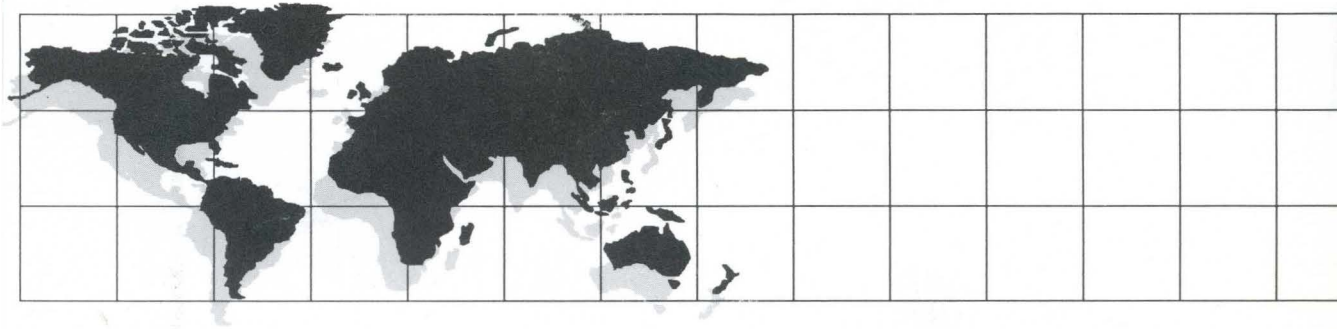

CTOS

CTOS/Vpc™
User's Guide

UNISYS

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CTOS/Vpc™

User's Guide

CTOS/Vpc 2.0

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Product Information Announcement

● New Release ○ Revision ○ Update ○ New Mail Code

Title

CTOS/Vpc™ User's Guide

This Product Information Announcement announces the release and availability of the *CTOS/Vpc™ User's Guide.*

This guide describes how to use CTOS/Vpc version 2.0; it provides a product overview as well as installation and configuration instructions. Separate sections provide information on using disk storage, mouse, printing, CTOS/DOS file transfer, CD-ROM drives, serial communications, disk caching, and memory. This guide completely revises an earlier version and provides information on new features, such as support for two serial ports, native DOS partitions and DOS hard disks on EISA/ISA workstations, and support for native Windows video drivers on EISA/ISA workstations.

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Contents

About This Guide

Introduction xvii
Who This Guide Is For xvii
What This Guide Covers xvii
What This Guide Does Not Cover xvii
What's New in CTOS/Vpc xviii
What's New in This Guide xviii
How This Guide Is Organized xix
Terminology xxi
Conventions xxi
Where to Find More Information xxii

Section 1. Overview of CTOS/Vpc

What Is CTOS/Vpc? 1-1
What You Can Do With CTOS/Vpc 1-1
How CTOS/Vpc Works 1-2
CTOS/Vpc Provides DOS/ROM BIOS Functions and CTOS/DOS Function Mapping 1-2
CTOS/Vpc and Disk Storage 1-3
Pseudovolumes 1-4
Native DOS Partitions 1-4
DOS Hard Disks 1-4
Issues You Need to Be Aware Of 1-5
Performance Issues 1-5
PC Compatibility 1-5
CTOS/Vpc and CTOS/DOS Configuration 1-6
Software Viruses 1-8
Supported Windows Versions 1-8
Windows Standard Mode Versus Enhanced Mode Operation 1-8
Video and Video Drivers 1-9
CTOS/Vpc Task Summary 1-9

Section 2. Installing, Configuring, and Using CTOS/Vpc

Before You Start 2-1
Have You Partitioned Your Hard Disk? 2-2
What You Need to Do 2-2
Preparing a Native DOS Partition or DOS Hard Disk for CTOS/Vpc 2-3
Preparing an Existing Pseudovolume for CTOS/Vpc 2-4
Installing CTOS/Vpc On the Workstation 2-5
Updating an Existing Version of CTOS/Vpc 2-5
Installing CTOS/Vpc New 2-7
Installing the DOS Files Package 2-9
Installing CTOS/Vpc Publicly Onto a Server 2-11
Configuring the Pc.sys File 2-13
Where to Find More Configuration Information 2-13
Starting a CTOS/Vpc Session 2-13
Installing MS-DOS 2-14
Configuring MS-DOS 2-14
Installing, Starting, and Using Windows 2-15
Running the WINSTALL.BAT Batch File 2-15
Installing Applications 2-15

