance is slower. To ensure that the diskette speed is the speed for optimum usage, execute the MODE SPEED command.

CEMMP

The COMPAQ Expanded Memory Manager (CEMMP) extends the 640-Kbyte memory limit imposed by MS-DOS and lets MS-DOS applications use more memory on COMPAQ personal computers with built-in COMPAQ EMS memory hardware. CEMMP is useful when you want to load a large program or run more than one program simultaneously. Refer to Table 1-1 in Chapter 1, "Learning About MS-DOS Support Software," to see if CEMMP works on your system.

! **IMPORTANT:** Before you use CEMMP, you should have run the SETUP utility or moved jumpers on your additional COMPAQ memory hardware. These actions provide your system with expanded memory. If you have not performed one of these actions, refer to your operations guide for more information about defining expanded memory.

Installation and Examples

To use CEMMP, you must install the CEMMP driver. Use UPCU or a text editor to modify your *CONFIG.SYS* file. To install CEMMP using UPCU, refer to Chapter 2 , "Installing User Programs Files for MS-DOS."

When you install the CEMMP driver, you can include parameters that customize CEMMP. Because many of the parameters are very technical, you may not want or need to use them. Each parameter has a default setting that CEMMP uses if you do not specify any parameters.

If you plan to use RUNHI, use one of three parameters when installing CEMMP: RAM, NOEMS, or FRAME = NONE. For more information on RUNHI, refer to Chapter 4, "Using RUNHI."

The following examples show different ways to add CEMMP to the *CONFIG.SYS* file:

Example 1:

```
DEVICE = CEMMP.EXE
```

This example illustrates the most basic way to access expanded memory with CEMMP. The amount of expanded memory CEMMP provides using this driver is determined by how much memory has been allocated for expanded memory during SETUP.

Example 2:

```
DEVICE = CEMMP.EXE RAM
```

With this device driver statement, CEMMP provides expanded memory and creates UMBs that can be used by MS-DOS applications. UMBs can be used by RUNHI and are created using the RAM NOEMS, or FRAME = NONE parameter.

The CEMMP.EXE Driver

Before you use CEMMP, you must run the SETUP utility. For more information, refer to the documentation that came with your computer. CEMMP lets you run applications that can use expanded memory on COMPAQ personal computers that have built-in COMPAQ EMS memory support.

Syntax:

DEVICE = [*drive:*] [*path*]CEMMP.EXE Δ [/H*nnn*]Δ [FRAME = *mmmm* | FRAME = NONE]Δ [/I*x*]Δ [X = *mmmm-nnnn*] [...]Δ [A = *nnn*]Δ [RAM]Δ [NOEMS]

Parameters:

/H*nnn*

This parameter sets the number of handles available for use. The range is from 2 to 255. The default is 64 and is sufficient for most applications.

Continued

FRAME = *mmmm* (also P*nnnn* or M*x*)
This parameter sets the hexadecimal address of the EMS page frame. The default is E000H. It is recommended that you do not use this parameter and instead allow CEMMP to select an available page frame address.

For more information on page frame addresses, refer to Table 3-1 in "The CEMM.EXE Driver" section of this chapter. If you have page frame address conflicts, you can select a value from this table that does not conflict with applications that you are using. For complete list, refer to the Comments section of the CEMMP command.

NOTE: FRAME = *mmmm* can also be entered as P*nnnn* or M*x*. The P*nnnn* and M*x* parameters provide compatibility with other computer systems.

FRAME = NONE
This parameter causes CEMMP to create UMBs in upper memory. To let MS-DOS applications use the UMBs, add the HIMEM driver to the *CONFIG.SYS* file before the CEMMP driver. EMS pages in base memory are not affected by this parameter.

RAM
This parameter causes CEMMP to create UMBs in upper memory. To let MS-DOS applications use the UMBs, add the HIMEM driver to the *CONFIG.SYS* file before the CEMMP driver. The RAM parameter does not affect the EMS page frame.

NOTE: The RAM parameter is not supported on COMPAQ PORTABLE III, COMPAQ LTE, or COMPAQ DESKPRO 286e Personal Computers.

X = *mmmm-nnnn*
This parameter specifies a hexadecimal address range which may not contain an EMS page or UMB. Use this parameter as many times as many times as necessary.

For example, if you add an expansion board that uses an upper memory address, and CEMMP cannot detect the RAM/ROM on the board, a conflict may occur. Using the X = *mmmm-nnnn* parameter to exclude the board's memory address prevents this type of conflict.

Continued

Ix
This parameter sets the starting I/O port address. You can select a value from 0 to B. The default is 0. This parameter can only be used on COMPAQ PORTABLE III, COMPAQ DESKPRO 286e, or COMPAQ LTE Personal Computers.

A = *nnn*
This parameter sets the number of fast alternate register sets in EMS 4.0 function 28. Enter a value for *nnn* from 0 to 254. The default is 7. Each fast alternate register set increases the work space used by CEMMP.

NOEMS
This parameter causes CEMMP to create UMBs in upper memory. This parameter also disables all EMS support. Add the HIMEM device driver to the *CONFIG.SYS* file before the CEMMP driver when you use this parameter.

Comments:

CEMMP only recognizes ROM options with a conventional ROM header.

Use the X = *mmmm-nnnn* parameter only on COMPAQ SLT/286, COMPAQ LTE/286, and COMPAQ DESKPRO 286N Personal Computers. If the address range specified by the X = *mmmm-nnnn* parameter includes the default page frame address, you must specify a different page frame address using the FRAME = *mmmm* parameter.

If you include the /X parameter with VDISK, BUFFERS, or FASTOPEN, the CEMMP driver must appear before these commands in your *CONFIG.SYS* file. When you remove CEMMP from the *CONFIG.SYS* file, you must also remove the X parameter from the respective driver or command.

If your system uses ENHDISK partitions or contains secondary disk drives, the *ENHDISK.SYS* or *EXTDISK.SYS* device driver statement must appear first in your *CONFIG.SYS* file. For more information about ENHDISK partitions, refer to your MS-DOS documentation.

Continued

When using the FRAME = *mmmm* parameter (or the M*x* or /P*nnnn* parameter), the following page frame addresses can be used for the corresponding computers:

- For the COMPAQ LTE:
  C000H, D000H, E000H
- For the COMPAQ DESKPRO 286e:
  C800H, CC00H, D000H, D400H, D800H, DC00H, E000H
- For the COMPAQ PORTABLE III:
  C000H, C400H, C800H, CC00H, D000H, D400H, D800H, DC00H, E000H
- For the COMPAQ SLT/286, COMPAQ LTE/286, and COMPAQ DESKPRO 286N:
  4000H, 4400H, 4800H, 4C00H, 5000H, 5400H, 5800H, 5C00H, 6000H, 6400H, 6800H, 6C00H, 7000H, 7400H, 7800H,7C00H, 8000H, 8400H, 8800H, 8C00H, 9000H, C800H, CC00H, D000H, D400H, D800H, DC00H, E000H

NOTE: You can only use the addresses from 4000h to 7C00h when you have 256 Kbytes of base memory. You can use addresses from 4000h to 8C00H when you have 256 to 512 Kbytes of base memory, and you can use all available addresses when you have 640 Kbytes of base memory.

For more technical information on the characteristics of CEMMP, refer to the *Technical Reference Guide* for your system.

THE CEMMP COMMAND

After you install the CEMMP driver, you may use the CEMMP command to display a screen which contains information about the way CEMMP is allocating your memory. CEMMP displays the status of the currently installed CEMMP driver.

Syntax:

CEMMP[Δ][/HELP | /?]

Parameter:

/HELP | /?
This parameter displays command line help on CEMMP.

RUNHI

RUNHI helps optimize the way your system uses memory by loading and running drivers and terminate-and-stay-resident (TSR) applications in upper memory (640 to 1024 Kbytes). Normally, MS-DOS applications use base memory (0 to 640 Kbytes), and system hardware devices use upper memory. RUNHI loads programs, such as CACHE and VDISK, in available sections of upper memory, letting MS-DOS use base memory for additional applications.

By adding RUNHI drivers to the *CONFIG.SYS* file, you can load other drivers in upper memory. When you use RUNHI as a command, you can load TSRs, such as ADAPT or CHARSET, in upper memory. The RUNHI command also provides statistics on system memory.

For more information on RUNHI, refer to Chapter 4, "Using RUNHI."

MODE MEMCACHE

Cache memory is a section of high-speed static memory that stores data retrieved from the relatively slower dynamic memory used for system memory. Data is temporarily stored in the cache memory in anticipation of future use by the central processing unit (CPU). If requested data is found in the cache memory, the data is transferred directly to the CPU at 0 wait states, thereby greatly improving performance of the system. This memory is managed by the cache memory controller.

Refer to Table 1-1 in Chapter 1, "Learning About MS-DOS Support Software," to see if MODE MEMCACHE works on your computer.

Syntax:

MODEΔ MEMCACHEΔ [ON|OFF]

Parameters:

ON|OFF
These parameters enable and disable the cache memory controller. ON enables the controller; OFF disables the controller. ON is the default setting.

Comments:

The MODE MEMCACHE command issued with no parameters allows you to display the current status of the cache memory controller. The memory cache controller is turned ON unless you turn it off with this command.

When you reset your computer using the **CTRL+ALT+DEL** key sequence, the cache memory controller retains the previous setting. When you turn off your personal computer, the cache memory controller returns to the default setting.

CACHE

CACHE can improve system performance by decreasing the time it takes for applications to access data from the fixed disk. Applications that require several disk reads, such as data retrieval from databases, can improve performance when CACHE is used. CACHE also takes advantage of the bus master interface controller for the 32-Bit Intelligent Drive Array (IDA) Controller.

CACHE has a feature called queued writes that significantly speeds up many applications that perform single sector writes to fixed disk drives. This feature allows you to write new data to your system without having to wait for disk writes to occur.

Installation and Examples

Use UPCU or a text editor to install the CACHE driver. If you plan to use the /EXP parameter, add the CACHE device driver statement after the CEMM or CEMMP device driver statement. Use only one CACHE statement in your *CONFIG.SYS* file. To install CACHE, CEMM, or CEMMP using UPCU, refer to Chapter 2, "Installing User Programs Files for MS-DOS."

The following examples illustrate various ways you can add the CACHE device driver statement to the *CONFIG.SYS* file:

Example 1:

```
DEVICE = CACHE.EXE 256 /EXT
```

This example illustrates the device driver statement used to create a 256 Kbyte disk cache in extended memory.

Example 2:

```
DEVICE = CACHE.EXE 1024 ON /EXP /Q
```

This example illustrates the device driver statement used to create a 1-megabyte disk cache in expanded memory. The queued writes feature is turned on.

Example 3:

```
CACHE OFF
```

This example shows how to disable CACHE so that it does not create a disk cache in memory. Using the CACHE ON command turns CACHE on again.

Example 4:

```
CACHE NOQUEUE
```

This example shows how to disable the queued writes feature. Using the CACHE QUEUE command turns the queued writes feature on again.

The CACHE.EXE Driver

Syntax:

DEVICE = [*drive:*] [*path*]CACHE.EXE[Δ] [*size*][Δ] [*min*][Δ] [ON|OFF][Δ] [/BAS|/EXT|/EXP][Δ] [/Q][Δ] [/T]

Parameters:

size

This parameter sets the initial size of the disk cache. You can enter a value from 128 through 15232 Kbytes. The default is 256 Kbytes. The value you enter is rounded to the nearest 16-Kbyte increment. If you enter a value greater than the amount of available memory, CACHE decreases the size to the amount available of the disk cache and displays a "Buffer size adjusted" message.

min

This parameter sets the minimum size of the disk cache. You can enter a value from 64 through 15232 Kbytes. The default is 256 Kbytes. If you enter a value that is not a multiple of 16 Kbytes, the value is rounded down to the nearest multiple of 16 Kbytes. This value must be less than or equal to the maximum size. If the CACHE memory space is reduced, a "Buffer size adjusted" message is displayed.

The CACHE size can be changed one of two ways:

- When you load the CACHE driver or change the CACHE size by using the CACHE command
- When Microsoft Windows Version 3.0 needs to use the CACHE memory space

If you load the CACHE driver in base memory, Windows cannot reduce the CACHE size. To allow Windows to use the CACHE memory space, follow these steps when loading the CACHE driver:

Continued

- Load the CACHE driver in either expanded or extended memory. If you use expanded memory, load an expanded memory manager such as CEMM or CEMMP before loading CACHE. If you use extended memory, load an extended memory manager such as HIMEM before loading CACHE.
- Specify the initial CACHE size (*size*) when you load CACHE.
- Specify the minimum CACHE size (*min*) when you load CACHE.

ON | OFF
This parameter sets CACHE to ON or OFF. If you select ON, the disk cache is available for use when you turn on your computer. If you select OFF, you cannot use the disk cache unless you turn it on using the CACHE ON command. ON is the default.

/BAS
This parameter creates the disk cache in base memory. Base memory is the memory between 0 and 640 Kbytes.

/EXT
This parameter creates the disk cache in extended memory. Extended memory is memory above 1 megabyte. This is the default setting. For more information on extended memory, refer to the "Extended Memory" section of this chapter.

/EXP
This parameter creates the disk cache in expanded memory. For more information on expanded memory, refer to the "Expanded Memory" section of this chapter. You can use /A with the CACHE device driver statement instead of /EXP.

/Q
This parameter makes queued writes available. (If you do not use the /Q option, queued writes will not be available.) The queued writes option is not supported on 8088- or 8086-based personal computers.

Continued

NOTE: If you include a CACHE NOQUEUE command in your *AUTOEXEC.BAT* file and include the /Q parameter with the CACHE device driver statement in your *CONFIG.SYS* file, the queued writes option is available but will be turned off.

CACHE disables queued writes while Microsoft Windows Version 3.0 is running in the 386 enhanced mode. When Windows terminates, the previous queued writes state is returned.

/T

This parameter causes CACHE to read entire tracks each time CACHE performs read operations. Without the /T parameter, CACHE stores data that a program requests and the sectors near the requested data.

For example, if the fixed disk drive has 39 sectors per track, without the /T parameter, CACHE only stores the requested data and the sectors nearest to that data. If you use the /T parameter, CACHE stores all 39 sectors during a disk read.

NOTE: Read requests larger than the disk track size are not placed in cache memory.

Comments:

CACHE only works on fixed disks.

If your system uses ENHDISK partitions or contains secondary disk drives, the *ENHDISK.SYS* or *EXTDISK.SYS* device driver statement must appear first in your *CONFIG.SYS* file. For more information about ENHDISK partitions, refer to your MS-DOS documentation.

THE CACHE COMMAND

After you install the CACHE driver, use the CACHE command to turn the CACHE on or off, enable or disable queued writes, lock or unlock the cache memory contents, reduce or increase the cache memory size, clear or display the disk cache statistics, or get help.

Syntax:

CACHEΔ [ON|OFF|QUEUE|NOQUEUE|
CLEAR|LOCK|UNLOCK|+*sss*|–*sss*|HELP|/?]

Parameters:

ON | OFF

This parameter turns disk caching on or off and displays the CACHE read statistics screen. If you set CACHE to OFF, any expanded memory assigned to CACHE is made available to other applications, and the queued writes option, if specified, is disabled.

QUEUE | NOQUEUE

This parameter turns the queued writes option on or off. If you use QUEUE, disk caching is turned on. To use this parameter, you must include the /Q parameter when you add the CACHE device driver statement to the *CONFIG.SYS* file.

CLEAR

This parameter sets the read statistics to zero but does not clear data from the cache buffers.

LOCK

This parameter specifies that all CACHE directory entries are locked and cannot be replaced. The free entries are locked when they are used. If the CACHE is already locked, then the lock remains.

UNLOCK

This parameter specifies that all of the CACHE directory entries are unlocked and available for replacement. If CACHE is already unlocked then it remains unlocked.

Continued

+sss |– sss
This parameter increases (+) or reduces (–) the CACHE size by *sss* Kbytes. The *sss* number is rounded to the nearest 16 Kbyte increment. This option is only available if you specified that the CACHE memory is to be in extended or expanded memory.

HELP
This parameter displays command line help for CACHE.

Comments:

If no parameters are specified, the CACHE status and read statistics are displayed.

All CACHE parameters except HELP display the current disk statistics and status. These include the type of buffer memory, disk cache size, disk cache status, queued writes status, the number of disk reads from cache memory, and the number of reads from the fixed disk drive.

NOTE: The status for the maximum and minimum size of cache memory displays only if cache memory is extended memory through HIMEM (XMS) or expanded memory through CEMM (EMS).

Disk read-intensive applications such as databases benefit the most from disk caching. Performance on other types of applications is usually not affected. If you notice a decrease in performance, turn disk caching off with the following command:

```
CACHE OFF
```

When you reset your computer, the status of CACHE returns to the default settings in the *CONFIG.SYS* file.

VDISK

VDISK lets you use a portion of memory as a disk drive. These disks drives, known as virtual disks (VDISKs), are faster than mechanical disk drives since they operate at the speed of your computer memory. Because the VDISK is created from RAM, you lose any information in the VDISK when you turn off your computer or when the power is interrupted. To retain data from a VDISK, you must save it to a diskette or fixed disk when you finish using VDISK.

Installation and Examples

Use the UPCU or a text editor to install VDISK. For information on UPCU, refer to your Chapter 2, "Installing User Programs Files for MS-DOS."

Because many of the parameters are technical, many users may not want or need to use them. The most important parameters are *vvv*, /E, and /X. These parameters let you set the size of the virtual disk and specify whether it should be in extended or expanded memory. If you want to create virtual disks in expanded memory, add CEMM or CEMMP to the *CONFIG.SYS* file. If you want to add a virtual disk in extended memory, add HIMEM to the *CONFIG.SYS* file.

Example 1:

```
DEVICE = C:\DOS\VDISK.SYS
```

This example illustrates the most basic way to use VDISK. This device driver statement creates a 64-Kbyte virtual disk in extended memory.

Example 2:

```
DEVICE = C:\DOS\VDISK.SYS 512 /X
```

This sample device driver statement creates a 512-Kbyte virtual disk in expanded memory. To use expanded memory, CEMM or CEMMP must be added to your *CONFIG.SYS* file before VDISK.

The VDISK.SYS Driver

Syntax:

DEVICE = [*drive*:] [*path*]VDISK.SYSΔ [*comment*]Δ [*vvv*]Δ [*comment*]Δ [*sss*]Δ [*comment*]Δ [*ddd*]Δ [*comment*]Δ [/X|/E[:*f*]|/B]Δ [*comment*]

Parameters:

comment
This parameter lets you include information about the virtual disk. You can use ASCII characters not including a carriage return, line feed, slash (/), or number.

vvv
This parameter sets the size of the virtual disk in Kbytes. The default is 64 Kbytes. If you use the /X or /E parameter with HIMEM installed, you can use up to 32 megabytes for a virtual disk. If you use the /X or /E parameter without HIMEM, you can use up to 15 megabytes of expanded or extended memory.

sss
This parameter sets the sector size of the virtual disk in bytes. Valid values are 128, 256, and 512 Kbytes. The default is 128 Kbytes. If the total number of sectors exceeds 65535, VDISK doubles the sector size.

ddd
This parameter lets you set the number of files that are in the root directory of the virtual disk. You may select a value from 4 to 512. The default is 64. If you enter an invalid value, VDISK uses the default and displays a "Directory entries adjusted method" message.

/X
This parameter lets you create a virtual disk in expanded memory. Before using this parameter, add CEMM or CEMMP to your *CONFIG.SYS* file. This parameter cannot be used in the same device driver statement as the /E or /B.

/E
This parameter lets you create a virtual disk in extended memory. This parameter cannot be used in the same device driver statement as the /X or /B.

Continued

:t

This parameter sets the maximum number of sectors that can be transferred to the extended memory virtual disk at one time. You can enter a value from 1 through 8. The default is 8. If you enter an invalid value, VDISK uses the default and displays a "Transfer size adjusted" message.

This parameter is useful because interrupt servicing is suspended during data transfers to the extended memory VDISK, and interrupts may be lost if you transfer a large amount of data at one time while interrupts are occurring.

/B

This parameter lets you create a virtual disk in base memory. /B cannot be used in the same device driver statement as /X or /E.

Comments:

To prevent loss of data, copy your data from the virtual disk to a fixed disk or diskette before you reset or turn off your system.

You can create several virtual disks. virtual disks are created sequentially, and only 12 virtual disks can be installed by UPCU. For more information on UPCU, refer to Chapter 2, "Installing User Programs Files for MS-DOS ."

The VDISK buffer size in expanded memory will always be in multiples of 16 Kbytes. If the value you enter is not a multiple of 16 Kbytes, the value is rounded down to the nearest multiple of 16 Kbytes.

If you enter a parameter that is not supported by VDISK, an error message is displayed, and VDISK ignores all parameter entries specified in the device /driver statement.

USING RUNHI

Because of restrictions imposed on your system by MS-DOS, computers normally load and run terminate-and-stay-resident (TSR) programs and drivers in base memory (between 0 and 640 Kbytes). If you try to run several programs simultaneously, you may not have enough memory because of this restriction.

RUNHI helps solve this problem. RUNHI loads drivers and TSRs in upper memory and frees base memory for use by other applications. Using RUNHI, you can:

- Increase the memory available for other applications.
- Decrease the time it takes for large programs to operate and access data.
- Use programs you previously could not run because of memory limitations.
- Link upper memory to base memory so that MS-DOS applications can automatically access upper memory.

NOTE: If you do not understand some of the terms or concepts in this chapter, refer to the glossary or to the system memory overview included in Chapter 3, "Maximizing System Memory."

! **IMPORTANT:** If you are using MS-DOS Version 5.0 and your *CONFIG.SYS* file contains the statement DOS = UMB, you cannot use RUNHI without modifying the *CONFIG.SYS* file. For more information on using RUNHI with MS-DOS 5.0, refer to the "Comments" section of this chapter.

WHY USE RUNHI

To understand why RUNHI is so useful, you need to know how drivers and TSRs use memory.

When drivers and TSRs are loaded in base memory, they are loaded at the lowest available address space. Each driver or TSR uses the next available address space until base memory is full. Once loaded, TSRs and drivers occupy memory even when they are not being used. This memory remains unavailable to other programs until you remove the TSR or driver from base memory.

Because of the nature of TSRs and drivers, RUNHI can be very useful. For example, if you want to use a word processor, a mouse, *CACHE.EXE,* and two TSRs (such as a thesaurus and a grammar checker), you may not have enough memory. But if you use RUNHI to load the grammar checker, CACHE, the thesaurus, and the mouse driver in upper memory, you can free base memory for use by the word processor.

Refer to Figure 4-1 for an illustration of how RUNHI works.

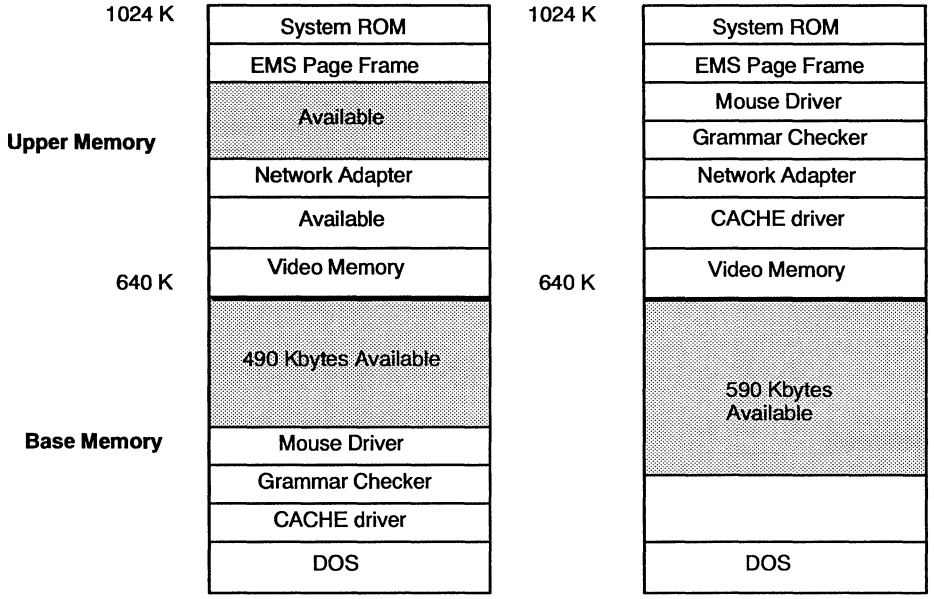

Figure 4-1. How RUNHI Works

BEFORE YOU INSTALL RUNHI

Before you install RUNHI, install CEMM or CEMMP with either the RAM or NOEMS parameter in the *CONFIG.SYS* file. CEMM and CEMMP fill available sections of upper memory with random access memory (RAM). The RAM-filled sections of upper memory, called upper memory blocks (UMBs), are used by RUNHI. Whether you use CEMM or CEMMP depends on the type of system you have. Refer to Table 1-1 in Chapter 1, "Learning About MS-DOS Support Software," to determine whether your system supports CEMM or CEMMP.

NOTE: You can install RUNHI, CEMM, and CEMMP using the USER PROGRAMS CONFIGURATION Utility (UPCU) or with a text editor. For information on UPCU, refer to Chapter 2, "Installing User Programs Files for MS-DOS."

When installing CEMM or CEMMP for use with RUNHI, use the following parameters on the CEMM or CEMMP device driver statement. An explanation of each parameter is listed below.

DEVICE = CEMM.EXE[Δ] [RAM | NOEMS | FRAME = NONE][Δ]
[I=*mmmm-nnnn*][Δ] [X=*mmmm-nnnn*]

Or

DEVICE = CEMMP.EXE[Δ] [RAM | NOEMS | FRAME = NONE][Δ]
[X=*mmmm-nnnn*]

NOTE: Refer to Chapter 3, "Maximizing System Memory," for a complete description of CEMM and CEMMP parameters.

CEMM and CEMMP Parameter Notes

RAM

This parameter causes CEMM/CEMMP to create UMBs in upper memory. This parameter does not affect the EMS page frame and is not valid on a COMPAQ PORTABLE III, COMPAQ LTE, or COMPAQ DESKPRO 286e Personal Computer.

NOEMS

This parameter causes CEMM/CEMMP to create UMBs in upper memory. This parameter removes the EMS page frame and disables EMS support.

FRAME = NONE

This parameter causes CEMM/CEMMP to create UMBs in the EMS page frame and in all EMS pages in upper memory.

! **IMPORTANT:** When you use the FRAME = NONE parameter, the EMS page frame does not exist. Applications that require expanded memory do not work when you use the FRAME = NONE parameter.

X = *mmmm-nnnn*
This parameter specifies a section of memory that CEMM or CEMMP may not use. Use this parameter only if you want to exclude a specific section of memory, such as a section that contains an optional network adapter. The variables *mmmm* and *nnnn* should be hexadecimal numbers, and CEMM rounds the values to the the next highest 4-Kbyte multiple. CEMMP rounds the values to the next highest 16-Kbyte multiple.

I = *mmmm-nnnn*
This parameter only works with CEMM. It specifies an extra section of memory that CEMM may use. Usually, you would not want to use this parameter; however, if you do, use it only if you want to use a specific section of memory, such as an available video area. The variables *mmmm* and *nnnn* should be hexadecimal numbers. CEMM will round the values to the next highest 4-Kbyte multiple.

For example, if you have a monochrome monitor, this parameter lets your system use the memory address reserved for color monitors. Conversely, if you have a color monitor, this parameter lets your system use the memory address reserved for monochrome monitors.

Example 1:

```
DEVICE = C:\DOS\CEMM.EXE RAM I = B000-B7FF
```

In this sample device driver statement, CEMM creates UMBs in upper memory, including the address space reserved for use by monochrome monitors.

Example 2:

```
DEVICE = C:\DOS\CEMM.EXE NOEMS I = B800-BFFF
```

In this sample device driver statement, CEMM creates UMBs in upper memory, including the address space reserved for use by color monitors.

NOTE: The video areas reserved for different types of monitors may be different on your system than the ones used in the two previous examples.

INSTALLATION AND EXAMPLES

You can install RUNHI using the USER PROGRAMS CONFIGURATION Utility (UPCU) or with a text editor. For information on UPCU, refer to Chapter 2, "Installing User Programs Files for MS-DOS." Each time you use RUNHI to load a driver in upper memory, you can use UPCU to add the RUNHI device driver statement to the *CONFIG.SYS* file. To load TSR programs with RUNHI, enter the RUNHI command with the appropriate parameters at the system prompt.

The following examples show how you may use RUNHI to load drivers and TSRs in upper memory.

Example 1:

```
BUFFERS = 15
FILES = 15
DEVICE = C:\DOS\HIMEM.EXE
DEVICE = C:\DOS\CEMM.EXE RAM
DEVICE = C:\DOS\RUNHI.EXE C:\DOS\VDISK.SYS 1024 /E:8
DEVICE = C:\DOS\RUNHI.EXE C:\DOS\ANSI.SYS
```

In this sample *CONFIG.SYS* file, RUNHI loads *VDISK.SYS* and *ANSI.SYS* in upper memory.

Example 2:

```
DEVICE = C:\DOS\CEMM.EXE NOEMS
DEVICE = C:\DOS\RUNHI.EXE C:\DOS\VDISK.SYS 1024 /E:8
```

In this example, RUNHI loads VDISK in upper memory.

Example 3:

```
DEVICE = C:\DOS\CEMM.EXE RAM
DEVICE = C:\DOS\RUNHI.EXE /BLOCK=1 C:\DOS\CACHE.EXE
```

In this example, RUNHI loads the CACHE driver in memory block number 1.

Example 4:

```
DEVICE = C:\DOS\CEMMP.EXE NOEMS
C:\DOS\RUNHI /LINK
```

In this example, RUNHI links upper memory to base memory. The statement in Example 4 should be entered on the same line on your computer.

Example 5:

```
RUNHI
```

To display the status of memory addresses in upper memory, enter this command line at the MS-DOS prompt.

Example 6:

```
RUNHI /SHOWALL
```

To display the status of memory addresses in both base and upper memory, enter this command line at the MS-DOS prompt.

Example 7:

To use the RUNHI /MARK and /RELEASE parameters to load and unload a TSR program named "TSR," complete the following steps:

1. To load the TSR program in upper memory, enter the following commands at the system prompt:

   ```
   RUNHI /MARK
   RUNHI TSR
   ```

   NOTE: You can use other RUNHI parameters to load the TSR program in upper memory.

2. Use the TSR program as needed.
3. To unload the TSR program from memory, enter the following command at the system prompt:

   ```
   RUNHI /RELEASE
   ```

The TSR program has now been released from upper memory.

Example 8:

For this example, assume that you want to use a TSR program, such as a pop-up calculator to add numbers in one DOS window and find the average of those numbers in the other DOS window. To use the /INSTANCE parameter to accomplish this, complete the following steps:

1. Use RUNHI to load the TSR program in upper memory by entering the following command at the system prompt:

   RUNHI /INSTANCE *Calculator*

   NOTE: The italicized word on the command line represents the actual name of the TSR program. Use the correct name and path for TSR program you plan to use with RUNHI.

2. Start Windows and open two DOS sessions.
3. Use the appropriate hot-key combination to start the *Calculator* program in the one DOS window.
4. Add the numbers.
5. Use the appropriate hot-key combination to start the *Calculator* program in the other DOS window.
6. Use the total in the first DOS window and in the other DOS window, divide the number of sums added by that total to find the average.

THE RUNHI.EXE DRIVER

The RUNHI driver lets you load and run drivers in upper memory.

Syntax:

DEVICE = [*drive:*] [*path*]RUNHI.EXE△[/NOLOW | /BESTFIT | /BLOCK = *n*]△
[*drive:*] [*path*] [*ProgramName*]△[*ProgramSwitches*]

Parameters:

/NOLOW

This parameter indicates that if RUNHI cannot load the driver in upper memory, it will not load the program in base memory. If the driver cannot be loaded in upper memory, it is loaded in base memory unless you use the /NOLOW parameter.

/BESTFIT

This parameter specifies that RUNHI will use the memory block closest in size to the program to be loaded. If this parameter is not used, RUNHI will load the driver in the first memory block in which the driver fits.

/BLOCK = *n*

This parameter specifies the upper memory block you want RUNHI to use. If RUNHI cannot load the driver in this block, it will load the driver in low memory. The block must be a physically contiguous region, and the variable *n* must be a positive number.

NOTE: Use the /SHOWALL parameter with the RUNHI command to determine which blocks are available.

ProgramName

This variable specifies the name of the driver to be loaded or run. You need to include the full path name for this parameter.

Continued

ProgramSwitches
This variable specifies the parameters supported by the driver specified by the *ProgramName*. Refer to the documentation about the driver for a description of these parameters.

Comments:

The following MS-DOS Version 5.0 *CONFIG.SYS* file statements are incompatible with RUNHI:

```
DOS = UMB
DEVICEHIGH = devicename
```

Although using these statements basically accomplish the same tasks as RUNHI, RUNHI has additional features that these statements do not support. If you have these statements in your *CONFIG.SYS* but want to take advantage of RUNHI's additional features, you must modify your *CONFIG.SYS* file.

NOTE: If you use Microsoft Windows Version 3.0, it is recommended that you use RUNHI.

To use RUNHI, complete the following steps to modify your *CONFIG.SYS* file:

1. Use UPCU or a text editor to edit your *CONFIG.SYS* file.
2. Delete the DOS = UMB statement from your *CONFIG.SYS* file.
3. Change all DEVICEHIGH statements to RUNHI statements, using the appropriate RUNHI parameters.
4. If you added any LOADHIGH statements to your *AUTOEXEC.BAT* file, change those to RUNHI commands using the appropriate parameters.
5. Restart your system so that the changes can take effect.

The following statements show an example of a *CONFIG.SYS* file with DOS = UMB statements:

```
DOS = HIGH
DOS = UMB
DEVICE = C:\DOS\HIMEM.EXE
DEVICEHIGH = C:\DOS\VDISK.SYS 512 /E:8
DEVICEHIGH = C:\DOS\CACHE.EXE 512 /EXT
```

Continued

The following statement shows an example of the same *CONFIG.SYS* file with RUNHI statements:

```
DOS = HIGH
DEVICE = C:\DOS\HIMEM.EXE
DEVICE = C:\DOS\CEMM.EXE RAM
DEVICE = C:\DOS\RUNHI.EXE C:\DOS\VDISK.SYS 512 /E:8
DEVICE = C:\DOS\RUNHI.EXE C:\DOS\CACHE.EXE 512 /EXT
```

THE RUNHI COMMAND

The RUNHI command lets you load terminate-and-stay-resident (TSR) programs in upper memory. This command also lets you link upper memory to base memory and provides statistics on how your system memory is being used.

Syntax:

[*drive*:] [*path*]RUNHIΔ[/LINK | /UNLINK]

Or

[*drive*:] [*path*] RUNHIΔ[/MARK | /RELEASE]

Or

[*drive*:] [*path*]RUNHIΔ[/NOLOW]Δ[/BLOCK = n | /BESTFIT]Δ[/INSTANCE] Δ[*d*:] [*path*]*ProgramName*Δ *ProgramSwitches*]

Or

[*drive*:] [*path*]RUNHIΔ[/SHOWALL | /HELP| /?]

Parameters:

/LINK

This parameter increases the size of base memory by linking upper memory to base memory. This is useful when you use programs that allocate memory at run time. Upper and base memory remain linked until you use the /UNLINK parameter to unlink them.

Continued

/UNLINK

This parameter unlinks upper memory from base memory. Upper and base memory remain unlinked until you use the /LINK parameter to link them.

/MARK and /RELEASE

The /MARK and /RELEASE parameters let you load a TSR program in upper memory and then unload the TSR program from memory so that you can use the memory space for other programs. /MARK takes a "snapshot" of upper memory before you load the TSR program. /RELEASE returns memory to the way it was allocated before you loaded the TSR program.

NOTE: The /MARK and /RELEASE parameters only work with TSR programs loaded in upper memory.

/NOLOW

This parameter indicates that if RUNHI cannot load the program in upper memory it will not load the program in base memory.

/BLOCK = *n*

This parameter specifies the upper memory block in which you want RUNHI to load a TSR. If RUNHI cannot load the TSR in this block, it will load the TSR in base memory. The block must be a physically contiguous region, and the variable *n* must be a positive number.

NOTE: Use the /SHOWALL parameter with the RUNHI command to determine which blocks are available.

/BESTFIT

This parameter specifies that RUNHI will use a memory block closest in size to the TSR you want to load. If this parameter is not used, RUNHI will load the TSR into the first memory block in which it fits.

Continued

/INSTANCE

While running Microsoft Windows Version 3.0, the /INSTANCE parameter creates separate versions of a TSR program in separate DOS windows at the same time. Without the /INSTANCE parameter, if you open two DOS windows in Windows, what you do in one window occurs in the other DOS window. With the /INSTANCE parameter, you can use a TSR program for one purpose in one DOS window, and use the same TSR for another purpose in another DOS window.

IMPORTANT: You can use the /INSTANCE parameter only when Windows is running in 386 enhanced mode. For more information on 386 enhanced mode, consult your Microsoft Windows documentation.

ProgramName

This variable specifies the name of the TSR to be loaded.

ProgramSwitches

This variable specifies the parameters (switches) supported by the TSR specified by the *ProgramName*. Refer to the documentation about the TSR program for a description of these switches.

/SHOWALL

This parameter displays both upper and base memory usage.

/HELP | /?

This parameter displays command line help.

Continued

Comments:

If the TSR cannot be loaded into upper memory, it is loaded in base memory unless you use the /NOLOW parameter.

If no command line parameters are specified, RUNHI displays the status of upper memory usage. The RUNHI command provides the following information:

- Number of each memory block
- Hexadecimal address of each memory block (in 16-byte multiples)
- Size of each memory block (in Kbytes)
- Description of current status of the memory range (An asterisk in the left margin indicates that a memory block is available.)
- Total upper memory available
- Largest UMB available
- Link Status (Whether base and upper memory are linked.)

To use the /BLOCK = *n* parameter, first use the RUNHI command without parameters to determine which memory blocks are available for use. Select one of these blocks to replace the variable *n* in this parameter.

RUNHI SCREEN DISPLAYS

RUNHI provides two different displays: one that includes information about upper memory and one that provides information about both upper and base memory. When you use RUNHI without parameters, RUNHI only provides information about upper memory. When you use RUNHI with the /SHOWALL parameter, RUNHI provides information about both upper and base memory.

Use the information that RUNHI provides to determine what memory blocks are available and how large they are. You need this information to use the /BLOCK = *n* parameter. You can also see what programs are currently loaded.

The following table explains the categories listed on the screen display:

Table 4-1
The RUNHI Display Categories

Category	Description
Block	Lists the block number of each section of memory. Use this number for the *n* variable in the /BLOCK = *n* parameter. If an asterisk (*) is next to the block number, then that block is available for use.
Address	Shows the address of each memory range. The addresses are in hexadecimal form.
Size	Shows the size of the memory range in Kbytes.
Description	Describes the status of a section of memory. Three possibilities exist: *Available* - Indicates that the range is available for use. *Program Name* - Indicates that the specified program is using the memory range. *Unknown Owner* - Indicates that the memory range is being used, but the owner is unknown.
Total Upper Memory Available	Shows how much upper memory is available.
Size of Largest Memory Block	Shows the size of the largest upper memory block.

NOTE: If you use the /LINK parameter, the message, "Upper memory is available to DOS," is displayed at the bottom of the screen to inform you that base memory and upper memory are linked.

CUSTOMIZING YOUR VIDEO DISPLAY

The User Programs utilities and drivers for MS-DOS detailed in this chapter let you change the display characteristics of your screen. Use these utilities and drivers to perform the following tasks:

- Change the way text looks. You can change the font and increase the contrast between colors or between shades.
- Change the cursor size.
- Use the screen save feature to set the number of minutes of keyboard and mouse inactivity that pass before the screen blanks.
- Use advanced VGA features with Autodesk products.
- Set the operational mode and format of display adapters.
- Change your screen display to look like that of another monitor.

NOTE: If you are not sure support software can be used with your COMPAQ personal computer, refer to Table 1-1 in Chapter 1, "Learning About MS-DOS Support Software."

ADAPT

ADAPT lets you customize the display characteristics of your screen. Use ADAPT to make text more readable by providing greater contrast between the text and the background or between normal and highlighted text.

ADAPT has a screen save feature. You can customize the ADAPT screen save feature by setting the number of minutes of keyboard and mouse inactivity that must pass before the screen blanks. Taking advantage of the screen save feature may extend the life of your monitor.

ADAPT lets you customize the cursor. You can change the cursor to be one of eight different sizes, and lock your setting so it remains the size you select.

You can use ADAPT either as a terminate-and-stay resident (TSR) program or as a command line program. When you turn off your computer, you lose any changes you made with ADAPT, unless you save the changes in a Display Attribute File (DAF). DAF files contain display characteristics settings. You can use DAF files to restore video settings that you previously selected.

NOTE: To use ADAPT, you must be in text mode.

Using ADAPT with Different COMPAQ Displays

ADAPT changes different screen displays in different ways. On a COMPAQ Dual-Mode Plasma Display, you change the way text appears by selecting one of the following options:

- *Normal Intensity*
- *Half Intensity* (default)
- *Reverse Video* – Reverses the shades of the background and the text.
- *Underline*
- *Alternate Character Set* – Uses a different character set (font) than the one currently displayed.

On a COMPAQ Backlit Display, colors are changed to different shades of gray. For example, a word processor may use green for normal text and blue for highlighted text, but the backlit display changes the colors to darker and lighter shades of gray. Sometimes difference between shades is hard to distinguish. You can use ADAPT to provide greater contrast between shades.

On a COMPAQ VGA display, you can select a different color or shade of color for the background or for text.

Syntax:

ADAPTΔ [/R]Δ [/FΔ [*drive:*] [*path*]*filename*]Δ [/CURSOR[=] [*n*|SMALL|MEDIUM|LARGE]Δ [LOCK|NOLOCK]]Δ [/SCREEN[=] [*n*|ON|OFF]]

Continued

Parameters:

/R
This parameter lets you install ADAPT as a TSR program.

/F
This parameter causes ADAPT to read a DAF file. If you do not specify a path to the DAF file on the command line, ADAPT searches the current directory to find a DAF file to load.

/CURSOR[=] [*n*|SMALL|MEDIUM|LARGE]
This parameter sets the cursor size. If you use the variable *n*, you can enter a value from 1 through 8. Choosing 1 makes the cursor one line, and 8 makes the cursor a full box. Using SMALL, MEDIUM, or LARGE sets the cursor to a preset size. SMALL is size 2, MEDIUM is size 4, and LARGE is size 8.

/CURSOR[=] [LOCK|NOLOCK]
LOCK lets you lock the cursor size setting so another application cannot reduce its size. NOLOCK allows applications to change the cursor size you selected.

NOTE: You can use UNLOCK or UN instead of NOLOCK on the command line.

Continued

/SCREEN[=]*n*|ON|OFF
This parameter lets you set the screen save timeout from the command line. The variable *n* represents the number of minutes of mouse and keyboard inactivity that must pass before the screen blanks. Valid values for this variable range from 0 to 63 minutes. The ON parameter blanks the screen after 15 minutes of keyboard and mouse inactivity. The OFF parameter turns the screen save off.

! **IMPORTANT:** The /SCREEN feature does not work under Microsoft Windows when using a COMPAQ DESKPRO Personal Computer with a VGA monitor.

Comments:

To run ADAPT whenever you turn your system on, add ADAPT to your *AUTOEXEC.BAT* file.

To make permanent changes to the display characteristics for a plasma display, run the SETUP utility. For information about SETUP, refer to the documentation that came with your computer. To make permanent changes to all displays, save the changes to a DAF file and use ADAPT to load them when required.

If you are using an external VGA monitor on a COMPAQ LTE 386s/20, COMPAQ SLT 386s/20, or COMPAQ SLT/286 Personal Computer, you cannot change the video attributes for the external VGA display.

Using ADAPT with some TSR programs may cause unpredictable results. If this occurs, remove any TSRs that are currently running.

Starting ADAPT

To use ADAPT, complete the following steps:

1. Enter

   ADAPT

   To use ADAPT as a TSR program, add the /R parameter when you enter the command line.

2. When you see the ADAPT Setup Display menu, select one of the following:

   - *Display Attributes*
     This option lets you change the way text looks.
   - *Hot-Key Selection*
     This option lets you change the hot-key combination that starts ADAPT once it is loaded as a TSR.
   - *Cursor Selection*
     This option lets you change the cursor size and lock it so the cursor cannot fall below the size you select.
   - *Screen Save Time-Out*
     This option lets you change the length of time that the keyboard and mouse must be inactive before the screen save feature starts.

3. To exit from ADAPT, press the **F3** key.

NOTE: After ADAPT is loaded as a TSR program, you can start ADAPT by pressing the hot-key combination: **CTRL** + **LEFT SHIFT**. If you use a program that has the same hot-key combination as ADAPT, change the ADAPT hot-key combination to avoid conflicts. To change the hot-key combination, start ADAPT using the procedure explained above. Select the *Hot-Key Selection* option and follow the directions on the screen.

Changing Character Appearance

To change the way text looks on your screen, complete the following steps:

1. Select the *Display Attributes* option. This causes ADAPT to display a menu that allows you to select how you want text to appear.
2. Follow the instructions on the screen.
3. To save these settings or load previously saved settings, press the function key specified on the screen for saving or loading a DAF file. Follow the instructions on the screen.

   NOTE: For more information on Display Attributes, press the **F1** key for help while using the ADAPT *Display Attributes* option.

Increasing Color Contrasts On VGA Displays

To increase the contrast between normal and highlighted text or between text and the background, complete the following steps:

1. After starting ADAPT, select the *Display Attributes* option.
2. To increase the contrast between two colors, highlight a shade by selecting it with the selector bar. Use the **LEFT** or **RIGHT** arrow keys to lighten or darken the shade. Use the **+** or **-** key to further enhance color selections.