Section 3. Working With Hard Drives and Floppy Drives

What You Need to Do 3-1
Mapping CTOS Drives to DOS Drives 3-2
Configuring the Pc.sys File for Floppy Drives 3-3
Configuring the Pc.sys File for Hard Drives 3-4
Using a Pseudovolume 3-4
Using a Native DOS Partition 3-5
Using a DOS Hard Disk 3-6
Using CTOS Passwording 3-7
Supplying a Password for the Disk Used for Drive C ... 3-7
Supplying a Password for the Disk Used for Drive D ... 3-7
Making a Drive Read-Only 3-8
Working With Pseudovolumes 3-9
Creating Pseudovolumes 3-9
Small and Large Dynamically Expandable Pseudovolumes 3-9
Small and Large Fixed-Size Pseudovolumes 3-9

Creating a Dynamically Expandable Pseudovolume . . . 3-10
Creating a Fixed-Size Pseudovolume Using Size PSV . . . 3-12
Resizing a Pseudovolume With the Size PSV Command . . . 3-14
Migrating to a Large Pseudovolume . . . 3-16
Splitting a DOS Partition Into Primary and Extended Partitions . . . 3-18
Logical Drives, Drive Letters and CTOS/Vpc . . . 3-19

Section 4. Setting Up and Using a Mouse

What You Need to Do . . . 4-1
Connecting a Mouse Device . . . 4-1
Installing the CTOS Mouse Service . . . 4-2
Using the Sysinit.jcl File to Load the Mouse Service Automatically . . . 4-2
Installing the Mouse Driver in MS-DOS . . . 4-3
Installing the Mouse Driver Included With Your Mouse . . . 4-4
Installing the Mouse Driver Included With CTOS/Vpc . . 4-4
Installing a Mouse in Windows . . . 4-5

Section 5. Printing

What You Need to Do . . . 5-1
Making Sure Your Printer is Supported . . . 5-1
Using DOS or CTOS Printing . . . 5-2
Using DOS Printing . . . 5-2
Using CTOS Printing . . . 5-3
A Note About Pre-GPS CTOS Printing: Spooling . . . 5-3
Connecting Printers . . . 5-3
About Printer Cables . . . 5-4
Installing and Configuring GPS . . . 5-4
Configuring the Pc.sys File for DOS Printing . . . 5-4
Configuring the Pc.sys File for CTOS Printing . . . 5-5
Configuring Pc.sys for CTOS Printing Using Spooler . . . 5-5
Reconfiguring the Pc.sys File During a CTOS/Vpc Session . . . 5-6
Using PC Network Printers . . . 5-6

Section 6. Working With Files in the CTOS/DOS Environment

What You Need to Do 6-2
Using the MSDOS Read Command 6-2
Parameter Field Descriptions for MSDOS Read 6-3
[DOS partition number] 6-6
Using the MSDOS Write Command 6-7
Parameter Field Descriptions for MSDOS Write 6-8
[DOS partition number] 6-10
Using MSDOS Directory 6-11
Parameter Field Descriptions for MSDOS Directory ... 6-12
[DOS partition number] 6-14

Section 7. Using Serial Communications Channels

What You Need to Do 7-1
Selecting a Communications Channel 7-1
Connecting Data Communications Hardware 7-2
Configuring the Pc.sys File for Communications 7-2
Assigning a Channel to a DOS COM Port 7-3
Assigning COM1 7-3
Assigning COM2 7-3
Assigning COM1 or COM2 During a CTOS/Vpc Session 7-4
Assigning Flow Control in the Pc.sys File 7-4
Types of CTOS/Vpc Flow Control: XON/XOFF and RTS/CTS 7-4
Editing the Pc.sys File to Assign Flow Control 7-5
Assigning Flow Control to COM1 7-5
Assigning Flow Control to COM2 7-5
Maximum Baud Rates Supported by CTOS/Vpc 7-6
Maximum Baud Rates Using Two Communications Channels 7-6