   NOTE: Eight different shades are displayed on the screen at once. To view more shades, use the **UP** and **DOWN** arrow keys to scroll through the color selections. The word "More" and an UP or DOWN arrow displays, indicating the direction that you can scroll the screen. Both arrows display when you can scroll in either direction.
3. If you want to save your changes, press the **ENTER** key. If you do not want to save your changes, press the **ESC** key to restore the previous color settings.

Using Display Attribute Files

To save changes made to the display characteristics of your screen to a file, complete the following steps:

1. Select the *Display Attributes* option. A menu displays that allows you to select how you want text to appear.
2. Press the **F9** key. You have two choices: to load a previously created DAF file or save your changes to a new DAF file.
3. Use the arrow keys to select the option you want. Press the **ENTER** key after you select an option.
4. Type the name and path of the desired DAF file to load, edit, or create.
5. To exit ADAPT, press the **F3** key.

Once you save display attribute settings to a DAF file, you can use the settings any time by loading them from the MS-DOS prompt, from within a batch file, or by using ADAPT. For more information on display attributes, press the **F1** key for help while using ADAPT.

Changing Hot-Key Selection

To change the hot-keys used to start ADAPT, complete the following steps:

1. After starting ADAPT, select the *Hot-Key Selection* option from the ADAPT Setup Display.
2. Use the arrow keys to select your choice and press the **ENTER** key.
3. To exit from ADAPT, press the **F3** key.

After you change and save a new hot-key setting, ADAPT saves the information in the *ADAPT.CFG* file. The next time you use ADAPT as a TSR program, the setting in the *ADAPT.CFG* file is used as the default setting for the hot-key combination.

Changing Cursor Size

To change the size of the cursor, complete the following steps:

1. After starting ADAPT, select the *Cursor Selection* option.
2. Use the arrow keys to select your choice of cursor size. There are three preset sizes: small (2), medium (4), and large (8). If you want to change the cursor to a size other than the first three options allow, highlight "Variable Cursor Selection" and select the size (1-8) you prefer. The on-screen cursor changes to reflect the size you select.
3. Press the **ENTER** key to save your choice.
4. To exit from ADAPT, press the **F3** key.

   NOTE: Cursor size can also be changed using command line parameters.

Locking/Unlocking Cursor Size

To lock the size of the cursor so it does not fall below the size you select, complete the following steps:

1. Change the cursor size, then check the bottom of the cursor selection screen for the message, "Cursor Size Locked."
2. If you do not see this message and you want to lock the cursor, press the **F7** key. If you see this message and you want to unlock the cursor size, press the **F7** key.
3. Press the **ENTER** key to save your choice.

4. To exit from ADAPT, press the **F3** key.

   NOTE: The cursor can also be locked or unlocked using the command line parameters.

Setting Screen Save

To set the number of minutes the system waits before blanking the screen when the mouse and keyboard are inactive, complete the following steps:

! **IMPORTANT:** The /SCREEN feature does not work under Microsoft Windows when using a COMPAQ DESKPRO Personal Computer with a VGA monitor.

---

1. After starting ADAPT, select the *Screen Save Time-Out* option.
2. Enter the amount of keyboard and mouse inactivity time that you want your system to wait before ADAPT blanks the screen. To disable the screen save feature, select 00.

   NOTE: On a COMPAQ LTE Personal Computer, the screen save feature can only be turned ON or OFF. The default is ON. Using ON causes the screen to blank after 15 minutes of keyboard and mouse inactivity.
3. Press the **ENTER** key after making your selection.
4. To exit from ADAPT, press the **F3** key.

After you enter and save a new screen save setting, ADAPT saves the information in the *ADAPT.CFG* file. The next time you use ADAPT as a TSR program, the setting in the *ADAPT.CFG* file is used as the default setting for the screen save. If you enter values for the screen save using command line parameters, the command line values replace the timeout values in the *ADAPT.CFG* file.

Examples of How to Use ADAPT

The following examples illustrate different ways you can use ADAPT.

Example 1:

```
ADAPT /R
```

Entering this line loads ADAPT as a TSR program. ADAPT then instructs you to press the **CTRL** + **LEFT SHIFT** key combination to start ADAPT.

Example 2:

```
ADAPT /F C:\COLOR.DAF
```

Entering this command line loads a previously created DAF file, called *COLOR.DAF*, that is on the fixed disk.

NOTE: The DAF file named *COLOR.DAF* is only an example of a DAF file. If you do not have a DAF file with this name on your fixed disk, this sample cannot work on your system.

Example 3:

```
ADAPT /CURSOR MEDIUM
```

Entering this command line changes the cursor size from its previous size to a half-box. If you add the LOCK parameter to the command line, then other applications cannot make the cursor any smaller than a MEDIUM cursor size.

THE COMPAQ ADVANCED VGA DRIVERS FOR USE WITH AUTODESK PRODUCTS

The User Programs diskette for MS-DOS support contains COMPAQ video drivers for the COMPAQ Advanced VGA. These drivers allow applications to use a video mode that provides 256 colors at 640x480 resolution. Without these drivers, VGA displays allow only 16 colors at 640x480 resolution. These drivers allow you to run supported high-resolution applications that have the capability of displaying screen images with near-photographic quality.

To use the COMPAQ Advanced VGA drivers, you should have the following:

- An Autodesk application that is compatible with the Autodesk Device Interface (ADI) Version 4.1 or 4.0. These products include AutoCAD Release 11, AutoCAD Release 10, AutoShade Version 2.0, and AutoSketch Version 3.0.
- A COMPAQ personal computer or computer system that supports the COMPAQ Advanced VGA.

NOTE: Because these enhancements also involve hardware changes, these drivers do not work on older COMPAQ systems. Refer to Table 1-1 in Chapter 1, "Learning About MS-DOS Support Software," to see if these drivers work on your system.

INSTALLING AND USING THE COMPAQ ADVANCED VGA WITH AUTODESK PRODUCTS

You can use the COMPAQ Advanced VGA with Autodesk applications that support the Autodesk Device Interface (ADI) Version 4.1 or 4.0. These applications include AutoCAD Release 11, AutoCAD Release 10, AutoShade Version 2.0, and AutoSketch Version 3.0.

After you install the COMPAQ Advanced VGA driver, *AVADI.COM*, you must load it into memory each time you use it. Because the AVADI driver is a terminate-and-stay-resident (TSR) program, you may want to unload it when you exit the Autodesk application. This step allows other applications to use the memory reserved for the AVADI driver.

Installing the AVADI Driver

NOTE: If you are installing the driver on a drive other than drive C, substitute the drive letter for that drive when you see a reference to drive C.

To install the AVADI driver, complete the following steps:

1. Change to the subdirectory where you want to install the COMPAQ Advanced VGA driver.
2. Insert the User Programs diskette for MS-DOS support in drive A.
3. Enter

   ```
   COPY A:\ADI\AVADI.COM C:

   COPY A:\ADI\AVCONFIG.EXE C:
   ```

4. Installation is now complete. Each time you use the AVADI driver, you must first load it into memory. Refer to the following section for information on how to load the AVADI driver.

Loading and Unloading the AVADI Driver

NOTE: If you installed the COMPAQ Advanced VGA driver on a drive other than drive C, substitute the drive letter for that drive when you see a reference to drive C.

! **IMPORTANT:** If you have another display adapter installed in addition to the COMPAQ Advanced VGA, be sure the COMPAQ Advanced VGA is the active display by using the MODE CRT command. See the "MODE CRT" section of this chapter for more information on the MODE CRT command.

To load the AVADI driver into memory, complete the following steps:

1. Change to the subdirectory where you installed the COMPAQ Advanced VGA driver.
2. At the system prompt, enter

   AVADI

   The driver loads into memory and the current configuration selections display.

To unload the ADI driver from memory, complete the following steps:

1. Change to the subdirectory where you installed the COMPAQ Advanced VGA drivers.
2. At the system prompt, enter

   AVADI /U

   The driver is unloaded from memory.

Configuring the AVADI Driver

The AVADI driver lets you configure several operating parameters such as the AUI color selections and the interrupt vector.

The interrupt vector specifies where the AVADI driver is installed. If you change the interrupt vector, you must ensure that the Autodesk product is configured to use the same interrupt vector.

To change the configuration information, complete the following steps:

1. Change to the subdirectory where you installed the COMPAQ Advanced VGA driver.
2. At the system prompt, enter

   AVCONFIG

3. Use the help-based configuration utility to modify the configuration parameters.

   NOTE: If you change the interrupt vector, make sure that your Autodesk product uses the same interrupt vector as the AVADI driver.

Using the COMPAQ Advanced VGA with AutoCAD

NOTE: If you installed the driver on a drive other than drive C, substitute the drive letter for that drive when you see a reference to drive C.

The first time you use AutoCAD with the AVADI driver, you must configure AutoCAD to accept the driver. To configure AutoCAD, complete the following steps:

1. Load the AVADI driver into memory.
2. Change to your AutoCAD subdirectory.
3. At the system prompt, enter

   ACAD

4. From the AutoCAD main menu, select the option to configure AutoCAD. AutoCAD displays the current configuration information.
5. Press the **ENTER** key. AutoCAD displays the configuration menu.
6. From the AutoCAD configuration menu, select the option to configure the video display.
7. AutoCAD displays the current video display configuration and asks if you want to select a different configuration. Enter

   Y

8. AutoCAD displays a list of available drivers.

   If you are using AutoCAD Release 11, select *ADI display v4.1*.
   If you are using AutoCAD Release 10, select *ADI display v4.0*.

9. You are now asked to enter the interrupt number. This entry must match the interrupt vector number displayed by the AVADI driver when it loaded into memory.

   NOTE: Both the driver and AutoCAD default to interrupt vector 7A. You can either accept the default or type a new interrupt vector that matches that of the AVADI driver.

10. Continue to follow the instructions on the screen to finish configuring AutoCAD. Installation is complete.

Using the COMPAQ Advanced VGA with AutoShade

NOTE: If you installed the driver on a drive other than drive C, substitute the drive letter for that drive when you see a reference to drive C.

The first time you use AutoShade with the AVADI driver, you must configure AutoShade to accept the driver. To configure AutoShade, complete the following steps:

1. Load the AVADI driver into memory.
2. Change to your AutoShade subdirectory.
3. At the system prompt, enter

   ```
   SHADE /R
   ```

4. When asked to select a pointing device, select the one you are using.
5. When asked to select a display device, select *Autodesk Device Interface display driver* and press the **ENTER** key.
6. You are now asked to enter the interrupt number. This must match the interrupt vector number displayed by the AVADI driver as it loaded into memory.

   NOTE: Both the driver and AutoShade default to interrupt vector 7A. Accept the default or type a new interrupt vector that matches that of the AVADI driver.

7. When asked to select a rendering device, select *Autodesk Device Interface rendering driver.*

8. You are now asked to enter the interrupt number. This entry must match the interrupt vector number displayed by the AVADI driver as it loaded into memory.

   NOTE: Both the driver and AutoShade default to interrupt vector 7A. Accept the default or type a new interrupt vector that matches that of the AVADI driver.

9. The following message displays on your screen:

   ```
   Do the display and AutoShade rendering devices share a single
   screen (default=NO):
   ```

   Enter

   YES

10. The following message displays on your screen:

    ```
    Do the display and Autodesk RenderMan rendering devices share a
    single screen (default=NO):
    ```

    Enter

    YES

11. The following message displays on your screen:

    ```
    Does FLIPSCREEN require a redraw (default=NO):
    ```

    Enter

    YES

12. You have now configured AutoShade to accept the AVADI driver. Follow the instructions on the screen to finish configuring AutoShade. Once you finish, AutoShade starts automatically.

Using the COMPAQ Advanced VGA with AutoSketch

NOTE: If you installed the driver on a drive other than drive C, substitute the drive letter for that drive when you see a reference to drive C.

The first time you use AutoSketch with the AVADI driver, you must configure AutoSketch to accept the driver. To configure AutoSketch, complete the following steps:

1. Load the AVADI driver into memory.
2. Change to your AutoSketch subdirectory.
3. At the system prompt, enter

   SKETCH /R

4. When asked to select a pointing device, select the one that you are using.
5. When asked to select a display device, select *Autodesk Device Interface Display* and press the **ENTER** key.
6. You are now asked to enter the interrupt number. This entry must match the interrupt vector number displayed by the AVADI driver as it loaded into memory.

   NOTE: Both the driver and AutoSketch default to interrupt vector 7A. Accept the default or type a new interrupt vector that matches that of the AVADI driver.

7. You have now configured AutoSketch to accept the AVADI driver. Follow the instructions on the screen to finish configuring AutoSketch. Once you finish, AutoSketch starts automatically.

CHARSET

CHARSET lets you select the font you want to use on a COMPAQ LCD display, COMPAQ Dual-Mode Plasma display, COMPAQ EGA monitor, or a COMPAQ VGA monitor. You can also select an alternate font to use for highlighted text.

Syntax:

CHARSETΔ [MAIN =] [*drive:*] [*path*]*filename*Δ ALT = [*drive:*] [*path*]*filename*

Or

CHARSETΔ ALT = [*drive:*] [*path*]*filename*Δ [MAIN = [*drive:*] [*path*]*filename*]

Parameters:

MAIN
This parameter selects the font specified by the filename as the primary character set.

ALT
This parameter selects the font specified by the filename as the secondary character set.

filename
This parameter specifies the character set. The available character sets are THINUS and THINNO.

THINUS
This is the thin-character version of the standard extended ASCII character set.

THINNO
This is the thin-character version of the character set for use in Norway and Denmark.

Comments:

The ROM contains the default character set for both the main and alternate character set. If this setting is satisfactory, you do not need to use CHARSET.

Before using the CHARSET command, be sure that all User Programs files were copied to your MS-DOS directory.

Continued

CHARSET defines the alternative character set used by the ADAPT and MODE ATTRIBUTE commands for COMPAQ plasma displays. For this reason, you must execute CHARSET in order for you to see the effect of the alternate character set when using either ADAPT or MODE ATTRIBUTE.

CHARSET allows you to change the character set after it is loaded. Once CHARSET is executed, it may be cleared only by resetting the system.

The following table shows various ways the command can be issued and the effect of each method. Note that the first two commands are default settings.

Table 5-1
Examples of the CHARSET Command

Command	Effect
CHARSET MAIN = THINUS	Main character set is thin in this version of the U.S. character set; alternate character set is normal.
CHARSET ALT = THINUS	Main character set is normal in appearance; alternate character set is thin.
CHARSET MAIN = THINNO	Main character set is thin in this version of the Norway/Denmark character set; alternate character set is normal.
CHARSET ALT = THINNO	Main character set is normal in appearance; alternate character set is the thin version of the Norway/Denmark character set.
CHARSET MAIN = THINUS	Main and alternate character sets are thin versions of the U.S. character set.

MODE ATTRIBUTE

The MODE ATTRIBUTE command lets you set certain display options of the COMPAQ Dual-Mode Plasma Display. Using MODE ATTRIBUTE is equivalent to changing the character appearance of highlighted text by using the ADAPT utility. Selections made through MODE ATTRIBUTE remain in effect unless changed through ADAPT or until you turn off or reset your computer.

Syntax:

MODE Δ ATTRIBUTE[=]ALTERNATE|HALF|REVERSE|UNDERLINE|
IGNORE|TOGGLE

Parameters:

ALTERNATE

This parameter uses an alternate character font for highlighted text. This font must be previously loaded using code page switching or CHARSET. For more information on code page switching, refer to your MS-DOS documentation.

HALF

This parameter uses half-intensity for highlighted text. This is the default mode for COMPAQ Dual-Mode Plasma Displays.

REVERSE

This parameter uses reverse video for highlighted text.

UNDERLINE

This parameter underlines highlighted text.

IGNORE

This parameter disables highlighting.

TOGGLE

This parameter reverses highlighted and normal text. For example, if you selected UNDERLINE and then selected TOGGLE, all text would be underlined except highlighted text.

MODE CRT

The MODE CRT command lets you set the operational mode and format of the display adapters. Refer to your MS-DOS documentation for information on using the MODE CRT command.

The MODE command appears in both the \DOS331 and \DOS4 subdirectories on the User Programs diskette. If you copy either version of this command to your fixed disk, you must also copy any other files from the appropriate subdirectory on the User Programs diskette to your fixed disk. Refer to Chapter 2, "Installing User Programs Files for MS-DOS," for more information about copying the \DOS331 or \DOS4 subdirectory to your fixed disk or working MS-DOS diskette.

NOTE: Installing User Programs with UPCU copies the files, but does not configure MODE.

Syntax:

MODEΔ [*n*] [,*rr*]
MODEΔ [*n*],*x*
MODEΔ [*n*],*m*[,T]

Additionally, for MS-DOS 4.01 or later:
MODEΔ CON[:]Δ [COLS = *ccc*] [LINES = *rr*]

Parameters:

n
This parameter specifies the CRT mode with one of the following values: 40, 80, 132, BW40, BW80, CO40, CO80, CO132, MO132, or MONO. For each of these options, 40, 80, and 132 indicate the number of characters per line. BW and CO refer to a color graphics monitor adapter with color burst disabled (BW) or enabled (CO). MONO specifies a monochrome display adapter with a constant display width of 80 characters per line. MO132 refers to the 132-column VGA monochrome mode.

x
This parameter specifies which monitor is enabled, the external (E) or internal (I).

m
This parameter specifies the shift direction, right (R) or left (L).

Continued

T
This parameter specifies if the monitor test is requested or not.

ccc
This parameter applies to MS-DOS 4.01 only and specifies the number of characters per line, 40, 80, or 132.

rr
This parameter specifies the number of lines per screen, 25, 28, 43, 50, or 60. If you specify a value that is not supported by your video adapter, an error message displays.

Comments:

The valid lines per screen in 40-, 80-, and 132-column modes for MS-DOS Version 3.31 are 25, 28, 43, and 50.

The valid lines per screen in 40-, 80-, and 132-column modes for MS-DOS Version 4.01 are 25, 43, and 50.

The 60 lines per screen value and the 132-column modes are supported on the following COMPAQ Personal Computers: COMPAQ DESKPRO 486/33L, COMPAQ DESKPRO 386/33L, COMPAQ DESKPRO 386s/20, COMPAQ DESKPRO 386N, COMPAQ DESKPRO 286N and certain models of the COMPAQ DESKPRO 386/20e, and COMPAQ 386/25e Personal Computers. The 60 lines per screen value is supported only in 132-column mode.

If you use MS-DOS Version 4.01 and want to change the lines per screen while in 40- or 80-column mode, you need to include *ANSI.SYS* in the *CONFIG.SYS* file. *ANSI.SYS* is not required to use the 132-column mode.

The 43 lines per screen value is only supported on EGA and VGA controllers. The 28 and 50 lines per screen values are only supported on VGA controllers.

To change the video board emulation, see MODE SELECT.

Continued

If you plan to use an external monitor with any COMPAQ portable personal computer on a regular basis, you can include this command in your *AUTOEXEC.BAT* file.

NOTE: The COMPAQ Enhanced Color Graphics Board and COMPAQ Video Graphics Controller Board do not have composite video output. Therefore, CRT modes, such as BW40 and CO40, are identical.

The *m* parameter values perform the following functions:

- In the 40-column mode, the display shifts one character position to the left or to the right depending the direction requested.
- In the 80-column mode, the display shifts two character positions to the left or to the right depending the direction requested.

If you specify the T option, a test pattern appears after the screen shifts in the direction requested by the *m* option. A message asks if the display is aligned correctly. If you answer N, the display shifts in the requested direction and the message repeats. When you answer Y, the command terminates.

The *x* parameter values are functional only on systems that have a COMPAQ Video Display Controller Board (VDU) or a COMPAQ Enhanced Color Graphics (ECGB) Board installed and a COMPAQ Dual-Mode Monitor or a COMPAQ color monitor. This parameter has two primary uses: to enable the use of an external monitor with a COMPAQ portable personal computer and to switch the display scan rates on other COMPAQ personal computers with a single monitor.

MODE SCREENSAVE

The MODE SCREENSAVE command lets you set the number of minutes of keyboard and mouse inactivity before the screen blanks on COMPAQ LCD and COMPAQ Dual-Mode Plasma Displays. Selections made through MODE SCREENSAVE remain in effect unless changed through ADAPT or PWRCON, or until you turn off or reset your computer.

Syntax:

MODE Δ SCREENSAVE[=]*nn*|ON|OFF

Parameters:

nn

This parameter is the number of minutes of inactivity before the screen blanks. The value for *nn* can be from 00 to 63. The default is 15. If you choose 00, you turn the screen save feature off.

ON|OFF

This parameter turns SCREENSAVE on or off. ON causes the screen to blank after 15 minutes of keyboard and mouse inactivity.

NOTE: If you are using a COMPAQ LTE Personal Computer, the MODE SCREENSAVE feature can only be turned ON or OFF.

MODE SELECT

If you have two monitors connected to your computer, you can use the MODE SELECT command to easily change the emulation of the currently active video board.

Syntax:

MODE Δ SELECT[=] [CGA|MDA|EGA Δ COLOR|EGA Δ MONO]

Parameters:

CGA

This parameter may only be specified on personal computers containing a COMPAQ Dual-Mode Plasma Display. It is the default value on all other COMPAQ personal computers. This variable puts the active video adapter into IBM Color Graphics Adapter (CGA) emulation mode.

Continued

MDA
This parameter is only used on personal computers with a COMPAQ Dual-Mode Plasma Display or a COMPAQ Dual-Mode Monitor. It puts the active video adapter into IBM Monochrome Display Adapter (MDA) emulation mode.

EGA COLOR
This parameter is only used on personal computers with an enhanced color graphics board. It puts the active video adapter into color IBM Enhanced Graphics Adapter (EGA) emulation mode.

EGA MONO
This parameter is only used on personal computers with an enhanced color graphics board. It puts the active video adapter into monochrome IBM Enhanced Graphics Adapter (EGA) emulation mode. The active board-monitor combination must support monochrome EGA; a monochrome adapter cannot be present in the system.

Comments:

The MODE SELECT command issued with no parameters displays the emulation of the currently active video board. To change the emulation of the currently active video board, issue the MODE SELECT command with one of the parameters listed.

When you reset your computer, the emulation of the currently active video board returns to the default setting.

Chapter 6

USING THE KEYBOARD SUPPORT SOFTWARE

This chapter provides information about utilities that let you increase the capacities of your keyboard. This chapter covers the following utilities:

- KEYB – Lets you use the character set of a specified language.
- KEYBDP – Lets you use an Enhanced Keyboard with a COMPAQ DESKPRO Personal Computer.
- KP – Lets you install a keyboard password that locks your keyboard and prevents others from using your system. KP also has a screen blanking feature.

NOTE: To see which utilities work on your computer, refer to Table 1-1 in Chapter 1, "Learning About MS-DOS Support Software."

KEYB

The KEYB utility lets you load a keyboard driver that specifies the character set for a particular language.

Syntax:

KEYBΔ [*xx* [,Δ [*nnn*],[[*drive*:] [*path*]*filespec*]]]Δ [/E]

Parameters:

xx

Use this parameter to enter the keyboard code of the country whose character set you want to use:

Code	Country/Language	Command
US	Australia	KEYB US
BE	Belgium	KEYB BE
US	Canada (English)	KEYB US

Continued

Code	Country/Language	Command
CF	Canada (French)	KEYB CF
DK	Denmark	KEYB DK
SU	Finland	KEYB SU
FR	France	KEYB FR
GR	Germany	KEYB GR
LA	Latin America	KEYB LA
NL	Netherlands	KEYB NL
NO	Norway	KEYB NO
PO	Portugal	KEYB PO
SP	Spain	KEYB SP
SV	Sweden	KEYB SV
SF	Switzerland (French)	KEY SF
SG	Switzerland (German)	KEYB SG
UK	United Kingdom	KEYB UK
US	United States	KEYB US

nnn
This parameter specifies one of the following code page numbers that define the character set: 437, 850, 860, 863, or 865. If you do not use this parameter, the current code page is used.

drive:
This parameter identifies the drive containing the keyboard definition file, *KEYBOARD.SYS*. If you do not use this parameter, KEYB searches for *KEYBOARD.SYS* in the current root directory.

Continued

path
This parameter specifies the directory where the *KEYBOARD.SYS* file is located.

filespec
This parameter identifies the file containing the definition file, *KEYBOARD.SYS*.

/E
This switch specifies an enhanced keyboard on an 8086-based desktop personal computer.

Comments:

The *KEYB.COM* and *KEYBOARD.SYS* files have been added to support users with keyboards other than the United States English keyboard. If you are using one of these keyboards, copy the files to your MS-DOS directory.

Refer to your MS-DOS documentation for more information about *KEYB.COM* and *KEYBOARD.SYS*.

KEYBDP

The KEYBDP utility lets you use a COMPAQ Enhanced Keyboard with a COMPAQ DESKPRO Personal Computer.

Syntax:

```
KEYBDP
```

Comments:

Add the KEYBDP command to your *AUTOEXEC.BAT* file to automatically load the keyboard driver each time you start the computer.

KP

The KP utility lets you enter a password that locks your keyboard. KP has a new feature, Quickblank. When the keyboard is locked, Quickblank blanks the screen to protect the data displayed on the screen, and may extend the life of your display. Refer to the "Using the Quickblank Feature" section for instructions on using this new feature.

! **IMPORTANT:** If you have a mouse connected to the auxiliary pointing device (mouse) interface (PDI), KP also locks your mouse. To determine whether your system has a pointing device interface, refer to documentation that came with your computer and check to see if your mouse is connected to this interface.

To determine whether KP works on your system, refer to Table 1-1 in Chapter 1, "Learning About MS-DOS Support Software." To determine if your system supports Quickblank, refer to documentation that came with your computer.

Syntax:

KP Δ [/C] Δ [/Q*n*] Δ [/B[Y|N]]

Parameters:

/C
This parameter allows you to set or change a keyboard password, set or change your Quicklock hot-key combination, and turn the Quickblank feature on or off.

/Q*n*
This parameter lets you change your Quicklock hot-key combination. (The CTRL+ALT+L key combination is the default for all machines that can use this feature.) If you do not use the *n* variable, a warning message is displayed.

Continued

n

The *n* variable specifies the Quicklock hot-key that will be used with the CTRL+ALT key combination to enter the password lock mode. The value of *n* can be any alphabetic key from A to Z or numeric key from 0 to 9.

/B[Y|N]

This parameter lets you turn the Quickblank screen feature on or off. /BY turns this feature on; /BN turns this feature off. If you do not use "Y" or "N" with the /B parameter, KP will use "Y" as a default.

Comments:

To change the keyboard password, type KP /C (for change) and follow the instructions to enter a new password. After you exit KP, the keyboard is disabled and you must enter the new password to enable the keyboard.

If you want to modify your default Quicklock hot-key combination and your default Quickblank setting, add the KP command with the /Q*n* and /B[Y|N] parameters to your *AUTOEXEC.BAT* file.

If you want to disable the keyboard and you did not specify a power-on password while running SETUP or the COMPAQ EISA CONFIGURATION Utility, type KP and follow the instructions to enter a password. After you exit KP, the keyboard is disabled and you must enter the password to enable the keyboard. This password remains in effect until you turn off the computer.

For more information on SETUP or the COMPAQ EISA CONFIGURATION Utility and the power-on password, refer to the documentation that came with your computer.

The keys on the numeric keypad produce a different password than the keys on the main section of the keyboard.

Using the Quickblank Feature

Quickblank blanks the screen, protects data displayed on the screen, and may extend the life of your display. To use the Quickblank feature, complete the following steps:

1. To start the KP utility, enter

   KP /C

   at the command prompt. The COMPAQ KEYBOARD PASSWORD Utility menu is displayed on your screen.

2. Enter a password in the space provided and press the **ENTER** key.

3. If you want to use a Quicklock hot-key combination that lets you lock your keyboard from inside a program, enter the desired letter and press the **ENTER** key. Otherwise, press the **ENTER** key.

   The following message is displayed:

   ```
   Blank screen when keyboard locked? (Y/N) [ ]
   ```

4. Enter

   Y

   The Quickblank feature is now set. The keyboard is locked, and the screen blanks until you either enter your keyboard password again or turn your system off.

OTHER SUPPORT SOFTWARE

This chapter provides information about utilities and drivers that do not easily fit into categories. Most of these are used only on specific computers or computer systems.

The following utilities and drivers are described in this chapter:

- CLOCK – If you have a COMPAQ DESKPRO Personal Computer, you can use this utility to update the clock on the serial board.
- MODE ADDRCOM*x* – If you have a COM3 or COM4 expansion board installed in your system, you can use this utility to load the hexadecimal memory address for it.
- MODE SPEED – This utility allows you to change the default operating speed of your computer. You may want to use this utility with the CEMM utility.
- PWRCON – If you have a COMPAQ battery-operated personal computer, you can use PWRCON to change certain power conservation settings.

NOTE: To determine which utilities and drivers work on your computer, refer to Table 1-1 in Chapter 1, "Learning About MS-DOS Support Software."

CLOCK

Use this command to update the clock on the serial board of a COMPAQ DESKPRO Personal Computer. This command keeps the current date and time on a COMPAQ DESKPRO Personal Computer.

Syntax:

DEVICE = [*drive*:] [*path*]CLOCK.SYS

Continued

Comments:

The first time you start your computer after installing the *CLOCK.SYS* driver in the *CONFIG.SYS* file, you are prompted to enter the date and time. After this initial setting, MS-DOS keeps the date and time current and automatically loads the date and time when you start your computer.

MODE ADDRCOM*x*

Use this command to load the address for COM3 or COM4.

Syntax:

MODE Δ ADDRCOM*x* [=] [*addr*]

Parameters:

x
This parameter specifies which COM to use. You can choose either 3 or 4.

addr
This parameter specifies the hexadecimal address for COM3 or COM4.

Comments:

If you do not specify the *addr* variable, a message is displayed giving you the current address of COM3 or COM4.

The *addr* variable is a three- or four-digit hexadecimal number. You do not have to enter the leading zeroes.

This hexadecimal value matches the number used by the COM3 or COM4 board that you have installed in your system. To determine the value set on the board, refer to the documentation that came with the board.

MODE SPEED

All COMPAQ personal computers and computer systems have a default operating speed. The MODE SPEED utility allows you to change the operating speed of your computer for compatibility with certain application programs. There are five operating speeds: COMMON, FAST, HIGH, AUTO, and *n*. The actual speed that is set varies with each COMPAQ personal computer. Refer to Tables 7-1, 7-2, 7-3, and 7-4 to determine the available speed settings for COMPAQ personal computers.

Syntax:

MODEΔ SPEED[=] [COMMON|FAST|HIGH|AUTO|*n*]

Parameters:

COMMON, FAST, HIGH, AUTO

The MODE SPEED command issued with a parameter allows you to change the operating speed of your COMPAQ personal computer. Refer to the tables that follow to see how the operating speed of a COMPAQ personal computer may be changed.

n

The *n* parameter is only available on COMPAQ 386- and 486-based personal computers. You can specify a speed value within the range 1 through 50.

Comments:

The MODE SPEED command issued with no parameters displays the current operating speed of your COMPAQ personal computer.

If you have an 8086- or 286-based personal computer, the operating speed returns to the default setting when you reset or turn off your computer.

If you have a 386- or 486-based personal computer, the operating speed returns to the default setting only when you turn off the computer.

The following table shows the operating speeds set by each MODE SPEED parameter on COMPAQ 486-based personal computers.

Table 7-1
MODE SPEED Settings On Compaq 486-Based Personal Computers

Command	25-MHz 486-Based Computers	33-MHz 486-Based Computers
AUTO	25-MHz CPU* 8.33-MHz bus	33-MHz CPU 8.33-MHz bus
HIGH**	25-MHz CPU 8.33-MHz bus	33 MHz CPU 8.33-MHz bus
FAST	8-MHz CPU 8.33-MHz bus	8.6-MHz CPU 8.33-MHz bus
COMMON	6-MHz CPU 8.33-MHz bus	7-MHz CPU 8.33-MHz bus

* CPU speed is reduced to 8 MHz during diskette access.
** Default speed

The following tables show the operating speeds set by each MODE SPEED parameter on COMPAQ 386-based personal computers.

Table 7-2
MODE SPEED Settings on COMPAQ 386-Based Personal Computers

Command	16-MHz 386-Based Computers	20-MHz 386-Based Computers
AUTO	16-MHz CPU* 8-MHz bus	20-MHz CPU* 8-MHz bus
HIGH**	16-MHz CPU 8-MHz bus	20-MHz CPU 8-MHz bus
FAST	8-MHz CPU 8-MHz bus	8-MHz CPU 8-MHz bus
COMMON	6-MHz CPU 8-MHz bus	6-MHz CPU 8-MHz bus

* CPU speed is reduced to 8 MHz during diskette access.
** Default speed

Table 7-3
MODE SPEED Settings on COMPAQ 386-Based Personal Computers

Command	25-MHz 386-Based Computers	33-MHz 386-Based Computers
AUTO	25-MHz CPU* 8.33-MHz bus	33-MHz CPU* 8.33-MHz bus
HIGH**	25-MHz CPU 8.33-MHz bus	33-MHz CPU 8.33-MHz bus
FAST	8-MHz CPU 8.33-MHz bus	8.6-MHz CPU 8.33-MHz bus
COMMON	6-MHz CPU 8.33-MHz bus	7-MHz CPU 8.33-MHz bus

* CPU speed is reduced to 8 MHz during diskette access.
** Default speed

The following table shows the operating speeds set by each MODE SPEED parameter on COMPAQ 286-based personal computers.

Table 7-4
MODE SPEED Settings on COMPAQ 286-Based Personal Computers

Command	8-MHz 286-Based Computers	12-MHz 286-Based Computers	COMPAQ LTE/286 Personal Computer
AUTO	Not Supported	12-MHz CPU* 8-MHz bus	12-MHz CPU*
HIGH	8-MHz CPU 8-MHz bus	12-MHz CPU 8-MHz bus	12-MHz CPU
FAST	8-MHz CPU 6-MHz bus	8-MHz CPU 8-MHz bus	8-MHz CPU
COMMON	6-MHz CPU 6-MHz bus	Not Supported	Not Supported

* CPU speed is reduced to 8 MHz during diskette access. Bus speeds shown in this table apply to expansion bus only.

The following table shows the operating speeds set by each MODE SPEED parameter on COMPAQ 8086-based personal computers.

Table 7-5
MODE SPEED Settings on COMPAQ 8086-Based Personal Computers

Command	8086-Based Computers	COMPAQ LTE Personal Computer
AUTO	Not Supported	Not Supported
HIGH	Not Supported	Not Supported
FAST	7.14-MHz CPU* 4.77-MHz bus	9.54-MHz CPU*
COMMON	4.77-MHz CPU 4.77-MHz bus	4.77-MHz CPU

*CPU speed is reduced to 8 MHz during diskette access. Bus speeds shown in this table apply to expansion bus only.

The following table shows how the **CTRL** + **ALT** + \ keystroke option toggles between operating speeds on COMPAQ personal computers.

Table 7-6
Effect of CTRL + ALT + \ Keystroke Option

Computer System	Effect of Keystroke Option
8086-Based Computers	Toggles between FAST (GREEN LED) and COMMON (RED LED)
COMPAQ LTE Personal Computer	Toggles between AUTO (2 beeps) and COMMON (1 beep) or Toggles between FAST (2 beeps) and COMMON (1 beep)
COMPAQ LTE/286 Personal Computer	Toggles between AUTO (2 beeps) and FAST (1 beep) or Toggles between HIGH (2 beeps) and FAST (1 beep)
8-MHz 286-Based Computers	Toggles between HIGH (2 beeps) and COMMON (1 beep)
12-MHz 286-Based Computers	Toggles between AUTO (2 beeps) and FAST (1 beep) or Toggles between HIGH (2 beeps) and FAST (1 beep)
386-Based Computers	Not Supported
486-Based Computers	Not Supported

NOTE: This option is activated by the **CTRL**, **ALT**, and **** keys on U.S. keyboards. The activation keys differ on some keyboards.

PWRCON

PWRCON allows you to change certain power conservation settings for COMPAQ battery-operated personal computers. When you use power conservation settings, you set the amount of time that a system device remains inactive before the device is turned off. For example, if you set 15 minutes for your screen, the screen blanks if you do not use the mouse or keyboard for 15 minutes.

If a system device is turned off, it is turned on again when you use it. For example, if the fixed disk is turned off because of inactivity, it will turn back on as soon as it is accessed. Using the PWRCON command, you can change the inactivity time-out values whenever necessary without changing the default values. When you change the inactivity time-out values, they remain in effect until you turn off or reset the computer.

Except for screen time-outs, inactivity time-outs occur only when the system is running under battery power. The screen time-out is in effect under AC power as well as under battery power.

With the PWRCON command, you can do the following:

- Clear all inactivity time-out values.
- Reset all inactivity time-out values to their default values.
- Change the inactivity time-out value for the fixed disk drive.
- Change the inactivity time-out value for all system devices.
- Change the screen save inactivity time-out value.
- Turn the modem on or off.
- Enable or disable the power conservation beeps.

The PWRCON Command

Use PWRCON to change certain power conservation settings for COMPAQ battery-operated personal computers. PWRCON modifies power conservation time-outs and settings and lets you reset all inactivity time-out values to their default values.

Syntax:

PWRCONΔ [CLEAR|DEFAULT]Δ [SYSTEM[=]*nn*]Δ [DISK[=]*nn*]Δ
[SCREEN[=]*nn*|ON|OFF]Δ [MODEM[=]ON|OFF]Δ
[PBEEPS[=]ON|OFF]

Parameters:

CLEAR

This parameter disables time-outs for system devices, the fixed disk drive, and the screen by setting the time-outs for these devices to 00.

DEFAULT

This parameter resets the time-out values for system devices, the fixed disk drive, and the screen to the default values specified with SETUP.

SYSTEM[=]*nn*

This parameter sets the number of minutes of inactivity for all system devices before Standby is initiated during battery-powered operation. System devices include the fixed disk drive, diskette drive, parallel interface, keyboard, and modem. If you use the *nn* variable, you can enter a value from 00 to 21. The default is 10.

DISK[=]*nn*

This parameter sets the number of minutes the fixed disk must be inactive before it shuts down. If you use the *nn* variable, you can enter a value between 00 and 16 minutes. The default is 2.

Continued

SCREEN[=]*nn* | ON | OFF
This parameter sets the number of minutes of keyboard and mouse inactivity that must pass before the screen blanks. If you use ON, the screen blanks after 15 minutes. If you use OFF, the screen does not blank. If you use the *nn* variable, you can enter a value from 00 to 63 minutes.

MODEM[=] ON | OFF
This parameter turns the modem on or off. The default is OFF. The MODEM parameter is supported only on the COMPAQ SLT/286 Personal Computer.

PBEEPS[=] ON | OFF
This parameter turns the power conservation and low battery warning beeps on and off. The default is ON.

Comments:

The PWRCON command issued with no parameters displays a menu from which you can change the inactivity time-out values for power conservation. When using this menu, press the **F3** key to exit or the **F1** key for help.

If you have a COMPAQ LTE Personal Computer, the screen save feature can only be turned on or off. If the screen save feature is set to ON, the inactivity default value is set at 15 minutes. If there is no keyboard activity for 15 minutes, the screen goes blank. When the screen save feature is set to OFF, the screen does not go blank while the system is on.

If the computer is operating under AC power, or if power conservation was previously disabled using SETUP, the PWRCON DISK command and the PWRCON SYSTEM command will have no effect. If you attempt to use these commands under these circumstances, an error message is displayed.

If the computer is operating under AC power, or if power conservation was previously disabled using SETUP, only the PWRCON SCREEN command is still in effect.

Continued

You may use any combination of parameters on the same command line. For example,

```
PWRCON MODEM = OFF DISK = 3 SYSTEM = 9
```

is an acceptable use of the command. If you use conflicting command line options, the value that appears last on the command line is used.
For example,

```
PWRCON DISK = 9 SYSTEM = 12 DISK = 3
```

sets the system device inactivity time-out value to 12 minutes and the fixed disk inactivity time-out value to 3 minutes.

You should periodically turn off PWRCON to let the battery completely drain. This helps the battery charge the next time you connect your system to AC power.
For example,

```
PWRCON SYS = 0 SCR = 0 DISK = 0
```

ensures the maximum number of minutes for battery-powered operation.

For more information on draining the battery, refer to the documentation that came with your computer.

Changes you make using PWRCON remain until you change them or until you reset the system. To make permanent changes to these time-out values, run SETUP.

LEARNING ABOUT MICROSOFT WINDOWS SUPPORT SOFTWARE

This section contains information on drivers designed to enhance the way Microsoft Windows Version 3.0 performs on your system. These drivers are located on the User Programs diskette for Microsoft Windows support.

To install and use these drivers, you need Microsoft Windows Version 3.0 or later installed on your system. For information on installing and using these drivers, refer to Chapter 9, "Installing Windows Video Drivers."

In addition to the drivers described here, you can use the utilities and drivers designed for the MS-DOS environment. For information about these utilities and drivers, refer to Chapter 1, "Learning About MS-DOS Support Software."

MICROSOFT WINDOWS DEVICE DRIVERS

Compaq provides two types of display drivers: COMPAQ Advanced VGA (AVGA) drivers and COMPAQ Integrated Video Graphics System (IVGS) drivers.

The following table describes these display drivers:

Table 8-1
Microsoft Windows 3.0 Drivers

Driver	Description
COMPAQ Advanced VGA	This driver provides 256-color support for VGA monitors at 640x480 resolution and features both 6- and 8-bit digital-to-analog converter (DAC) modes.
COMPAQ Integrated Video Graphics System	This 16-color driver improves the way Microsoft Windows Version 3.0 performs graphic operations, such as menu scrolling and using pulldown and popup menus.

IMPORTANT: Because these enhancements also involve hardware changes, these drivers do not work on all COMPAQ systems. When running CPQWIP prior to installation, CPQWIP determines which of these drivers you can use on your system. For more information on CPQWIP, refer to Chapter 9, "Installing Windows Video Drivers."

INSTALLING WINDOWS VIDEO DRIVERS

This chapter contains the following information:

- Instructions for running the CPQWIP program. (You must run this program before installing these video drivers.)
- Instructions for installing both the COMPAQ Advanced VGA and COMPAQ Integrated Video Graphic System drivers.
- Information on the Advanced VGA digital to analog converter (DAC) modes and how to adjust them.

Before you begin, be sure you have Microsoft Windows Version 3.0 or later installed on your system.

CAUTION: Do not copy the Windows drivers files directly from the User Programs diskette to your fixed disk drive. Doing so could cause unpredictable results.

BEFORE YOU INSTALL

Before installing the COMPAQ driver for use with Microsoft Windows, you must run CPQWIP. CPQWIP determines which driver (if any) you can install, and it creates the *OEMSETUP.INF* file needed by Windows SETUP.

If you are using a drive other than drive A, substitute that drive letter when you see a reference to drive A.

To run CPQWIP, complete the following steps:

1. Insert the User Programs diskette for Microsoft Windows support in drive A. Enter

   ```
   A:
   ```

2. Enter

   ```
   CPQWIP
   ```

3. One of the messages listed in the following table is displayed on your screen. Find the message in the table that corresponds to the one on your screen.

Table 9-1
CPQWIP Messages

Message	Description
COMPAQ Advanced VGA	Your system supports the COMPAQ Advanced VGA.
COMPAQ Integrated Video Graphics System	Your system supports the COMPAQ Integrated Video Graphics System.
Drivers to support your video display controller for use with Microsoft Windows Version 3 are not available on the User Programs diskette.	Your system does not currently support COMPAQ display drivers on the User Program diskettes.

INSTALLING THE DRIVERS

If you previously installed Windows in a subdirectory other than \WINDOWS, use that subdirectory name instead of \WINDOWS.

To install either of the video drivers, complete the following steps:

1. At the system prompt, change to the Windows subdirectory by entering

   CD \WINDOWS

2. Once in the Windows subdirectory, enter

   SETUP

IMPORTANT: Do not start SETUP from Windows.

   The System Information screen displays the computer type, display adapter, mouse, keyboard, and network adapter.

3. Use the arrow keys to highlight the Display line and press the **ENTER** key.

4. When you see the list of display drivers, use the arrow keys to highlight the following:

   ```
   Other (Requires disk provided by a hardware manufacturer)
   ```

   and press the **ENTER** key.

   You are then prompted to insert a diskette into drive A and enter the path for the device driver files.

5. Be sure the User Programs diskette for Microsoft Windows support is in drive A. Enter

   ```
   A:
   ```

   The name of the driver selected while running CPQWIP displays. That driver will be one of the following:

   ```
   COMPAQ ADVANCED VGA, 640x480x256
   COMPAQ Integrated Video Graphics System
   ```

6. Press the **ENTER** key. The driver and the required Windows files are copied to the fixed disk. The System Information menu displays again.
7. Press the **ENTER** key to accept the configuration shown.
8. Select the *No Changes* option to accept the displayed configuration. Installation is now complete.

ADJUSTING THE ADVANCED VGA DAC MODES

The COMPAQ Advanced VGA driver supports both 6- and 8-bit digital-to-analog converter (DAC) modes.

The 8-bit mode provides much more subtle shading capability than the 6-bit mode, and an increasing number of application programs are taking advantage of the wider range of color available from an 8-bit digital-to-analog converter.

It is not uncommon for users who require a special-purpose high-resolution video adapter and monitor to have a standard VGA adapter and monitor installed as well. In such situations, the signals are "passed through" to the high-resolution equipment.

Because most "standard" VGAs have only 6-bit DACs, most high-resolution systems are designed to expect pass-through signals consisting of 6-bit DAC values. Therefore, the default mode for the COMPAQ Advanced VGA driver is the 6-bit mode.