Section 8. Using CD-ROM Drives

CTOS/DOS Interoperation in Accessing CD-ROM Drives 8-1
What You Need to Do 8-3
Locating the CD-ROM Extension and CD-ROM Drivers .. 8-4
Installing the CTOS CD-ROM Service 8-5

Using the SysInit.jcl File to Load the CD-ROM Service Automatically 8-5
Setting Up AUTOEXEC.BAT and CONFIG.SYS to Support CD-ROM 8-6
Modifying the CONFIG.SYS File for CD-ROM 8-7
Modifying the AUTOEXEC.BAT File for CD-ROM 8-7
Modifying the MSCDEX.EXE Line 8-8
Modifying the CDR ASSIGN Lines 8-8
Using Multiple CD-ROM Drives 8-9
Using a CD-ROM Drive On the Server 8-9
Using a CD-ROM Drive On Another Node 8-9

Section 9. Disk Caching

What You Need To Do 9-1
What Is Disk Caching? 9-1
When Should I Use Disk Caching? 9-2
What Types of Disk Caching Are Available? 9-2
CTOS Disk Caching 9-2
SmartDrive Disk Caching 9-3
Improving Floppy Drive Performance 9-3
Using CTOS and SmartDrive Disk Caching Concurrently 9-3
Which Type of Disk Caching Should I Use? 9-4
How Much Cache Do I Need? 9-5

Section 10. Memory

Workstation Memory for CTOS/Vpc 10-1
Determining the Amount of Workstation Memory 10-1
Determining the Amount of Memory Occupied by Programs 10-1
What If There is Not Enough Unused Memory for CTOS/Vpc 10-2
Reserving Memory for CTOS/Vpc 10-2
Restricting CTOS/VPC to a Specific Amount of Memory 10-2

The Amount of CTOS/Vpc Memory Available for DOS ... 10-3
Supported Types of MS-DOS Memory ... 10-3
Conventional Memory ... 10-5
Obtaining Conventional Memory ... 10-5
Upper Memory Area and Upper Memory Blocks ... 10-5
Obtaining and Using Upper Memory Blocks ... 10-6
EMS Memory ... 10-6
EMS Memory is Provided by CTOS/Vpc's PEMM Program ... 10-6
Obtaining EMS Memory ... 10-7
XMS Memory ... 10-7
XMS Memory and the High Memory Area ... 10-7
XMS Memory Support Is Provided By CTOS/Vpc's HIMEM.SYS ... 10-8
Obtaining XMS Memory ... 10-8
DPMI Memory ... 10-8
Obtaining DPMI Memory ... 10-9
How CTOS/Vpc Allocates Memory ... 10-9

Appendix A. Status Codes ... A-1

Appendix B. The Pc.sys Configuration File

Introduction ... B-1
About the Pc.sys File ... B-1
The Format of the Pc.sys File ... B-2
The Default Pc.sys File ... B-2
Editing the Pc.sys File ... B-3
Floppy Drive and Hard Drive Options ... B-3
Hard Drive, Pseudovolume, and Native DOS Partition Options ... B-4
Printer Configuration Options ... B-7
Communications Options ... B-8
Video Options ... B-10
Keyboard Options ... B-10
Memory Options ... B-12
Suppressing the Pop-Up Menu ... B-12
Cluster and System Performance Options ... B-13

Appendix C. Troubleshooting

Introduction C-1
Problems Starting CTOS/Vpc C-1
Application-Related Problems C-2
Drive Access Problems C-2
Performance Problems C-3
Insufficient Memory C-3
Non-Optimized Printing C-3
Failure to Use Disk Caching C-3
Failure to Use SmartDrive C-4
Wrong Baud Rates C-4
Windows-Related Problems C-4
Windows "Hangs" During Installation C-5
Windows Won't Start (VGA Initialization Error) C-5
VGA Initialization Error Message is Displayed ... C-5
Error Message W031V011E is Displayed C-6
Windows Won't Run in Enhanced Mode C-6
Windows Won't Run in Standard Mode C-6
Windows Applications Won't Start C-7
Problems Starting Multiple CTOS/Vpc Sessions C-7
Communications Problems C-7
Can't Open a COM Device C-8
Can't Close a COM Device C-8