To change the DAC mode, use the text editor of your choice and edit the *WIN.INI* file. If you edit the *WIN.INI* file with a text editor that runs under Windows (for example, Notepad or Windows Write), you must exit and restart Windows for the changes to become apparent.

NOTE: Before editing the *WIN.INI* file, it is a good idea to make a backup copy of the file.

To edit the *WIN.INI* file, complete the following steps:

1. Open the *WIN.INI* file with the text editor of your choice.

   Notice that the file is grouped into sections and that each section title is contained in brackets ([ ]).

2. At the end of any section, create a new section by inserting a blank line and typing the following:

   ```
   [COMPAQ]
   DACMODE = 8
   ```

   Be sure the opening bracket ([) of the section is in the left most column of the line. (If the file already has a COMPAQ section, simply add the DACMODE = 8 entry under that section.)

! **IMPORTANT:** Do not insert these lines into the middle of another section. Doing so causes the lines following the new COMPAQ section to be misinterpreted.

You can now switch modes back and forth by editing the DACMODE entry, changing the 8 to 6 and so forth.

LEARNING ABOUT MS OS/2 SUPPORT SOFTWARE

This section contains utilities and device drivers for use with Microsoft Operating System/2 (MS OS/2) as published by Compaq Computer Corporation and IBM OS/2. The utilities and drivers are divided into the following categories:

- COMPAQ Advanced VGA driver
- COMPAQ Fixed Disk Drivers
- MS OS/2 support software which includes the POWER CONSERVATION (PWRCON) driver and utility, the KEYBOARD PASSWORD (KP) utility, and the VIDEO SWITCHING (VSWITCH) utility.

Refer to the "MS OS/2 Support Software Summary" section in this chapter for a description of each utility and driver.

WHAT YOU CAN DO WITH MS OS/2 SUPPORT SOFTWARE

The following list shows what you can do with the MS OS/2 utilities and drivers and where you can go to find information.

What you can do	Reference
Learn about the COMPAQ Advanced VGA Driver	*Chapter 11*
Learn about the Intelligent Drive Array (IDA) Driver	*Chapter 12*
Learn about the Array Expansion System Driver	*Chapter 12*
Learn about the 650-Megabyte Fixed Disk Driver	*Chapter 12*
Learn about the PWRCON Driver and Utility	*Chapter 13*
Learn about the KP Utility	*Chapter 13*
Learn about the VSWITCH Utility	*Chapter 13*

MS OS/2 SUPPORT SOFTWARE SUMMARY

This section contains a brief description of each USER PROGRAMS utility and driver for MS OS/2 explained in this guide.

Table 10-1
MS OS/2 Support Software

Support Software	Description
COMPAQ Advanced VGA	This driver provides 256 color support for VGA monitors at 640x480 resolution.
IDA	This driver enhances the performance of IBM OS/2 Version 1.2 and Version 1.3 on a COMPAQ 32-Bit Intelligent Drive Array (IDA) Controller.
Array Expansion System	This driver lets you configure your system with the COMPAQ Intelligent Array Expansion System.
650-Megabyte Fixed Disk	This driver allows you to use the entire capacity of a COMPAQ 650-megabyte fixed disk when running IBM OS/2 1.2.
PWRCON	This driver manages power conservation for battery-operated systems.
KP	This utility lets you enter a password that locks your keyboard and can lock your mouse. On certain systems, KP also lets you blank your screen to protect data and to extend the life of your display.
VSWITCH	This utility lets you switch between internal and external displays on a COMPAQ LTE or SLT computer.

All MS OS/2 support software is external to the operating system. You must either access the software from the directory where it is located or have the directory in the SET PATH line of the *CONFIG.SYS* file.

WHAT MS OS/2 SUPPORT SOFTWARE WORKS ON YOUR SYSTEM

Table 10-2 shows the User Programs utilities and drivers for MS OS/2 available for each computer.

Table 10-2
Computer/Software Cross Reference

Computer	AVGA	PWRCON	KP	VSWITCH	IDA	ARRAY EXP
COMPAQ SYSTEMPRO			X		X	X**
COMPAQ DESKPRO 486/50L	X*		X		X	X**
COMPAQ DESKPRO 486/33L			X		X**	
COMPAQ DESKPRO 486/25			X		X**	
COMPAQ DESKPRO 386/33L			X		X**	
COMPAQ DESKPRO 386/33			X			
COMPAQ DESKPRO 386/25						
COMPAQ DESKPRO 386/25e	X*		X			
COMPAQ DESKPRO 386/20						
COMPAQ DESKPRO 386/20e	X*		X			
COMPAQ DESKPRO 386s/20			X			
COMPAQ DESKPRO 386s			X			
COMPAQ DESKPRO 386N			X			
COMPAQ DESKPRO 386						
COMPAQ DESKPRO 286						
COMPAQ DESKPRO 286e			X			
COMPAQ DESKPRO 286N			X			
COMPAQ PORTABLE 386						
COMPAQ SLT 386s/20		X		X		
COMPAQ LTE 386s/20		X		X		
COMPAQ SLT 286		X		X		
COMPAQ PORTABLE III						
COMPAQ PORTABLE II						
COMPAQ LTE 286			X	X		

* Refer to the documentation that came with your computer to see if your system supports Advanced VGA.
** Supported options.

NOTE: If your computer is not listed in this table, it is not supported with MS OS/2 support software.

INSTALLING THE COMPAQ ADVANCED VGA VIDEO DRIVER

The User Programs diskette for MS OS/2 support contains the COMPAQ Advanced VGA driver that allows MS OS/2 applications to use a video mode that provides 256 colors at 640x480 resolution. Without this driver, COMPAQ VGA displays provide 16 colors at 640x480 resolution. This driver allows you to use graphics applications to display screen images with almost photographic quality.

NOTE: Because these enhancements also involve hardware changes, these drivers do not work on older COMPAQ systems. Refer to Table 10-2 in Chapter 10, "Learning About MS OS/2 Support Software," to see if these drivers work on your system.

To use this driver, you must have one of the following versions of MS OS/2 on your system:

- MS OS/2 Starndard Version 1.21 as published by Compaq Computer Corporation
- IBM OS/2 Extended Edition Version 1.2
- IBM OS/2 Standard or Extended Edition Version 1.3

To install the COMPAQ Advanced VGA driver, complete the following steps:

1. At the command prompt in an OS/2 session, enter

   ```
   DDINSTAL
   ```

2. When DDINSTAL prompts you to insert a device support diskette, insert the User Programs diskette for MS OS/2 support.
3. DDINSTAL lists drivers and utilities it finds on the diskette. From the list, select the COMPAQ Advanced VGA PM Display Driver.
4. When DDINSTAL asks if you have another device support diskette to install, select "No."
5. Follow the instructions on the screen to complete the installation process.

COMPAQ FIXED DISK DRIVERS

The following sections provide information on the COMPAQ Array Controller drivers and the 650-megabyte fixed disk driver.

IDA DRIVER

The User Programs diskette for MS OS/2 support contains files that enhance the performance of the IBM Operating System/2 (OS/2) Version 1.2 and Version 1.3 on your COMPAQ 32-Bit Intelligent Drive Array (IDA) Controller. These files allow IBM OS/2 to use the IDA Controller's bus master capabilities and the full storage capacity of any large volumes (disk volumes larger than 528-megabytes) on the IDA Controller.

Installation Method

For information on how to install the IDA Controller drivers on your system, refer to the README file in the \DISK\IDA directory. Instructions pertaining to OS/2 1.2 are in the *README.1_2* file and instructions for IBM OS/2 1.3 are in the *README.1_3* file on the User Programs diskette for MS OS/2 support.

Comments

If you receive Corrective Service Disks (CSDs) for IBM OS/2 after installing the COMPAQ support files, you must modify the CSD installation procedure. Information on this modification is in the README file.

ARRAY EXPANSION SYSTEM DRIVER

The Array Expansion System driver allows you to use the COMPAQ Intelligent Array Expansion System with the following versions of the operating system:

- MS OS/2 Standard Version 1.2 as published by Compaq Computer Corporation
- IBM OS/2 Standard or Extended Version 1.3

The Array Expansion System driver files are located in the \DISK\IDA_EXP directory.

Installation Method

For information on how to install the Array Expansion System driver files on your system, refer to the README file in the \DISK\IDA_EXP directory on the User Programs diskette for MS OS/2 support. The README file also discusses limitations when using MS OS/2 with the Array Expansion System and memory considerations for HPFS drivers.

Comments

If you receive CSDs for IBM OS/2 after installing the Array Expansion System driver files, you must modify the CSD installation procedure. For more information on this modification, refer to the README file in the \DISK\IDA _EXP directory.

650-MEGABYTE FIXED DISK DRIVER

The 650-megabyte fixed disk driver allows you to use the entire capacity of a COMPAQ 650-megabyte fixed disk when running IBM OS/2 Version 1.2. Without this driver, IBM OS/2 can recognize only 528 megabytes on the fixed disk.

Information about the installation and use of the 650-megabyte fixed disk driver is found in the README file of the \DISK\650MB directory.

Comments

If you receive CSDs for IBM OS/2 after installing the 650-megabyte fixed disk driver files, you must modify the CSD installation procedure. For more information on this modification, refer to the README file on the User Programs diskette for MS OS/2 support.

USING MS OS/2 SUPPORT SOFTWARE

This section contains information on miscellaneous device drivers and utilities available for the MS OS/2 and IBM OS/2 operating systems. Instructions in this chapter describe how to install the User Programs files on a fixed disk.

INSTALLING MS OS/2 SUPPORT SOFTWARE

Follow these steps to install MS OS/2 drivers and utilities:

1 At the command prompt in an OS/2 session, enter

```
DDINSTAL
```

2. DDINSTAL lists drivers and utilities it finds on the diskette. From the list, select the drivers and utilities you want to install and press the **ENTER** key. DDINSTAL copies the selected items onto the fixed disk and updates the *CONFIG.SYS* file if necessary.
3. When DDINSTAL asks if you have another device support diskette to install, select "No."
4. When you are returned to the command prompt, restart the system so the new drivers and utilities can take effect.

PWRCON DRIVER AND UTILITY

The following information describes the purpose, installation, and use of the PWRCON driver and utility. The *PWRCON.SYS* driver manages power conservation under MS OS/2 on COMPAQ LTE 386s/20, COMPAQ SLT 386s/20, and COMPAQ SLT/286 Personal Computers. The PWRCON utility lets you modify power conservation time-outs and settings and reset all inactivity time-out values to their default values.

Installation Method

To install the PWRCON driver and utility, use DDINSTAL. Refer to the "Installing MS OS/2 Support Software" section.

Syntax:

Driver:

DEVICE = [drive:];path]PWRCON.SYS

Utility:

PWRCONΔ [CLEAR|DEFAULT]Δ [SYSTEM[=]*nn*]Δ [DISK[=]*nn*]Δ
[SCREEN[=]*nn*|ON|OFF]Δ [MODEM[=]ON|OFF]Δ
[PBEEPS[=]ON|OFF]

Parameters:

CLEAR

This parameter disables time-outs for system devices, the fixed disk drive, and the screen by setting the time-outs for these devices to 00.

DEFAULT

This parameter resets the time-out values for system devices, the fixed disk drive, and the screen to the default values specified with SETUP.

SYSTEM [=] *nn*

This parameter sets the number of minutes of inactivity for all system devices before Standby mode starts during battery-powered operation. These system devices are the fixed disk drive, diskette drive, parallel interface, keyboard, and modem. If you use the *nn* variable, you can enter a value from 00 to 21. The default is 10.

DISK[=] *nn*

This parameter sets the number of minutes the fixed disk must be inactive before it turns off. If you use the *nn* variable, you can enter a value from 00 to 16 minutes. The default is 2.

SCREEN[=] *nn* | ON | OFF

This parameter sets the number of minutes of keyboard and mouse inactivity that must pass before the screen blanks. If you use ON, the screen blanks after 15 minutes. If you use OFF, the screen will not blank. If you use the *nn* variable, you can enter a value from 00 to 63 minutes.

Continued

MODEM[=] ON | OFF
This parameter turns the modem ON or OFF. The default is OFF. The MODEM parameter is supported only on the COMPAQ SLT/286 Personal Computer.

PBEEPS[=] ON | OFF
This parameter turns the power conservation and low battery warning beeps ON and OFF. The default is ON.

Comments:

When SETUP is run, it automatically sets the Power Conservation State to AUTO. When the status is set to AUTO and you want to use power conservation under MS OS/2, you must install the *PWRCON.SYS* driver on your system.

If the *PWRCON.SYS* driver is not installed, you must run SETUP to set the Power Conservation State to OFF before running MS OS/2.

The PWRCON command issued with no parameters displays a menu from which you can change the inactivity time-out values for power conservation. When using this menu, press the **F3** key to exit or the **F1** key for help.

If the computer is using AC power, or if power conservation was previously disabled using SETUP, the PWRCON command and the *PWRCON.SYS* driver will have no effect. An error message is displayed if you attempt to use these commands under these circumstances.

If the computer is using AC power, or if power conservation was previously disabled using SETUP, only the PWRCON SCREEN command is still in effect.

You may use any combination of parameters on the same command line. For example,

```
PWRCON MODEM = OFF DISK = 3 SYSTEM = 9
```

is an acceptable use of the command. If you use conflicting command line options, the value that appears last on the command line is used.

Continued

For example,

```
PWRCON DISK = 9 SYSTEM = 12 DISK = 3
```

sets the system device inactivity time-out value to 12 minutes and the fixed disk inactivity time-out value to 3 minutes.

You should periodically turn off PWRCON to let the battery completely drain. This helps the battery charge the next time you connect your system to AC power. For example,

```
PWRCON SYS = 0 SCR = 0 DISK = 0
```

Periodically draining the battery and then recharging ensures the maximum number of minutes for battery-powered operation.

When you make changes using the PWRCON utility, they remain until you change them or until you reset the system. To make permanent changes to these time-out values, run SETUP.

KP

The KP utility lets you enter a password that locks your keyboard. KP has a new feature, Quickblank. When the keyboard is locked, Quickblank blanks the screen to protect the data displayed on the screen, and may extend the life instructions on using this new feature.

IMPORTANT: If you have a mouse connected to the COMPAQ auxiliary pointing device interface (PDI), KP also locks your mouse. To determine whether your system has a PDI, refer to the documentation that came with your computer and check to see if your mouse is connected to this interface.

To determine whether KP works on your system, refer to Table 10-2 in Chapter 10, "Learning About MS OS/2 Support Software." To determine if your system supports Quickblank, refer to the documentation that came with your computer.

Installation Method

To install the KP utility, use DDINSTAL. Refer to the "Installing MS OS/2 Support Software" section.

Syntax:

KP [/C] [/Q*n*] [/B[Y|N]]

Parameters:

/C
This parameter allows you to set or change a keyboard password, set or change your Quicklock hot-key combination, and turn the Quickblank feature ON or OFF.

/Q*n*
This parameter lets you change your Quicklock hot-key combination. (The CTRL+ALT+L key combination is the default for all machines that can use this feature.) If you do not use the *n* variable, a warning message is displayed.

n
The *n* variable specifies the Quicklock hot-key that will be used with the CTRL+ALT key combination to enter the password lock mode. The value of *n* can be any alphabetic key from A to Z or numeric key from 0 to 9.

/B[Y|N]
This parameter lets you turn the Quickblank screen feature ON or OFF. /BY turns this feature ON; /BN turns this feature OFF. If you do not use "Y" or "N" with the /B parameter, KP will use "Y" as a default.

Comments:

To change the keyboard password, type KP /C (for change) and follow the instructions to enter a new password. After you exit KP, the keyboard is disabled and you must enter the new password to enable the keyboard.

If you want to modify your default Quicklock hot-key combination and your default Quickblank setting, add the KP command with the /Q*n* and /B[Y|N] parameters to your *STARTUP.CMD* file.

Continued

If you want to disable the keyboard and you did not specify a power-on password while running SETUP or the COMPAQ EISA CONFIGURATION Utility, type KP and follow the instructions to enter a password. After you exit KP, the keyboard is disabled and you must enter the password to enable the keyboard. This password remains in effect until you turn off the computer.

For more information on SETUP or the COMPAQ EISA CONFIGURATION Utility and the power-on password, refer to the documentation that came with your computer.

The keys on the numeric keypad produce a different password than the keys on the main section of the keyboard.

IMPORTANT: In order for KP to run in an OS/2 session, IOPL = YES must be in the MS OS/2 *CONFIG.SYS* file. This is the default set during MS OS/2 installation. Refer to your MS OS/2 documentation for more information.

Using the Quickblank Feature

Quickblank blanks the screen, protects data displayed on the screen, and may extend the life of your display. To use the Quickblank feature, complete the following steps:

1. Start the KP utility, enter

   KP/C

   at the command prompt. The COMPAQ KEYBOARD PASSWORD Utility menu is displayed on your screen.
2. Enter a password in the space provided and press the **ENTER** key.
3. If you want to use a Quicklock hot-key combination that lets you lock your keyboard from inside a program, enter the desired letter and press the **ENTER** key. Otherwise, press the **ENTER** key.

The following message is displayed:

Blank screen when keyboard locked? (Y|N) []

4. Enter

   Y

The Quickblank feature is now set. The keyboard is locked, and the screen blanks until you either enter your keyboard password again or turn your system off.

VSWITCH

The VSWITCH utility lets you switch video output between the internal display and a display attached to the external monitor port on a COMPAQ LTE or SLT computer. The following information describes the purpose and use of the VSWITCH utility.

Installation Method

To install the VSWITCH utility, use DDINSTAL. Refer to the "Installing MS OS/2 Support Software" section.

Syntax:

VSWITCH [/E | /I]

Parameters:

/E
This parameter directs video output to the external display.

/I
This parameter directs video output to the internal display.

Comments:

The VSWITCH command issued without a parameter toggles video output from one display to the other. If added to a Presentation Manager program group, double click on the VSWITCH icon to toggle between internal and external displays.

IMPORTANT: In order for KP to run in an OS/2 session, IOPL = YES must be in the MS OS/2 *CONFIG.SYS* file. This is the default set during MS OS/2 installation. Refer to your MS OS/2 documentation for more information.

LEARNING ABOUT NOVELL NETWARE SUPPORT SOFTWARE

This section contains information about the COMPAQ device drivers and utilities for Novell NetWare v2.1*x*, v2.2, and v3.1*x*, and patches for Novell NetWare v3.1*x*. These drivers, utilities, and patches are designed to enhance the performance of COMPAQ personal computers and personal computer systems that have COMPAQ Array Controllers.

NOTE: For the current system requirements needed to install and run drivers for the COMPAQ Array Controllers, contact your Authorized COMPAQ Computer Dealer.

The following topics are detailed in this section:

- Novell NetWare v2.1*x* and v2.2 drivers for the COMPAQ 32-Bit Intelligent Drive Array (IDA) Controller
- Novell NetWare v3.1*x* drivers for the IDA Controller and the COMPAQ 32-Bit Intelligent Drive Array (IDA) Expansion Controller
- COMPAQ IDA Status Utility
- Novell NetWare v3.1*x* patches

Refer to the "Novell NetWare Support Software Summary" section in this chapter for a description of each utility, driver, and patch.

COMPAQ ARRAY CONTROLLER TERMINOLOGY

The following table describes terms used to describe the COMPAQ Array Controllers:

Table 14-1
IDA Terminology

Term	Refers to
COMPAQ 32-Bit Intelligent Drive Array (IDA) Controller	The IDA Controller. The term COMPAQ 32-Bit Intelligent Drive Array (IDA) Controller is only used as the first reference to the IDA Controller in each chapter.
COMPAQ 32-Bit Intelligent Drive Array (IDA) Expansion Controller	The IDA Expansion Controller. The term COMPAQ 32-Bit Intelligent Drive Array (IDA) Expansion Controller is only used as the first reference to the IDA Expansion Controller in each chapter.
COMPAQ Array Controllers	The term COMPAQ Array Controllers is used when you are referring to both the IDA Controller and IDA Expansion Controller.
COMPAQ Intelligent Array Expansion System	The Array Expansion System. The term COMPAQ Intelligent Array Expansion System is only used as the first reference to the Array Expansion System in each chapter.
IDA Controller	The COMPAQ 32-Bit Intelligent Drive Array (IDA) Controller.
IDA Expansion Controller	The COMPAQ 32-Bit Intelligent Drive Array (IDA) Expansion Controller.

WHAT YOU CAN DO WITH NOVELL NETWARE SUPPORT SOFTWARE

The following list shows what you can do with Novell NetWare drivers, utilities, and patches and where you can go to find further information:

What you can do	Reference
Install the IDA Controller driver on a Novell NetWare v2.1*x* or v2.2*x* system	Chapter 15
Install the COMPAQ Array Controller driver on a NetWare v3.1*x* system	Chapter 16
Learn how to install the IDA Status Utility on a Novell NetWare v3.1*x* system	Chapter 17
Learn how to use patches for Novell NetWare v3.1*x* systems which use large disk capacity	Chapter 18

NOVELL NETWARE SUPPORT SOFTWARE SUMMARY

The following table contains a brief description of each Novell NetWare driver, utility, and patch:

Table 14-2
Novell NetWare Support Software

Utility	Files	Description
Novell NetWare v2.1*x* and v2.2*x* drivers	*CPQDA286.DSK* *CPQDA286.OBJ*	The driver for the IDA Controller on a Novell 286 NetWare system.
Novell NetWare v3.1*x*	*CPQDA386.DSK*	The driver used for COMPAQ Array Controllers in EISA based systems running Novell NetWare v3.1*x*. This driver allows Novell NetWare to communicate with the bus master interface of the COMPAQ Array Controllers, and supports their enhanced disk I|O capabilities.
IDA Status Utility	*IDA_MON.NLM* *IDA_STAT.EXE*	Allows you to determine the status and configuration of any COMPAQ Array Controller running on a Novell NetWare v3.1*x* system.
LGHOTFIX Patch	*LGHOTFIX.NLM*	This patch corrects errors in the Novell NetWare v3.10 redirection hot fix area when large capacity disk subsystems are installed.
LGVOLFIX Patch	*LGVOLFIX.EXE*	This patch allocates more memory for the File Allocation Table (FAT) for Novell NetWare v3.10 to support large capacity disk subsystems.

Continued

Table 14-2 *Continued*

Utility	Files	Description
CPQNSHDW Patch	*CPQNSHDW.EXE*	Allows users of Novell NetWare v3.11 who have more than 16 megabytes of system memory to have megabytes or systems memory to have contiguous memory by disabling COMPAQ shadow RAM.

NOTE: CPQDA286 drivers support up to two COMPAQ IDA Controllers. The IDA Expansion Controller is not supported under the Novell NetWare v2.1*x* or v2.2 operating system.

INSTALLING THE IDA CONTROLLER DRIVER ON NOVELL NETWARE v2.1*x* OR v2.2

The following sections detail the installation and use of the COMPAQ 32-Bit Intelligent Drive Array (IDA) Controller device driver when configured with a Novell NetWare v2.1*x* or v2.2 system.