Appendix D. CTOS and PC Keyboard Key Mapping

Keyboard Decals D-1
CTOS and PC Key Mapping Tables D-2
CTOS Keyboard LED Indicators D-6
Superset Keyboard D-6
SG1000 Keyboard D-7

Figures

1-1. Mapping DOS Print Functions to CTOS GPS Print Functions 1-3
1-2. Interaction Between CTOS, DOS, and CTOS/Vpc 1-7

3-1. CTOS Hard Disk With Entire DOS Partition as Primary 3-18
3-2. CTOS Hard Disk with Primary and Extended DOS Partitions 3-19
3-3. CTOS/Vpc and Extended DOS Partition Drive Letters 3-20

8-1. Accessing a CD-ROM: Interoperation between CTOS and DOS 8-2

9-1. Application Performance and Disk Caching Type 9-5

10-1. DOS Memory Types 10-4

Tables

3-1.	Configuring Pc.sys For Floppy Drives	3-3
3-2.	Configuring Pc.sys For Pseudovolumes	3-4
3-3.	Configuring Pc.sys For Native DOS Partitions	3-5
3-4.	Configuring Pc.sys For DOS Hard Disks	3-6
3-5.	Resizing Pseudovolumes: Size Limitations	3-14
A-1.	CTOS/Vpc Status Codes	A-1
D-1.	K1 Keyboard	D-2
D-2.	K2 Keyboard	D-3
D-3.	K5 Keyboard	D-4
D-4.	SuperGen I-bus Keyboard (SG-101-K)	D-5
D-5.	PC Style Superset Keyboard (SG-102-K)	D-5

Examples

4-1. Sample SysInit.jcl File That Loads the Mouse Service 4-3

5-1. Printer Configuration in the Default Pc.sys Configuration File 5-5

7-1. Default Pc.sys Configuration File 7-3

8-1. Sample SysInit.jcl File That Loads the CD-ROM Service 8-6

B-1. Default Pc.sys File B-2

About This Guide

Introduction

This guide tells you how to use CTOS/Vpc™, a software product that allows CTOS® workstations to emulate an IBM-PC/AT® running the MS-DOS® operating system.

Who This Guide Is For

This guide tells you how to run PC applications on a CTOS workstation. It assumes that you know how to give commands from the CTOS Executive command line and start PC applications from the MS-DOS prompt or from Windows. The guide also assumes that you know how to use the MS-DOS **edit** text editor command and the CTOS **Editor** text editor command. (You use these text editors to modify configuration files in CTOS and in MS-DOS.)

If you don't know how to use the text editors listed above, see your MS-DOS manual and the *CTOS Executive Reference Manual.*

What This Guide Covers

This guide explains how to install, set up, and use CTOS/Vpc. It includes configuration information for both the CTOS and MS-DOS environments. Using a mouse, printers, serial communications, CD-ROM drives, disk caching and memory management are also covered.

What This Guide Does Not Cover

This guide does not describe the MS-DOS or CTOS operating systems, Windows, or any of the text editors you might need to configure CTOS/Vpc. See "Where to Find More Information," for more information.

What's New in CTOS/Vpc

This version of CTOS/Vpc provides several new or enhanced functions, such as support for a second serial port, support for MS-DOS 6.2, and the ability to run Windows applications in the background under Context Manager.

In addition, when running on EISA/ISA bus workstations, CTOS/Vpc supports native VGA BIOS and most native mode Windows 3.1 video drivers, allows applications to use the speaker, supports some parallel port bidirectional functions and some software security devices (dongles), supports native DOS partitions so that you can use a DOS disk partition, and supports MS-DOS hard disks that have no CTOS partitions on them. These items are documented in more detail later in this guide.

For a complete list of the new functions provided by this version of CTOS/Vpc, see the *CTOS / Vpc Product Family Software Release Announcement*.