NOTE: The COMPAQ 32-Bit Intelligent Drive Array (IDA) Expansion Controller and the IDA Status Utility are not supported under Novell NetWare v2.1*x* or v2.2 operating systems.

! **IMPORTANT:** Do not format COMPAQ fixed disks using the Novell NetWare COMPSURF Utility. COMPAQ fixed disks are preformatted from the factory. Running a full pass of COMPSURF should not be required and is not recommended. COMPAQ fixed disks are low level formatted from the factory. If a low level format is required, contact your Authorized COMPAQ Computer Dealer who will assist you in using the ADVANCED DIAGNOSTICS utilities to format your COMPAQ fixed disks.

CONFIGURING THE IDA CONTROLLER FOR USE WITH NOVELL NETWARE v2.1*x* OR v2.2

The COMPAQ driver (*CPQDA286.OBJ*) for Novell NetWare v2.1*x* or v2.2 supports the IDA Controller. This driver supports up to two IDA controllers, each with two logical drives. When configuring the IDA Controller, use the COMPAQ EISA CONFIGURATION Utility to set the interrupt request (IRQ) number for the IDA Controller(s). Refer to your *COMPAQ EISA CONFIGURATION User's Guide* for information on how to set the IRQ value. Set the Standard Interface value as primary or secondary. If you disable the Standard Interface of the IDA Controller, the CPQDA286 driver will not operate.

To install the IDA Controller, refer to your IDA Controller installation guide.

INSTALLING THE CPQDA286 DRIVER

Refer to your Novell NetWare documentation for information about installing and using Novell NetWare v2.1*x* or v2.2.

The following sections describe installation of the CPQDA286 driver from diskette or fixed disk.

Installing the CPQDA286 Driver from Diskettes

If you are installing the CPQDA286 driver for Novell NetWare v2.1*x* or v2.2 from a diskette, complete the following steps:

1. Format a blank diskette. The volume label on this diskette should be "DSK_DRV_203".

   NOTE: For information about the FORMAT and LABEL commands, refer to your MS-DOS documentation.

2. Copy the *CPQDA286.OBJ* file, which is found in the \NW286 subdirectory on the User Programs diskette for MS-DOS and Novell support, to the newly formatted diskette.

3. Copy the *CPQDA286.DSK* file from the \NW286 subdirectory on the User Programs diskette for MS-DOS and Novell support to the Novell NetWare AUXGEN diskette for Novell NetWare v2.1*x* or to the Novell NetWare SYSTEM–1 diskette for Novell NetWare v2.2.

4. To install CPQDA286 drivers, run the Novell NETGEN Utility for Novell NetWare v2.1*x* or run the Novell INSTALL Utility for Novell NetWare v2.2.

5. Follow the instructions in the Novell NetWare documentation to continue the installation process.

   Be sure to select the IDA driver for each IDA Controller in your system.

   NOTE: If you selected a disk fault tolerant option, such as mirroring or data guarding when using the COMPAQ EISA CONFIGURATION Utility, do not select mirroring under Novell NetWare. The fault tolerance capabilities of the IDA Controller provide its own performance improvements and automatic data recovery features.

When you choose the disk driver configuration, select from the available options that are displayed on the screen. The I/O base address and IRQ value should match the values that were selected during the COMPAQ EISA CONFIGURATION Utility. If these values differ, the CPQDA286 driver will operate properly, but unfavorable results with other system components may occur. Using values specified by the COMPAQ EISA CONFIGURATION Utility ensures conflict-free operation.

Installing the CPQDA286 Driver from Another File Server or Fixed Disk

If you want to install the CPQDA286 driver for Novell NetWare v2.1*x* or v2.2 from another file server or fixed disk, complete the following steps:

1. Create a subdirectory called DSK_DRV_203 in the same directory where the installation program is located. The installation program will be Novell NETGEN or Novell INSTALL depending upon the version of Novell NetWare you are running.
2. Copy the *CPQDA286.OBJ* file, which is found in the \NW286 subdirectory on the User Programs diskette for MS-DOS and Novell support, to the subdirectory "DSK_DRV_203" on your file server or fixed disk.
3. Copy the *CPQDA286.DSK* file from the User Programs diskette for MS-DOS and Novell support to the AUXGEN subdirectory for Novell NetWare v2.1*x* or the SYSTEM–1 subdirectory for Novell NetWare v2.2 on your file server or fixed disk.
4. Run the NETGEN Utility for Novell NetWare v2.1*x* or the Novell INSTALL Utility for Novell NetWare v2.2.
5. Follow the instructions in the Novell NetWare documentation to continue the installation process.

   Be sure to select the IDA Controller disk driver for each IDA Controller in your system.

   NOTE: If you selected a disk fault tolerant option, such as mirroring or data guarding when using the COMPAQ EISA CONFIGURATION Utility, do not select mirroring under Novell NetWare. The fault tolerance capabilities of the IDA Controller provide its own performance improvements and automatic data recovery features.

When you choose the disk driver configuration, select from the available options that are displayed on the screen. The I/O base address and IRQ value should match the values that were selected during the COMPAQ EISA CONFIGURATION Utility. If these values differ, the CPQDA286 driver will not operate properly, but unfavorable results with other system components may occur. Using values specified by the COMPAQ EISA CONFIGURATION Utility ensures conflict-free operation.

Refer to the *README.286* file for further information on installing Novell NetWare v2.1*x* or v2.2 on the IDA Controller driver.

INSTALLING THE COMPAQ ARRAY CONTROLLER DRIVER ON NOVELL NETWARE v3.1*x*

The following chapter details the installation and use of the CPQDA386 driver. This driver supports the COMPAQ 32-Bit Intelligent Drive Array (IDA) Controller and the COMPAQ 32-Bit Intelligent Drive Array (IDA) Expansion Controller when configured using Novell NetWare v3.1*x*.

INSTALLING THE NOVELL NETWARE v3.1*x* DRIVER

The *CPQDA386.DSK* file is a NetWare Loadable Module (NLM) that supports the bus master interface of the COMPAQ Array Controllers. For more information about NLMs, refer to your Novell NetWare installation documentation. The driver for Novell NetWare v3.1*x* is located in the \NW386V31 subdirectory on the User Programs diskette for MS-DOS and Novell support.

To install the COMPAQ Array Controllers, refer to the appropriate COMPAQ Array Controller installation card. The *CPQDA386.DSK* driver uses the bus master interface to communicate with the COMPAQ Array Controllers. Ensure that the bus master interface is enabled by using the COMPAQ EISA CONFIGURATION Utility.

INSTALLATION PROCEDURE

Refer to your Novell NetWare documentation for information about installing and using Novell NetWare.

NOTE: *CPQDA386.DSK* is used by both of the COMPAQ Array Controllers.

1. Copy the *CPQDA386.DSK* file to the location of the Novell NetWare v3.1*x* files. This is done by copying the *CPQDA386.DSK* file in the \NW386V31 subdirectory from the User Programs diskette for MS-DOS and Novell support to the primary MS-DOS partition of your fixed disk (usually drive C) or by copying the file to the primary MS-DOS partition of your system startup diskette.

The destination directory determines how the NetWare Loadable Module (NLM) will be loaded by the user (or the *STARTUP.NCF* file). For more information about NLMs or the *STARTUP.NCF* file, refer to your Novell NetWare installation documentation.

2. To install the *CPQDA386.DSK* file, include a statement in the *STARTUP.NCF* file that is loaded automatically during system initialization. Ensure that you edit the *STARTUP.NCF* file with the following statement:

   C:*directory*\CPQDA386 SLOT = *xxx*.

   (The *xxx* variable is the slot number where the Array Controller is installed. C:\directory represents the drive and subdirectory from where *CPQDA386.DSK* is loaded.) There should be one load statement for each COMPAQ Array Controller. In the following example, there is an IDA Controller in slot 1 and an IDA Expansion Controller in slot 2:

   C:*directory*\LOAD CPQDA386 SLOT = 1

   C:*directory*\LOAD CPQDA386 SLOT = 2

   NOTE: If you selected a fault tolerant option, such as mirroring or data guarding when using the COMPAQ EISA CONFIGURATION Utility, do not select mirroring under Novell NetWare. The fault tolerance capabilities of the Array Controller provides its own performance improvements and automatic data recovery features.

3. Refer to your Novell NetWare installation documentation for information about installing and mounting volumes associated with your new disk subsystem.

Refer to the *README.V31* file for further information on installing Novell NetWare v3.1*x* on the COMPAQ Array Controller driver.

COMPAQ IDA STATUS UTILITY

The COMPAQ IDA Status Utility allows you to determine the current status and configuration of any COMPAQ 32-Bit Intelligent Drive Array (IDA) Controller or COMPAQ 32-Bit Intelligent Drive Array (IDA) Expansion Controller configured in a Novell NetWare v3.1*x* server.

This utility provides the following information:

- Driver information – Name and version of the COMPAQ Array Controller device driver currently executing in the Novell NetWare v3.1*x* server.
- COMPAQ Array Controller configuration – This includes the type of controller, the configuration of the standard interface, the ROM version, and the physical slot location.
- Logical drive configuration – The status of the logical drive, the fault tolerance method used to protect data, the data stripping method, drive recovery status, and request counters.
- Physical drive configuration – This includes the current status, mapping, error counts, remap counts, drive ID, manufacturer, and model information.
- Mapping – Novell NetWare 3.1*x* volume and volume segment mapping to logical drive.
- File Servers – One more file servers with *CPQDA386.DSK* loaded can be monitored.
- Information update frequency – The amount of elapsed time between requests for new data from the COMPAQ Array Controller driver to the IDA Status Utility. The frequency has a range of 1 to 999 seconds with a default of 30 seconds.
- Warnings – Statements regarding conditional errors or possible errors.
- Information output – All status information can be sent to a file printer.
- Request history counters – Can be reset.

REQUIREMENTS

To use the IDA Status Utility, you must have the following:

- Novell NetWare v3.1*x*
- One or more COMPAQ Array Controllers installed in the Novell NetWare file server(s) you want to monitor
- Novell NetWare v3.1*x* disk driver (*CPQDA386.DSK*). This driver is found in the \NW386V31 subdirectory on the User Programs diskette for MS-DOS and Novell support.
- One or more client workstations with Novell's workstation software
- IDA Controller ROM revision 0.96 or greater and/or IDA Expansion Controller ROM revision 1.0

  NOTE: To order a COMPAQ Array Controller ROM version update, to learn about the latest versions of IDA Controller ROM, or to find out about any components described in this document, contact your Authorized COMPAQ Computer Dealer.
- *IDA_MON.NLM* and *IDA_STAT.EXE* located in the \NW386V31 subdirectory

How the IDA Status Utility Works

The IDA Status Utility is a client-server application. The server part, *IDA_MON.NLM*, gathers information about the COMPAQ Array Controller(s) from the *CPQDA386.DSK* driver and updates the information at user-defined intervals. When a user wants information, the client part, *IDA_STAT.EXE*, requests data from *IDA_MON.NLM*. *IDA_MON.NLM* then checks to see how many users are logged in to the utility. If the maximum number of users are logged in, the IDA Status Utility states that you do not have room for a new IDA display program to attach and a different file server must be selected.

If a login slot is available, *IDA_MON.NLM* sends data to the client, and *IDA_STAT.EXE* displays the data.

In addition to the client-server parts of this utility, a third file, *IDA_MON.CFG* is included. This file keeps track of default information about for the IDA Status Utility. It also keeps a list of users who will be alerted if a problem with the file server is detected.

IDA Status Utility Installation Procedures

In the following instructions, the file server's SYS volume has been mapped to drive F. If your system is not set up this way, replace "F" with the appropriate driver letter.

To use this utility, it is recommended that you have IDA Controller ROM Version 0.96 or later. Previous versions of the IDA Controller ROM may also be used, but some of the features will not be available. The utility notifies you when a server that does not have the upgraded IDA Controller ROM is detected.

To use this utility, you must have the IDA Controller driver (*CPQDA386.DSK*) loaded for each file server that is to be monitored by the IDA Status Utility. This driver is in the \386V31 subdirectory on User Programs diskette for MS-DOS and Novell support. If you have not already done this, install *CPQDA386.DSK* now. Any *CPQDA386.DSK* disk driver loaded after the IDA Status Utility has been loaded will not be monitored by this utility unless you unload and reload the utility.

! **IMPORTANT:** Do not use the Novell ISADISK driver for any of the COMPAQ Array Controllers.

To install the IDA Status Utility, complete the following steps:

1. Login to the file server from any client workstation with supervisor privileges.
2. Locate the User Programs diskette for MS-DOS and Novell support.
3. Insert that diskette in drive A.

4. Using the MS-DOS COPY command or the Novell NCOPY command, copy *IDA_MON.NLM* and *IDA_MON.CFG* from the \NW386V31 subdirectory of the User Programs diskette for MS-DOS and Novell support to the \SYSTEM directory of the SYS volume. Copy the *IDA_STAT.EXE* file from the User Programs diskette for MS-DOS and Novell support to the \PUBLIC directory of the SYS volume.

   ```
   COPY A:\NW386V31\IDA_MON.NLM F:\SYSTEM
   COPY A:\NW386V31\IDA_MON.CFG F:\SYSTEM
   COPY A:\NW386V31\IDA_STAT.EXE F:\PUBLIC
   ```

5. From the NetWare file server, ensure that *CPQDA386.DSK* is loaded for each IDA Controller or IDA Expansion Controller before loading *IDA_MON.NLM*.

   NOTE: If *CPQDA386.DSK* is not loaded for all COMPAQ Array Controllers, unload *IDA_MON.NLM*, load all disk drivers, and then reload *IDA_MON.NLM*.

6. Load *IDA_MON.NLM*:

   ```
   LOAD IDA_MON
   ```

7. From the client workstation, execute the *IDA_STAT.EXE* program.

   ```
   F:\PUBLIC\IDA_STAT
   ```

Installation is now complete and the IDA Status Utility is running. *IDA_STAT.EXE* can be executed when needed .*IDA_MON.NLM* should only be unloaded when you shut down the file server or when you unload or reload the *CPQDA386.DSK* disk driver. If you need to unload *IDA_MON.NLM*, use the Novell NetWare v3.1*x* UNLOAD command to remove the NLM from the file server.

Refer to the *README.V31* file for further information on the IDA Status Utility.

Syntax:

LOAD[*path*] IDA_MON [*-screen*] [*-update*] [*-clients*]

Parameters:

When you load *IDA_MON.NLM* or run *IDA_STAT.EXE*, you can include additional parameters on the command lines to change the default values used by this utility. You can only use these parameters when loading the IDA Monitor Utility from the Novell NetWare v3.1*x* file server console.

-screen
If you use this parameter, limited information about the current operation of *IDA_MON.NLM* will be displayed on the file server's console screen.

-update
This parameter lets the supervisor change the time interval at which *IDA_MON.NLM* updates the information that *IDA_STAT.EXE* displays. You can enter values from 1 to 999 seconds. The default is 30 seconds. It is recommended that you do not decrease the value, because this will slow the performance of the network.

-clients
This parameter lets you set the number of users that can concurrently use information from the *IDA_MON.NLM* program. You can enter values which range from 1 to 999. The default is 10.

NOVELL NETWARE PATCHES

NOVELL NETWARE v3.10 PATCHES

This section describes the patches available for Novell NetWare v3.10 in the \NW386_v31 directory on the User Programs diskette for MS-DOS and Novell support. It also suggests possible alternative solutions to anomalies identified with Novell NetWare v3.10 when used on large disk capacity systems such as those supported by the COMPAQ SYSTEMPRO.

To determine what patches are currently installed on a Novell NetWare server, complete the following steps:

1. Copy the *PATCHMAN.NLM* file from the User Programs diskette for MS-DOS and Novell support to the fixed disk.
2. At the server console, access the directory where you copied *PATCHMAN.NLM* and enter

   ```
   LOAD PATCHMAN
   ```

3. Enter

   ```
   PATCHES
   ```

   A list of currently installed patches is displayed on the NetWare server system console.

LGHOTFIX Patch

INSTALL.NLM Version 1.40 dedicates a default of two percent of the available disk space for the redirection hot fix area. When the value exceeds 8000 blocks, the Novell NetWare disk process encounters problems. These problems have been identified and fixed in Novell NetWare v3.11. Novell provides a patch for the Novell NetWare v3.10 operating system. This patch, *LGHOTFIX.NLM*, is available on the User Programs diskette for MS-DOS and Novell support. Refer to the Novell *LGHOTFIX.DOC* file for further description and installation instructions.

An alternative to applying this patch is to reduce the number of blocks allocated to the hot fix redirection area when using *INSTALL.NLM* to create the Novell NetWare partition. To increase the disk capacity available for data, you should consider reducing the number of blocks allocated to the hot fix redirection area.

The Novell NetWare hot fix redirection area will be used to remap data located on COMPAQ Array Controllers if a read request fatal error is detected. Read request errors will be reported by the controller if no fault tolerance method can regenerate the data. If the drives are mirrored or duplexed by the operating system, Novell NetWare will read the alternate drive to return the data. Novell NetWare will then use this data to remap the sector on the drive that originally returned the fatal error to the read request.

Write request errors that cannot be corrected through hardware fault tolerance will cause the controller to fail the logical drive. Novell NetWare is not able to remap the write request to the hot fix redirection area if the logical drive has failed.

To install *LGHOTFIX.NLM*, complete the following steps:

1. Copy the *LGHOTFIX.NLM* file from the User Programs diskette for MS-DOS and Novell support to the same directory as the other NLM files (SYS:SYSTEM or DOS partition).
2. At the server console, access the directory where you copied *LGHOTFIX.NLM* and enter

   ```
   LOAD LGHOTFIX
   ```

   Once the patch has loaded, all changes are in effect until the server is brought down. If an error message appears, contact Novell Technical Support.

   Refer to the *LGHOTFIX.DOC* file on the User Programs diskette for MS-DOS and Novell support for more information on using the LGHOTFIX patch with Novell NetWare v3.10.

LGVOLFIX Patch

The *LGVOLFIX.EXE* file, found on the User Programs diskette for MS-DOS and Novell support in the \NW386V31 subdirectory, allows the Novell NetWare 3.10 operating system to allocate memory for the File Allocation Table (FAT) from system memory address space above 16 megabytes. Refer to the *README.V31* file for further information about the Novell NetWare FAT memory requirements. The Novell NetWare v3.10 operating system does not view memory below and above 16 megabytes as contiguous memory. This patch allows Novell NetWare to choose the largest contiguous memory pool when allocating the system memory for the Novell NetWare FAT. This may require additional investment in system memory. You should consider upgrading your environment to Novell NetWare v3.11 since it supports the ability to view memory address space above and below the 16-megabyte boundary as contiguous memory. Refer to the "Novell NetWare v3.11 Patch" section for more information.

To execute *LGVOLFIX.EXE*, complete the following steps:

1. Start your system using MS-DOS.
2. Copy the *LGHOTFIX.NLM* file from the User Programs diskette for MS-DOS and Novell support to the directory that contains the *SERVER.EXE* file for Novell NetWare v3.10.
3. Access the directory where you copied *LGVOLFIX.NLM* and enter

   ```
   LOAD LGVOLFIX
   ```

   The LGVOLFIX program should be executed at one time. This program will locate and verify the *SERVER.EXE* file and then apply a patch directly to the *SERVER.EXE* file resident on disk. Therefore, you should make a backup of your *SERVER.EXE* file before you execute this patch.

   If the LGVOLFIX program executes successfully, the *SERVER.EXE* file displays the date the patch was applied. If the patch is not applied, the LGVOLFIX program reports the failure and the *SERVER.EXE* file is not updated.

   Refer to the *LGVOLFIX.DOC* file on the User Programs diskette for MS-DOS and Novell support for more information about using the LGVOLFIX patch with Novell NetWare v3.10.

NOVELL NETWARE v3.11 PATCH

To provide improved performance, a copy of system BIOS ROM is copied to system memory just below the 16-megabyte boundary. This memory image of ROM, called shadow RAM, provides better system performance when system BIOS is used frequently. EISA provides support for more than 16 megabytes of system memory. If shadow RAM remains at the 16-megabyte boundary, this memory cannot be used by other programs. Novell NetWare does not use system BIOS often enough to benefit from having shadow RAM enabled for performance improvement reasons.

CPQNSHDW is a terminate-and-stay-resident (TSR) program designed to allow users of Novell NetWare v3.11 with more than 16 megabytes of system memory the ability to have contiguous memory by disabling shadow RAM. Disabling shadow RAM makes the memory below the 16-megabyte boundary available for use by the Novell NetWare operating system. This contiguous memory is particularly helpful on systems with large amounts of disk capacity. Novell NetWare requires that the Novell NetWare FAT be allocated from contiguous memory. Refer to the *README.V31* file on the User Programs diskette for MS-DOS and Novell support to learn more about calculating the required amount of contiguous memory for the Novell NetWare FAT.

To use CPQNSHDW, complete the following steps:

1. Use a text editor to edit your *AUTOEXEC.BAT* file to include CPQNSHDW. The following example gives a sample *AUTOEXEC.BAT* file that will load CPQNSHDW and then start the Novell NetWare server:

```
@ECHO OFF
C:\CPQNSHDW\CPQNSHDW
C:\NOVELL\SERVER
```

This sample *AUTOEXEC.BAT* file assumes that:

- *CPQNSHDW.EXE* is stored in a directory named CPQNSHDW on the C drive, and
- The Novell NetWare software is stored in a directory called NOVELL on the C drive.

These commands will have to be adjusted to fit your specific system.

2. Start your system.

   The CPQNSHDW program displays a welcome message when loaded. Once the program is loaded, Novell NetWare v3.11 is able to use the memory previously used by shadow RAM.

   Refer to the *CPQNSHDW.DOC* file on the User Programs diskette for MS-DOS and Novell support for more information about installing and using the CPQNSHDW program with Novell NetWare v3.11.

Appendix A

SYSTEM MESSAGES

This section contains a list of messages that you may see while installing or running the User Programs support software. They are listed in alphabetical order, according to the first word of the message. Information about what caused the message and what actions to take is listed below each message.

ADAPT is already resident

An attempt was made to load ADAPT when it was already resident. Use the hot-key combination to access ADAPT.

Adapter boards conflict

When using MODE SELECT, the requested emulation mode conflicts with a second installed adapter. Turn off the power, remove the second adapter, and enter the command again.

Address exclusion not valid for this system

The X=*mmmm–nnnn* parameter used with CEMMP is not allowed on this system. This parameter is valid only on the COMPAQ SLT/286, COMPAQ LTE/286, and COMPAQ DESKPRO 286N Personal Computers. Either correct or remove this parameter from the *CONFIG.SYS* file. Then, enter the command again.

Base address for COM*x* = *nnnnh*

This message is displayed if you do not specify the base address for COM3 or COM4 with MODE ADDRCOM3/ADDRCOM4. The variable *nnnnh* is the four-digit hexadecimal base address for COM3 or COM4.

Buffer size adjusted

When using CACHE, this message means the buffer size you specified requests more memory than is available. CACHE adjusts the buffer size down to the next 16 Kbyte increment.