What's New in This Guide

This version of the CTOS/Vpc User's Guide completely revises earlier versions: installation instructions have been added (see Section 2), along with information about serial communications (see Section 7), CD-ROM drive support (see Section 8), and disk caching (see Section 9).

In addition, to help you access information more easily, material that logically belongs together has been grouped into a separate section. For example, material on using hard drives and floppy drives is located in a single section (see Section 3), all of the mouse material is in a separate section (see Section 4), and all of the information about printing is in a single section (see Section 5).

How This Guide Is Organized

This guide is divided into ten sections and four appendixes:

Section 1. Overview of CTOS/Vpc

This section describes what CTOS/Vpc is and how it works, along with some of the issues you need to be aware of when you use CTOS/Vpc.

Section 2. Installing, Configuring, and Using CTOS/Vpc

This section describes what you need to do to install and set up CTOS/Vpc.

Section 3. Working With Hard Drives and Floppy Drives

This section describes how to map CTOS drives to DOS drive names so that CTOS/Vpc can support the drives you want to use. This section also describes creating, resizing, and copying pseudovolumes.

Section 4. Setting Up and Using a Mouse

This section describes setting up the CTOS and DOS environments to provide mouse support for DOS applications.

Section 5. Printing

This section describes how to configure CTOS/Vpc to support printing from applications running under MS-DOS, including Windows.

Section 6. Working With Files in the CTOS/DOS Environment

This section describes how to transfer files between the CTOS and the MS-DOS environment and how to examine the contents of a DOS disk from CTOS using the **MSDOS Read**, **MSDOS Write**, and **MSDOS Directory** commands provided by the CTOS DOS package that is included with CTOS Standard Software.

Section 7. Using Serial Communications Channels

This section describes how to set up CTOS/Vpc to support DOS data communication over asynchronous serial lines. It also provides information about baud rates.

Section 8. Using CD-ROM Drives

This section describes how to set up the CTOS and DOS environments to provide support for CD-ROM drives.

Section 9. Disk Caching

This section describes the performance advantages of using disk caching, and described the disk caching options available under CTOS/Vpc. Both SmartDrive and CTOS disk caching are covered.

Section 10. Memory

This section describes the types of DOS memory that are supported by CTOS/Vpc, and provides instructions on obtaining each memory type under CTOS/Vpc.

Appendix A. Status Codes

This appendix explains the status codes returned by CTOS/Vpc.

Appendix B. The Pc.sys Configuration File

This appendix describes the configuration file format and configuration options.

Appendix C. Troubleshooting

This appendix describes the symptoms and causes of common problems you might encounter during the operation of CTOS/Vpc.

Appendix D. CTOS/PC Keyboard Mapping

This appendix describes how to map the various CTOS keyboards to the standard PC keyboard.

Terminology

The following terms are used throughout this guide:

- The term *CTOS* refers to the entire family of CTOS workstation operating systems
- The term *EMS* refers to expanded memory
- The term *XMS* refers to extended memory
- The term *386 processor* refers to a workstation containing an 80386 Intel microprocessor
- The term *486 processor* refers to a workstation containing an 80486 Intel microprocessor
- The term *EISA/ISA bus workstation* refers to the newer CTOS workstations that have the industry standard EISA or ISA bus
- The term *Windows* refers to the Microsoft Windows® product

Conventions

The following style conventions are used throughout this guide:

- Names of fields appear in italics, for example, *PSV File Name*
- CTOS volume, directory, and file names appear in italics, for example, *[Sys]<Sys>*
- MS-DOS file names appear in small caps, for example, CONFIG.SYS
- CTOS commands appear in boldface type, for example, **Editor**
- MS-DOS commands appear in lowercase boldface type, for example, **chkdsk**
- Keycap names appear in uppercase boldface type, for example, **ALT**
- Characters you type appear in boldface type, for example, **Yes**
- Characters displayed on the monitor screen appear in monospace type, for example

  `Press` **ENTER** `to continue`

- The contents of a file also appear in monospace type

Where to Find More Information

The documents listed below provide more information about MS-DOS and CTOS-related products.