When using VDISK, this message means the virtual disk that was installed is smaller than you specified. VDISK adjusted the virtual disk size down to leave 64 Kbytes available after the virtual disk was installed.

CACHE Already Installed

CACHE was already installed. Remove *CACHE.EXE* from your *CONFIG.SYS* file.

CACHE Not Installed

CACHE was not installed as a device driver. Add the *CACHE.EXE* device driver to the *CONFIG.SYS* file and reset the system.

CACHE Not Installed – Cache Too Large

The directory that CACHE needs is so large that code would be overwritten.

CACHE Not Installed – Disk Error

A disk error occurred while installing *CACHE.EXE*. Check to see if the fixed disk drive and the controller are installed properly. If you still receive this message, run DIAGNOSTICS, note the conditions that produced this message, and contact your Authorized COMPAQ Computer Dealer.

CACHE Not Installed – Expanded Memory Error

An error was returned from the expanded memory manager while installing *CACHE.EXE*. Be sure the expanded memory manager is installed correctly.

CACHE Not Installed – Expanded Memory Not Available

While installing *CACHE.EXE*, you selected expanded memory as the location for the disk cache, but no expanded memory is installed. Either install the device driver for expanded memory support before installing the *CACHE.EXE* device driver, or edit the *CACHE.EXE* device driver statement in the *CONFIG.SYS* file (adding either the /BAS or /EXT parameter as appropriate).

CACHE Not Installed – Extended Memory Not Available

While installing *CACHE.EXE*, you selected extended memory as the location for the disk cache, but no extended memory is installed. Edit the *CACHE.EXE* device driver statement in the *CONFIG.SYS* file adding either the /BAS or /EXP parameter as appropriate.

CACHE Not Installed – Extended Memory Not Supported On This Machine

While installing *CACHE.EXE*, you specified the /EXT parameter on a computer that is not a 286-, 386-, or 486-based system. Edit the *CACHE.EXE* device driver statement in the *CONFIG.SYS* file adding either the /BAS or /EXP parameter as appropriate.

CACHE Not Installed – Incorrect DOS Version

An attempt was made to use CACHE with an incorrect version of MS-DOS. Install MS-DOS Version 3.31 or later as published by Compaq Computer Corporation prior to using CACHE.

CACHE Not Installed – Insufficient Memory

You do not have at least 128 Kbytes of available system memory to create a disk cache of the size specified while installing *CACHE.EXE*.

CACHE Not Installed – Invalid Parameter

You entered an invalid CACHE parameter on the command line in your *CONFIG.SYS* file. Edit your *CONFIG.SYS* file to correct the error.

CACHE that is installed is different version. Unable to give any statistics

The CACHE that was installed as a device driver is a different version than the CACHE used at the command line. Be sure the path to the *CACHE.EXE* device driver is the same as that specified in the *CONFIG.SYS* file. Try the command again.

Cannot find file <filespec.fyy>; 8xyy font not loaded

The font file specified on the CHARSET command line cannot be found. Enter a correct font file name.

CEMM already installed.

The CEMM device driver was already installed.

CEMM DMA buffer is too small. Add D = *nnn* parameter and reboot.

The CEMM DMA buffer is too small for the currently running application. The variable *nnn* specifies the amount of memory reserved for DMA which can range from 16 to 256 Kbytes. After rebooting, change the *CONFIG.SYS* driver invocation line and reboot the system again.

CEMM: DMA mode not supported – press ENTER and reboot.

DMA is being used in a manner that is not supported by CEMM. CEMM must be turned OFF while using this application.

CEMM driver not installed.

You tried to use the CEMM command without first installing the *CEMM.EXE* device driver in the *CONFIG.SYS* file. Add *CEMM.EXE* to the *CONFIG.SYS* file.

CEMM Exception error #*xx* – press ENTER to reboot

While using CEMM, an unrecoverable virtual mode exception occurred. Press the **ENTER** key.

CEMM is not installed

You tried to set the status of CEMM, and the CEMM driver was not installed. Install the *CEMM.EXE* driver prior to setting the CEMM status.

CEMM not installed - incorrect DOS version

You tried to use CEMM with an incorrect version of MS-DOS. Install MS-DOS Version 3.1 or later as published by Compaq Computer Corporation prior to installing CEMM.

CEMM not installed – incorrect machine type

You tried to install CEMM on a computer that cannot use CEMM. CEMM can only be installed on COMPAQ 386- or COMPAQ 486-based personal computers.

CEMM not installed – insufficient memory

Either there is not enough additional upper memory or there is less than 64 Kbytes of base memory after CEMM was installed. Add additional memory.

CEMM not installed – only one page frame base address may be indicated.

When you added the *CEMM.EXE* driver to the *CONFIG.SYS* file, you used two page frame addresses on the command line, and there can be only one page frame address. Edit the *CONFIG.SYS* file to remove conflicting parameters.

CEMM not installed – other expanded memory manager detected.

An expanded memory manager other than CEMM was already installed. Remove either CEMM or the other expanded memory manager from the *CONFIG.SYS* file.

CEMM not installed – protected mode software already running.

A program designed to use protected mode is installed on the system. Remove CEMM while using the program that uses protected mode.

CEMM not installed – unable to set page frame base address

The page frame base address was not specified when you installed *CEMM.EXE*, and CEMM was not able to find an available address range for the 64-Kbyte page frame. Prior to installing CEMM, make 64 Kbytes of address space available.

CEMM Privileged operation error *#xx*
Deactivate CEMM and Continue (C) or reboot (B) (C / B)?

CEMM returns this message if an MS-DOS program is attempting to execute an instruction that cannot be executed in virtual mode. Enter the selected choice: press **C** (continue) or **B** (reboot).

CEMM: Unrecoverable privileged operation error *#xx* – press ENTER to reboot.

CEMM returns this message if an unrecoverable privileged error occurs. Press the **ENTER** key.

CEMM/Microsoft Windows Interface failure. CEMM will remain off.

When Microsoft Windows terminated, it did not turn CEMM back on. If you want to use CEMM, use the CEMM command line to turn CEMM on.

CHARSET not installed

An error was encountered that caused CHARSET to abort. A font type may have been specified, MAIN or ALT, and no files could be successfully loaded for that font. Verify that the font files are available in the specified path. Issue the CHARSET command again.

CMOS memory configuration is invalid – SETUP must be run

CEMMP returns this message if the CMOS memory configuration is not valid. Run SETUP.

Current cursor size...SMALL|MEDIUM|LARGE|n scan lines.

The current cursor size was set to the size indicated with ADAPT.

Cursor size monitor...ACTIVE

The cursor size is being monitored by ADAPT to ensure that it does not fall below the size you selected.

Directory entries adjusted

The number of directory entries you specified is not acceptable. VDISK adjusted the number of directories.

Disk error reading/writing ADAPT.CFG. Options will be restored to initial settings

An error occurred while ADAPT was trying to save the new hot-key combination or screen save time-out setting to the disk copy of *ADAPT.CFG*. The new setting is not saved. Check the setting of the MS-DOS path to ensure that the *ADAPT.CFG* file is in the current directory or in one of the directories specified.

Emulation mode unsupported

The active display adapter does not support the mode requested with MODESELECT. Request another emulation mode or parameter to another display adapter, and enter the command again.

ERROR ACCESSING <EXPANDED, EXTENDED> MEMORY – DISK CACHING DISABLED

While running CACHE, an expanded or extended memory error occurred while trying to access data in the disk cache. No action is required at this time. However, before running CACHE again, check the validity of the extended memory or the correct operation of the expanded memory manager; then reset the system.

Error: An XMS manager is already installed. XMS Driver not installed.

HIMEM can only be installed once. Installing HIMEM more than once results in an error for the second and subsequent installations. Remove conflicting memory managers from your *CONFIG.SYS* file.

Error: Available extended memory was not found. XMS Driver not installed.

Either all available extended memory was allocated by a device driver appearing before HIMEM in the *CONFIG.SYS* file, or the system does not have any extended memory. The *HIMEM.EXE* device driver can be installed only on a personal computer with available extended memory. If XMS memory allocation is needed by the application programs you are using, decrease the amount of extended memory used by the device drivers or purchase more extended memory.

Error: Can't enable A20! XMS Driver not installed.

HIMEM could not enable the A20 hardware of your system. This condition could cause some application to not run properly on your system. Switch the A20 hardware line to access extended memory.

Error: Cannot unmap the Shadow ROM. XMS Driver not installed.

The /SHADOW parameter for *HIMEM.EXE* was entered on the command line of the *CONFIG.SYS* file. HIMEM was unable to unmap the Shadow ROM/RAM area. Re-enter the HIMEM command without the /SHADOW parameter, or move *HIMEM.EXE* to the beginning of your *CONFIG.SYS* file.

Error: Cursor locking value out of range.
Value must be from 1-8.

The value specified with ADAPT for the cursor size was not in the range from 1 to 8. Enter a value in the range from 1 to 8 for the cursor size.

Error: Different version of ADAPT already resident

You have tried to install ADAPT 2.*x* when ADAPT 1.*x* was already installed. Reset your computer and install ADAPT 2.*x* or use the hot-keys to use ADAPT 1.0.

Error: Disk inactivity time-out value out of range. Valid time-out must range from 0 to 16 minutes

While using PWRCON, you entered an invalid value for the fixed disk inactivity time-out. Enter a value in the range from 0 to 16.

Error: DISK parameter invalid when operating under AC power

You specified a value for the fixed disk inactivity time-out on the PWRCON command line, and the computer is operating under AC power. Do not use this parameter with the PWRCON command while operating under AC power.

Error: DISK parameter invalid when power conservation disabled.

You specified a value for the fixed disk inactivity time-out on the PWRCON command line, and power conservation was disabled through SETUP. Do not use this parameter with the PWRCON command when power conservation was disabled through SETUP.

Error: Display Attribute File not found.

ADAPT could not open the Display Attribute File (DAF) you specified. Check the path you specified and try again.

Error: HMAMIN parameter value out of range.

When using HIMEM, specify a number in the range from 0 to 63.

Error: HIMEM requires an 80x86-based machine. XMS Driver not installed.

HIMEM can only be installed on a 286-, 386-, or 486-based system. Remove *HIMEM.EXE* from your *CONFIG.SYS* file.

Error: HIMEM.EXE requires DOS 3.00 or higher. XMS Driver not installed.

Use HIMEM only on systems with MS-DOS Version 3.0 or later.

Error: Incorrect command line option
Usage: ADAPT[/R][/F[d:][path]file]
[/CURSOR[=][n|SMALL|MEDIUM|LARGE][LOCK|NOLOCK]]
[/SCREEN[=]nn|ON|OFF]

You specified an invalid command line parameter when executing ADAPT. Enter the command line again using the specified command line parameter.

Error: Incorrect DOS version.

You tried to use PWRCON with the incorrect version of MS-DOS. PWRCON requires MS-DOS Version 3.0 or later as published by Compaq Computer Corporation.

Error: Internal COMPAQ display not in use

ADAPT determined that the system has a flat panel display, but an external monitor is being used as the active display. Use ADAPT only with a COMPAQ flat panel display or COMPAQ VGA display on a desktop computer.

Error: Invalid command line parameter.
XMS Driver not installed.

The *HIMEM.EXE* device driver cannot be loaded because you entered an incorrect command line syntax in the *CONFIG.SYS* file. Change the command line syntax in your *CONFIG.SYS* file to load the *HIMEM.EXE* device driver.

Error: Invalid Display Attribute File. Display attributes not loaded.

ADAPT cannot find a Display Attribute File (DAF) with the filename you specified. The file is either not a DAF file, or it was corrupted. Check the filename's spelling. If the filename is correct, you must recreate the corrupted file or replace it with a backup copy.

Error: Invalid file name or invalid path specified for the Display Attribute File.

The filename you entered while using ADAPT either has incorrect syntax or is the name of a special file, such as a directory name, a hidden file, or a system file. Specify a valid DAF filename.

Error: Invalid memory configuration. Reconfigure memory with the latest version of SETUP.

CEMMP returns this message if your system memory configuration is invalid. Use the latest version of SETUP to correct your memory configuration or contact your Authorized COMPAQ Computer Dealer.

Error: Invalid parameter entered on command line

You specified an invalid parameter in the PWRCON command line. Re-enter the command using valid command line parameters.

Error: Invalid screen save value. Screen save value must be between 0 and 63 minutes or ON or OFF.

You entered an invalid value for the /SCREEN parameter in ADAPT. Enter the ADAPT command line again with either a value between 0 and 63, or for the COMPAQ LTE, enter ON or OFF.

Error: Invalid video configuration.

Adapt does not recognize the video configuration. Use the internal display for COMPAQ portables and laptops or use a COMPAQ VGA for other systems.

Error: Invalid video configuration.

You tried to use the PWRCON command in an MS OS/2 protected mode session while the video was in graphics mode. Use the PWRCON command only in MS-DOS, the MS OS/2 MS-DOS compatibility box, or from an MS OS/2 protected mode session.

Error: LEAVE parameter value out of range

The amount of extended memory specified to be left after HIMEM allocates memory is larger than the amount of extended memory on the system. Reduce the amount of memory specified for the LEAVE parameter.

Error: Move Block failure clearing memory – unmapping Shadow ROM incomplete. XMS Driver not installed.

HIMEM attempted to unmap the Shadow ROM/RAM area on a COMPAQ 386-based or COMPAQ 486-based system, and an error occurred, clearing the Shadow RAM area. Remove the /SHADOW command line option for *HIMEM.EXE*.

Error: No fixed disk configured for this system.

While using PWRCON, you specified a time-out value for the fixed disk drive, and no fixed disk drive is configured for the system. If you have a fixed disk drive, run SETUP to correctly configure your system. If you do not have a fixed disk drive, no action is required.

Error: No modem configured for this system.

While using PWRCON, you specified ON or OFF for the modem, and no modem is configured for the system. If you have a modem, run SETUP to correctly configure your system. If you do not have a modem, no action is required.

Error: NUMHANDLE parameter value out of range.

The number of handles specified with HIMEM is not within the valid limit of 1 to 128. Specify a number in the range from 1 to 128 for the number of handles. The default is 32.

Error: OS/2 power conservation driver is not installed or is not available.

Either you tried to use PWRCON under MS OS/2 without adding *PWRCON.SYS* to your *CONFIG.SYS* file, or you tried to use PWRCON when it was open in another MS OS/2 session. Check to make sure that PWRCON is not open in another MS OS/2 session, or install *PWRCON.SYS* in the *CONFIG.SYS* file.

Error: PBEEPS or LOWBATBEEP parameter invalid when operating under AC power.

You specified a value for the PWRCON power conservation and low battery warning beeps while the computer was operating under AC power. Do not use these parameters with the PWRCON command while your system is operating under AC power.

Error: PBEEPS or LOWBATBEEP parameter invalid when power conservation disabled.

You specified a value for the PWRCON power conservation and low battery warning beeps while power conservation is disabled in CMOS. Do not use these parameters with the PWRCON command while power conservation is disabled through SETUP.

Error: PWRCON.COM not supported on this computer.

You tried to use the PWRCON utility on a computer that does not support it. Refer to Table 1-1 in Chapter 1, "Learning About MS-DOS Support Software," to determine which utilities and drivers are supported on each computer.

Error reading from file <filespec.fyy>

While using CHARSET, either an error occurred while reading from the font file *filespec*, or the file contained fewer than the required number of characters to represent a particular font. The name of the font file must agree exactly with the name of the User Programs file. Recopy the User Programs font file, and issue the CHARSET command again.

Error: Screen inactivity time-out value out of range. Valid time-out must range from 0 to 63 minutes or use "ON" or "OFF"

While using PWRCON, you entered an invalid value for the screen save time-out. Enter a value in the range from 0 to 63 or use the ON or OFF parameter.

Error: SHADOW parameter not valid on this system.

The /SHADOW parameter for HIMEM is valid on all COMPAQ 486-based and most 386-based systems. This parameter is not available on COMPAQ PORTABLE 386 or COMPAQ DESKPRO 386 Personal Computers. Remove the /SHADOW parameter from the HIMEM device driver statement in your *CONFIG.SYS* file.

Error: SHADOW parameter only valid on COMPAQ systems.

The /SHADOW parameter for HIMEM is valid only on COMPAQ 386- and 486-based personal computers. Remove the /SHADOW parameter from the HIMEM device driver statement in your *CONFIG.SYS* file.

Error: System inactivity time-out value out of range. Valid time-out must range from 0 to 21 minutes.

While using PWRCON, you entered an invalid value for the system-wide inactivity time-out. Enter a value in the range from 0 to 21.

Error: SYSTEM parameter invalid when operating under AC power

You specified a value for the system inactivity time-out on the PWRCON command line and the computer is operating under AC power. Do not use this parameter with the PWRCON command while operating under AC power.

Error: SYSTEM parameter invalid when power conservation disabled.

You specified a value for the system inactivity time-out on the PWRCON command line and power conservation was disabled through SETUP. Do not use this parameter with the PWRCON command while power conservation is disabled through SETUP.

Error: The RAM parameter is not valid for this system.

You tried to use the CEMMP RAM parameter on a COMPAQ PORTABLE III, COMPAQ LTE, or COMPAQ DESKPRO 286e Personal Computer. Use the NOEMS parameter with these systems.

Error: Unable to change VGA display attributes while in monochrome mode

You tried to use ADAPT while in monochrome mode. Reset the mode to use colors by typing MODE CO80 at the MS-DOS prompt.

Error: Unable to unmap Shadow ROM – memory area is in use. XMS Driver is not installed.

Interrupt vectors are pointing to the Shadow ROM/RAM area indicating that HIMEM cannot free this memory for use. Move *HIMEM.EXE* to appear at the beginning of your *CONFIG.SYS* file. If the error continues to occur, do not use the /SHADOW parameter.

Error: Unrecognized A20 hardware.

HIMEM cannot recognize the A20 hardware of your system. If this happens, it is probably because the system is not supported by this release of HIMEM. Remove HIMEM from your *CONFIG.SYS* file.

Expanded Memory Manager already installed

Another Expanded Memory Manager device driver or another copy of CEMMP is already loaded in memory. Make sure that only one Expanded Memory Manager device driver is contained in the *CONFIG.SYS* file.

Expanded Memory Manager is not installed

When CEMMP was entered from the command line, the program could not find an Expanded Memory Manager device driver loaded in memory. Add the *CEMMP.EXE* device driver to your *CONFIG.SYS* file and reset the computer.

Expanded Memory Manager Error *#xx*

CEMMP encountered a EMS error while gathering status information. Refer to your LIM EMS 4.0 software documentation for information on this message as well as others in this format.

Extended memory R/W error

An extended memory read or write error occurred while CEMMP tested for expanded memory. Contact your Authorized COMPAQ Computer Dealer.

File not found. RUNHI only supports COM, EXE, and SYS files.

RUNHI.EXE could not find the requested file. Correct or specify the path to the file you requested to load.

File unsuitable for viewing

The selected file either is not a README file, or it does not meet the size requirements of a README file. Press the **ENTER** key to continue.

[HMAON[=n]] is an invalid parameter on this machine.

You tried to use this CEMM parameter on a system that does not accept it. This parameter is available only on COMPAQ 386-based systems with one megabyte of memory.

Incorrect DOS version

You tried to use ADAPT, CEMMP, CHARSET, MODE, PWRCON or RUNHI with an incorrect version of MS-DOS. Use the correct version of MS-DOS. ADAPT requires MS-DOS Version 2.0 or later as published by Compaq. CHARSET requires MS-DOS Version 2.0 or later as published by Compaq. CEMMP requires MS-DOS Version 3.1 or later as published by Compaq. MODE Version 3.31 requires MS-DOS Version 3.1 to 3.31 as published by Compaq. MODE Version 4.01 requires MS-DOS Version 4.0 or later as published by Compaq. PWRCON requires MS-DOS Version 3.0 or later as published by Compaq or MS OS/2 Standard Version 1.0 or later as published by Compaq. RUNHI requires MS-DOS Version 3.1 or later as published by Compaq.

Insufficient upper memory. Program loaded low.

There is not enough memory between 640K and 1024K to load the program in upper memory. RUNHI loaded the program in base memory.

Insufficient upper memory. Program not loaded.

RUNHI returns this message when there is not enough memory between 640K and 1024K to load the program. Free up other programs from upper memory. You can also load the selected program in base memory.

Insufficient memory

README returns this message when the selected file contains too many bytes of information for the amount of memory your computer has available. Press the **ENTER** key to continue.

Insufficient memory for UMBs or virtual HMA.

Not enough extended memory is available for CEMM to create upper memory blocks (UMBs) and the virtual High Memory Area (HMA).

Invalid command line syntax:
Usage: DEVICE=[d:][path]CEMMP.EXEΔ[/Hxxx]Δ
[Mx|FRAME = mmmm|FRAME = NONE|/Pmmmm]Δ
[/Ix]Δ[X = mmmm-nnnn][...]Δ[A = nnn]Δ[RAM]Δ[NOEMS]

The syntax for CEMMP in the *CONFIG.SYS* file was incorrect. Refer to the "CEMMP" section in Chapter 3, "Maximizing System Memory," for an explanation of the correct syntax.

Invalid exclusion address range

CEMM or CEMMP will not load because the address range specified for exclusion either includes a page frame address or the specified upper range is less than the specified lower range. Enter the CEMM or CEMMP command again with a valid value specified for the X parameter.

Invalid fast alternate register set count specified:
0 - 254 allowed

The A parameter specified on the CEMM or CEMMP command line has a number larger than 254. Either do not use this parameter, or set to a number between 1 and 10. For each additional fast register set allocated, more memory is required for the device driver. Enter the CEMM or CEMMP command again with the A parameter corrected.

Invalid handle count specified: 2 - 255 allowed

While using CEMMP, you specified a handle count outside the range of 2 to 255. Specify a valid handle count.

Invalid number of parameters

While using CHARSET, either no filename was specified, or multiple MAIN or ALT character sets were specified. Enter the command with the correct parameters.

Invalid page frame address specified

While using CEMMP, you specified a page frame address outside the allowed range for the environment. Specify a valid page frame address. Refer to the comments in the "The CEMM.EXE Driver" section of Chapter 3, "Maximizing System Memory."

INVALID PARAMETER
Usage: CACHE [ON|OFF|QUEUE|NOQUEUE|CLEAR|LOCK|UNLOCK|+sss|-sss| HELP|/?]

You entered an invalid parameter on the CACHE command line. Enter the command again using one of the specified command line parameters.

INVALID PARAMETER – +sss|-sss – WHEN CACHE MEMORY IS NOT ALLOCATED THROUGH AN EXPANDED MEMORY MANAGER OR EXTENDED MEMORY MANAGER
Usage: CACHE [ON|OFF|QUEUE|NOQUEUE|CLEAR|LOCK|UNLOCK|HELP]

The use of +sss or -sss is an invalid parameter when CACHE is not allocated through an expanded memory manager or an extended memory manager. Install *CACHE.EXE* with the /EXT option for extended memory and be sure that an extended memory manager, such as *HIMEM.EXE,* is loaded before *CACHE.EXE* in the *CONFIG.SYS* file. Or, use the /EXP option for expanded memory and be sure that an expanded memory manager, such as *CEMM.EXE* or *CEMMP.EXE*, is loaded before *CACHE.EXE* in the *CONFIG.SYS* file.

Invalid parameters

You entered one or more invalid parameters while using a MODE command. Refer to the description of the particular MODE command you are using to determine which parameters can be used with your computer.

Invalid parameter specified

An invalid CEMM parameter or value was specified. Enter a valid parameter or value.

Invalid parameter string

The CHARSET command was entered with an unrecognized parameter (string) on the command line. Enter a valid parameter.

Invalid RUNHI parameter:[Parameter]

You tried to use an invalid parameter with RUNHI. Enter a valid parameter.

Invalid starting I/O port address specified: 0 - B allowed

While using CEMMP, you specified a starting I/O port address out of the allowable range of 0 to B. Specify a valid starting I/O port address.

Invalid switch character

You entered an invalid parameter or you tried to use /E and /X on the same VDISK command line. Try the operation again, entering a valid parameter or parameter combination.

Invalid switch – n

You entered a parameter that CEMM does not recognize. Try the operation again, entering a valid parameter.

I/O port address re-assignment is not valid for this system

You specified the /I parameter on a COMPAQ personal computer that does not support this parameter. Refer to the CEMMP command for COMPAQ personal computers that support this parameter.

Mapping Register Address adjusted

An invalid I/O address for a set of mapping registers was specified. CEMM uses the default value.

Memory Cache already OFF

The OFF parameter was used on the MODE MEMCACHE command line, but the cache memory controller is already disabled.

Memory Cache already ON

The ON parameter was used on the MODE MEMCACHE command line, but the cache memory controller is already enabled.

Memory Cache Controller not present

The MODE MEMCACHE option was specified on a system that does not support memory caching.

Memory Cache turned OFF

The OFF parameter was used on the MODE MEMCACHE command line, but the cache memory controller is already enabled.

Memory Cache turned ON

The ON parameter was used on the MODE MEMCACHE command line, but the cache memory controller is already disabled.

Memory control blocks destroyed.

RUNHI returns this message if the memory control blocks were erased or damaged. Restart your system.

Memory error – either memory is bad or page frame is in use

Either CEMMP found a memory integrity error while testing expanded memory, or the page frame is in use. Make sure your page frame address does not conflict with any other device driver. If it does not, contact your Authorized COMPAQ Computer Dealer.

Minimum cursor size: n|SMALL|MEDIUM|LARGE

The cursor size monitor in ADAPT will not let the cursor size fall below the size specified.

Monitor type incompatible

The requested mode while using MODE SELECT is not supported by your monitor. Turn off the power and attach another monitor to your system. Re-enter the command.

No COMPAQ expanded memory board found

CEMMP returns this message if you have no COMPAQ expanded memory installed.

COMPAQ CEMMP expanded memory manager driver is not installed. Unable to provide extended status information

You installed an Expanded Memory Manager device driver other than CEMMP. Install the *CEMMP.EXE* device driver in your *CONFIG.SYS* file.

Page Frame Base Address adjusted

An invalid page frame base address (M parameter) was set. CEMM uses the default value.

Page frame is not available for use by Expanded Memory Manager

CEMMP returns this message if you specify a page frame address that is occupied by either RAM or ROM. Specify a nonconflicting page frame address.

Press: <key sequence> to activate

Displays the current hot-key sequence for starting ADAPT. Simultaneously press the keys listed to activate ADAPT.

Queued Writes Disabled

Queued writes were disabled because either disk caching was disabled or the command, CACHE NOQUEUE, was entered. Enable queued writes with the command CACHE QUEUE.

Queued Writes Disabled – Error Has Occurred

CACHE returns this message if a write error occurs while the queue is active. BACKUP and RESTORE the file you were working with when the beeping started. The file may be lost if it is not backed up and restored.

Queued Writes Disabled – Software Conflict

CACHE returns this message if queued writes are disabled because an application program cannot coexist with queued writes. Do not attempt to enable queued writes until you are finished using the program that is causing queued writes to be disabled. When you are finished, enable queued writes with the command CACHE QUEUE

QUEUED WRITES IS DISABLED WHEN WINDOWS IS RUNNING IN 386 ENHANCED MODE

CACHE returns this message because it is not possible to enable Queued Writes when Windows 386 Enhanced Mode is active. When Windows is no longer running, CACHE reinstates the previous state of queued writes and CACHE QUEUE and CACHE NOQUEUE becomes available.

Queing Not Available On 8086/8088 Based Machines

CACHE returns this message because the 8086/8088 ROM does not support the interrupts needed to perform queued writes.

Queued Writes Not Available

The CACHE /Q option was not specified, or /Q was specified on an 8088- or 8086-based computer. Do not include the /Q option on 8088- or 8086-based computers.

Requested cache buffer size is too large.
Cache buffer size is adjusted to maximum size.

The new size requested is larger than the maximum size allowed. CACHE will automatically reduce it to the maximum size.

Requested cache buffer size is too small.
Cache buffer size is adjusted to minimum size.

The new size requested is smaller than the minimum sized allowed. CACHE will automatically increase it to the minimum size.

RUNHI Only Supports COM, EXE, and SYS Files

The file specified is not a COM, EXE, or SYS file.

RUNHI is Unable To Mark Upper Memory

RUNHI is unable to mark due to insufficient memory.

Screen save inactivity monitor installed

You set the screen save with ADAPT, and the mouse and keyboard are being monitored for activity.

Screen save timeout set to...nn minutes|ON|OFF

You set the screen save feature in ADAPT. The screen save will blackout the screen if you do not use the mouse or keyboard within the specified amount of time.

Sector size adjusted

You have specified a sector size other than 128, 256, or 512. VDISK adjusted the sector size up to the next acceptable value.

Size of expanded memory pool adjusted

CEMM returns this message if there is not enough extended memory to meet specified request for expanded memory.

Specified Display Attribute File successfully loaded.

The Display Attribute File (DAF) you specified with ADAPT loaded successfully.

The Expanded Memory Manager has not been installed

CEMMP encountered an error condition when trying to install. Correct the error and reset the computer.

The KP command with the /Q switch is not supported on this computer.

Your keyboard microcontroller does not support the KP /Q parameter. Contact your Authorized COMPAQ Computer Dealer.

Transfer size adjusted

You either did not specify the maximum number of sectors to transfer at one time to extended memory, or you specified a value that is outside of the acceptable range of 1 to 8. VDISK adjusted the transfer size to the default value of 8 sectors.

Unable to activate CEMM

An error occurred when the utility attempted to activate CEMM.

Unable to de-activate CEMM

An error occurred when the utility attempted to de-activate CEMM.

Unable to disable Weitek Coprocessor support

Either there is no Weitek coprocessor in the system, or an error occurred when CEMM attempted to disable the coprocessor. If you have a Weitek coprocessor installed in the system, consult your Authorized COMPAQ Computer Dealer.

Unable to enable Weitek Coprocessor support

Either there is no Weitek coprocessor in the system, or an error occurred when CEMM attempted to enable the coprocessor. If you have a Weitek coprocessor installed in the system, consult your Authorized COMPAQ Computer Dealer.

UNABLE TO CHANGE THE CACHE SIZE TO THE REQUESTED SIZE

If +sss returns a failure, CACHE may be unable to reallocate the previously deallocated memory that now belongs to another application. Increase the size by a smaller value.

Unable to map RAM into Upper Memory Blocks

You tried to use the RAM, NOEMS, or FRAME = NONE parameter, and CEMMP could not supply RAM for the upper memory blocks (UMBs). Do not use the RAM, NOEMS, or FRAME = NONE parameter.

Unable to open file

While using README, an error occurred reading the disk. Check to ensure that the diskette door is properly closed. Press the **ENTER** key to continue.

Unable to read file

While using README, an error occurred reading the disk. Press the **ENTER** key to continue.

Unable to place CEMM in Auto mode

The CEMM driver returned an error to the utility when an attempt was made to place CEMM in AUTO mode.

Upper memory control blocks destroyed.

CEMMP returns this message if control structures for the upper memory blocks were damaged by a terminate-and-stay-resident program (TSR) or device driver. Do not load the offending TSR or device driver.

Upper memory is not available.

RUNHI returns this message if you did not install a memory manager and cannot currently access upper memory. Refer to Chapter 4, "Using RUNHI," to install CEMM or CEMMP.

Upper memory is not linked.

Upper memory is not linked to base memory. Use the RUNHI /LINK parameter to link upper memory to base memory.

Upper memory successfully linked to DOS memory.

Your request to link upper memory to base memory was successful.

Upper memory successfully un-linked from DOS memory.

Your request to un-link upper memory from base memory using RUNHI was successful.

Usage: CEMM[ON|OFF|AUTO][W=ON|W=OFF]

You used an invalid parameter when you entered the CEMM command line. Try entering the command line again.

VDISK not installed – Insufficient memory

Either you specified the /E parameter without having extended memory installed, you specified the /X parameter without having expanded memory, less than 64 Kbytes of memory was available during the VDISK installation, or installing VDISK would exceed the number of allowable sectors. Retry the operation using different parameters.

VDISK not installed – no more logical drive letters available.

You requested the creation of a virtual disk, but no more logical drive letters are available. Therefore, the VDISK could not be installed. Delete a logical volume to make a logical drive letter available for assignment to the VDISK you want to install.

Video display switching is not available on this system.

You attempted to run VSWITCH on a system that does not have internal/external video display switching capabilities or on a system that VSWITCH does not support.

WARNING: Can't disable A20.

HIMEM was unable to disable the A20 hardware line. Either move the *HIMEM.EXE* device driver statement to the beginning of the *CONFIG.SYS* file, or do not use the HIMEM command.

WARNING: CEMM installed without a LIM 3.2 compatible Page Frame.

Because you used the P(0-3) = *mmmm* or the FRAME = NONE parameter with CEMM, the page frame does not exist. Do not use EMS LIM 3.2 applications.

WARNING: E0000 page frame address not recommended.

CEMM returns this message because system ROMs do not allow DMA in the E0000 EFFFF address range. Specify a different page frame address in the *CEMM.EXE* device driver statement of the *CONFIG.SYS* file and try again. If the message occurs again, contact your Authorized COMPAQ Computer Dealer.

WARNING: Option ROM or RAM detected within page frame

CEMM detected an option ROM or RAM located within the page frame address range specified. Remove the *CEMM.EXE* device driver statement from the *CONFIG.SYS* file, or change page frame address.

WARNING: The A20 Line was already enabled.

HIMEM found that the A20 hardware line was enabled when it was installing the hardware device driver. This condition is caused by another program that is controlling the A20 hardware line. The HIMEM command is installed; the A20 hardware line is never disabled.

WARNING: The High Memory Area is unavailable.

HIMEM cannot find enough memory to use the High Memory Area (HMA). HIMEM is unable to process any requests for the HMA; however, HIMEM remains in effect to process any requests for the Extended Memory Data Blocks.

WARNING: The KP command is not supported on this computer.

KP can only be installed on a COMPAQ system that supports enabling or disabling the keyboard. Refer to Table 1-1 in this guide to determine if this command is used on your system. Press the **ENTER** key to remove the error message.

WARNING: The KP command is not supported under Microsoft Windows.

An attempt was made to use the KP command under Microsoft Windows. Press the **ENTER** key to remove the error message.

WARNING: This version of HIMEM may cause conflicts with CEMM.

The version of the HIMEM device driver that you are using is incompatible with this version of CEMM. Replace the HIMEM device driver with the latest version from the User Programs diskette.

WARNING: The Weitek coprocessor not installed.

You have used either the W = ON or W = OFF parameter with CEMM, and you do not have a Weitek coprocessor.

WARNING: User specified ranges overlap.

CEMM returns this message if the exclude (X = *mmmm-nnnn*) and include (I = *mmmm-nnnn*) ranges overlap. The exclude range takes precedence.

Weitek coprocessor is inaccessible until CEMM is re-activated.

The Weitek coprocessor may be accessed only if CEMM is turned on. Use the CEMM command line to turn CEMM on.

Windows 3.0 does not support memory above 16 Megabytes. Add the /ISAONLY parameter to HIMEM.EXE in CONFIG.SYS

Memory above 16 MB is allocated by a device driver or an application, and Windows 3.0 does not support memory above 16 MB. Add the /ISAONLY parameter to the *HIMEM.EXE* device driver statement in the *CONFIG.SYS* file and reboot the system.

GLOSSARY

A

ADAPT — Advanced Display Attribute Programming Tool. A utility that lets you:

1. Change the way characters are displayed on COMPAQ flat panel and COMPAQ VGA displays and save the changes to a file.
2. Change the cursor size and lock it so that the cursor will not be smaller than the size specified.
3. Set the screen save option from within an application for a flat panel display.

address range — *See* address space.

address space — All the memory addresses that a processor can reference.

application — A program that performs a predefined task. For example, a spreadsheet program or word processor is an application. Also called an application program.

application program — *See* application.

Array Expansion System — A COMPAQ system option which uses the 32-Bit Intelligent Drive Array (IDA) Expansion Controller and driver. A system configured with this controller and driver makes full use of the IDA Expansion Controller's bus master capabilities and the full storage capacity of any large disk volumes on the IDA Expansion Controller.

B

base memory — The section of memory between 0 and 640 Kbytes in which most MS-DOS applications run. Also called conventional DOS memory.

BIOS — Basic Input/Output System. This software provides basic functionality for your computer. BIOS is located in upper memory ROM.

C

cache memory An area of very fast static memory dedicated to storing data retrieved from main memory. Data is temporarily stored in the cache memory in anticipation of future use by the microprocessor. If data requested by a program is found in cache memory, the data is transferred directly to the microprocessor at zero wait states, increasing the speed of the operation.

CEMM The COMPAQ Expanded Memory Manager for COMPAQ 386- and 486-based personal computers. CEMM allows MS-DOS applications to access up to 32 megabytes of additional memory. CEMM supports EMS Version 4.0.

CEMMP COMPAQ Expanded Memory Manager for certain 8086- and 286-based personal computers that have built-in COMPAQ Expanded Memory Specification (EMS) hardware. CEMMP allows MS-DOS applications to access expanded memory. CEMMP supports EMS 4.0.

CGA Color Graphics Adapter. A plug-in video display board that produces low resolution graphics and text.

character set The specific set of characters that your computer displays on the screen. Character sets vary among countries. *See also* code page.

code page A table that defines the computer's character set for a specific country. When you change code pages, you change the set of letters that is displayed on your screen.

COMPAQ Array Controllers 32-Bit Intelligent Drive Array Controller and the 32-Bit Intelligent Drive Array Expansion Controller.

CONFIG.SYS A file containing special commands that let users provide software enhancements for their systems. Using this file, users can set up or configure MS-DOS for use with devices and software applications. This file is accessed every time you turn on your computer or reset your system.

conventional DOS memory The section of memory between 0 and 640 Kbytes in which most MS-DOS applications run. Also called base memory.

Corrective Service Disks (CSDs)	Disks that contain software changes which occurred after the last version of the the operating system was released.

D

device driver	Software that is used to control and communicate with system hardware. For example, a mouse driver allows you to use a mouse with your system. Device drivers are either built into your operating system, or they must be added to the *CONFIG.SYS* file.
disk cache	An area of memory used as a temporary holding place for data. Frequently used data is stored in a disk cache for fast access by an application.
Display Attribute File (DAF)	A file used by the ADAPT utility. The user can change the character appearance of an application and then save the changes to a DAF file. These changes can then be reinstated when the user wants to use them again. *See also* ADAPT.
DMA	Direct Memory Access. A technique used to transfer data directly between memory and hardware devices. DMA transfers occur without the central processing unit (CPU) acting as an intermediary and are preferred when using high-speed applications.
DOS extender	Software that allows an MS-DOS program to access extended memory by using protected mode. DOS extenders are usually built into a program. Several large programs, such as spreadsheet programs, statistics packages, and word processors, often contain DOS extenders.

E

EGA	Enhanced Graphics Adapter.
EMB	Extended Memory Block. EMBs consist of memory beyond the first 64 Kbytes of extended memory.
EMM	Expanded Memory Manager.

EMS	Expanded Memory Specification. The EMS standard is the software interface used to access expanded memory. Three companies, Lotus, Intel, and Microsoft, joined to create the EMS standard so that MS-DOS applications could access more than 640 Kbytes of memory. Using the EMS 3.2 standard, MS-DOS can access memory mapped through a 64-Kbyte page frame. Using the EMS 4.0 standard, memory can be mapped through the page frame and through other 16-Kbyte sections of memory called EMS physical pages.
EMS logical page	A 16-Kbyte page of memory on an expanded memory board. When used, this section of memory follows EMS functions.
EMS page frame	As defined by the EMS 3.2 standard, a 64-Kbyte area of upper memory through which expanded memory can be mapped. Before the EMS 4.0 standard, the page frame was the only area through which memory could be mapped.
EMS physical page	A 16-Kbyte section of memory through which memory can be mapped, using the EMS 4.0 standard. Four contiguous pages make up the EMS (or LIM) 3.2 page frame.
emulation	Using one system to imitate another system so that both system accept the same programs or achieve the same end results. This process can ease conversion between two systems.
expanded memory	Memory that exists outside of base memory but can be accessed by MS-DOS applications. Expanded memory is accessed using a memory manager that supports the EMS standard.
Expanded Memory Specification	*See* EMS.
extended memory	The memory addressed above 1 megabyte.
eXtended Memory Specification	*See* XMS.

F

FASTART — A utility designed to partition and format your fixed disk, install MS-DOS and USER PROGRAMS, and create *CONFIG.SYS* and *AUTOEXEC.BAT* files.

H

handle — A short name used to refer to a resource, such as an upper memory block (UMB) or file.

HIMEM — A memory utility that allows MS-DOS applications to access extended memory. HIMEM supports the eXtended Memory Specification (XMS). Used as a command, HIMEM displays the current status of system memory.

HMA — High Memory Area. As defined by the eXtended Memory Specification (XMS), the first 64 Kbytes of extended memory, which ranges from 1024 to 1088 Kbytes.

hot-keys — Multiple keystrokes used to activate a memory-resident program.

I

IDA Controller — 32-Bit Intelligent Drive Array Controller.

IDA Expansion Controller — 32-Bit Intelligent Drive Array Expansion Controller.

Interrupt Request (IRQ) — A signal sent to the CPU to determine whether servicing is needed.

L

logical page — A 16-Kbyte page of memory on an expanded memory board. When used, this section of memory follows EMS functions.

LIM — Lotus/Intel/Microsoft. The three companies that designed the Expanded Memory Specification (EMS). The EMS standard allows MS-DOS to access expanded memory.

M

MDA Monochrome Display Adapter. A plug-in video display board that produces high-resolution, single-color text but does not allow the use of graphics.

memory resident Once loaded, a program that stays in memory and is available for use until you turn the computer off. *See also* TSR.

O

operating speed The speed in megahertz at which your system processes information. The operating speed can be changed to accommodate the applications to be run. Every machine has a default operating speed.

P

page frame As defined by the EMS 3.2 standard, a 64-Kbyte area of upper memory through which expanded memory can be mapped. Prior to the EMS 4.0 standard, the page frame was the only area through which memory could be mapped.

physical page One of the four 16-Kbyte sections of memory that make up the EMS page frame. Programs can use expanded memory by mapping it through these pages. Also known as a window or EMS window.

processor The computer chip that controls your computer. COMPAQ processors are usually 286, 386, or 486 models.

protected mode A processor mode in which extended memory may be directly accessed by DOS extenders. MS-DOS programs that include DOS extenders may use extended memory in this mode. The 286, 386, and 486 processors include the protected mode.

Q

queued write — A feature of the CACHE Utility that reduces the time it takes to perform write operations. When data is written to a system, the written data is checked against the data in the disk cache to see if it is the same. If it is, nothing happens. If it is not, then the disk cache data will be over-written with the new information. The new information will then be queued in the disk cache and later written to a diskette or fixed disk. This process allows new data to be written without causing the system to perform immediate disk-write operations, which are much slower.

R

RAM — Random Access Memory. Memory that can be used to load and run programs. When you turn the system off, data stored in RAM will be cleared. To preserve data in RAM, you must save it to a diskette or a fixed disk.

real mode — A mode that 8088, 8086, 286, 386, and 486 processors share that allows only the first megabyte of memory to be addressed. Without a memory manager, such as CEMM, this is the only mode MS-DOS programs can use.

ROM — Read Only Memory. Memory that contains permanent data that will not be lost when you turn your system off. Programs in ROM are used to control hardware.

S

Shadow RAM — A 128-Kbyte section of memory that is used to decrease the amount of time needed for ROM BIOS calls. The BIOS, usually located in ROM, is mapped into an area of faster RAM. This area of faster RAM is usually used for BIOS; however, HIMEM can reclaim the memory and make it available as extended memory through the XMS interface.

syntax — Rules that must be followed when entering information into the computer.

T

32-Bit Intelligent Drive Array (IDA) Controller — A COMPAQ system option which uses the IDA Controller and driver. A system configured with this controller and driver makes full use of the IDA Controller's bus master capabilities and the full storage capacity of any large disk volumes on the IDA Controller.

32-Bit Intelligent Drive Array (IDA) Expansion Controller — A COMPAQ system option which uses the IDA Expansion Controller and driver. A system configured with this controller and driver makes full use of the IDA Expansion Controller's bus master capabilities and the full storage capacity of any large disk volumes on the IDA Expansion Controller.

TSR — Terminate-and-stay-resident. When loaded, TSRs initialize themselves and can be accessed when needed by pressing a particular key sequence. The disadvantage, however, is that they occupy memory even when they are not being used.

U

UMB — Upper memory block. UMBs are sections of upper memory that can be used by the RUNHI utility and MS-DOS applications. UMBs are created by a memory manager, such as HIMEM, CEMM, or CEMMP, that follows the eXtended Memory Specification (XMS).

upper memory — The section of memory between 640 and 1024 Kbytes. Upper memory is usually used for system hardware, although expanded memory may be mapped into available sections. Upper memory blocks may also be created in upper memory.

V

VCPI — Virtual Control Program Interface. This specification allows compatibility between DOS extenders and memory managers such a CEMM.

virtual disk — A section of RAM that is set up as a disk drive. Read and write operations are faster to a virtual disk than they are to a fixed disk or to a diskette. Also called VDISK.

virtual mode — A mode included by 486 and 386 processors. Using this mode, MS-DOS programs can access extended memory that has been mapped into the first megabyte of memory. This mode allows CEMM to work without additional EMS hardware.

W

Weitek coprocessor — An optional processor used to decrease the amount of time needed to perform complex numeric computation.

working MS-DOS diskette — The diskette that contains the copy of MS-DOS that you use to run programs on your computer.

window — *See* physical page.

X

XMS — eXtended Memory Specification. The XMS standard is a software interface created to allow MS-DOS programs to use upper memory blocks (UMBs), the High Memory Area (HMA), and extended memory.

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