MS-DOS User's Guide

This guide provides comprehensive information about MS-DOS. It covers the various tasks you can complete using MS-DOS, such as file and disk management, and describes how to customize the MS-DOS environment.

CTOS Context Manager II Installation and Configuration Guide

This manual describes how to install, configure, and use Context Manager.

Microsoft Windows User's Guide

This guide provides detailed information about configuring and using the Windows environment. It includes information on starting applications, changing system settings, managing files and directories, and configuring Windows to support printers and other devices.

CTOS Presentation Manager User's Guide

This guide contains user and reference information on the Presentation Manager graphical environment for CTOS. It provides step-by-step procedures on specific tasks you can perform, such as starting applications, changing system settings, managing files and directories, and configuring Presentation Manager printers and plotters.

CTOS LANce/pc and LANce/LM Administration and Programming Guide

This guide describes how to install and administer the CTOS LANce/pc and LANce/LM networking products, which provide IBM-PCs and compatibles access to CTOS system services, and enable cluster servers to be connected to PCs in a Token Ring or Ethernet LAN.

CTOS Executive Reference Manual

This manual describes the command interpreter for the CTOS operating system. It also contains detailed information about the Standard Software commands packaged with the CTOS operating system, including the **Editor**, the **MSDOS Write**, the **MSDOS Read**, and the **MSDOS Directory** commands.

CTOS Executive User's Guide

This step-by-step guide explains how to use the Executive command interpreter to perform common tasks, such as copying and deleting files or backing up to floppy diskettes.

CTOS System Administration Guide

This procedural guide contains general information about hardware types and system software products. It provides detailed information about installing system services, user configuration files, formatting disks, backing up to tape, optimizing system performance, configuring operating systems, and troubleshooting common problems.

CTOS/Vpc Product Family Software Release Announcement

This software release announcement provides information about the new functions provided by the current version of CTOS/Vpc, product interdependencies, product restrictions and limitations, and so on.

Section 1
Overview of CTOS/Vpc

This section is an introduction to CTOS/Vpc: it describes what CTOS/Vpc is, how it works, what you can do with it, and the issues you need to be aware of when you use CTOS/Vpc. At the end of the section is a task summary list that summarizes what you must do to install, configure, and use CTOS/Vpc.

What Is CTOS/Vpc?

CTOS/Vpc is a CTOS application that provides software emulation of an IBM PC/AT (or compatible) computer and allows you to run PC compatible software on a CTOS workstation. In a CTOS/Vpc session, CTOS/Vpc loads a PC/AT-compatible BIOS into memory, boots MS-DOS, and emulates the hardware environment of an IBM PC/AT.

What You Can Do With CTOS/Vpc

You can use CTOS/Vpc to run DOS- or Windows-based applications and to support a variety of tasks carried out by those applications. When you run DOS or Windows applications, you can

- Print to printers attached to your workstation, to the cluster server workstation, or to server workstations at remote nodes
- Access your workstation's floppy disks
- Access hard disks at your workstation, the server, or servers at remote nodes
- Access CD-ROM drives at your workstation, at the server workstation, or at server workstations at remote nodes
- Access PC networks
- Perform PC serial communications

These activities are described later in this manual.

How CTOS/Vpc Works

To understand how CTOS/Vpc works, you first need to look at how DOS-based software operates on a PC.

On a PC, a software application carries out tasks by accessing hardware resources such as processors, disks, memory, video, and so on. DOS-based software accesses PC hardware primarily by using MS-DOS functions or PC ROM BIOS functions; in some cases, DOS-based software accesses PC hardware directly. Therefore, DOS-based software can't operate unless those MS-DOS and PC ROM BIOS functions and hardware components are available.

Because the CTOS functions for accessing computer hardware are entirely different from the DOS and PC ROM BIOS functions, and because some PC hardware components (chips) may not be present on CTOS workstations, DOS-based applications can't run on a CTOS workstation without an emulation program like CTOS/Vpc.

CTOS/Vpc provides the DOS and PC ROM BIOS functions required by DOS-based applications and maps those functions to the proper CTOS functions. CTOS/Vpc also provides software emulation of hardware components that are required by DOS applications.

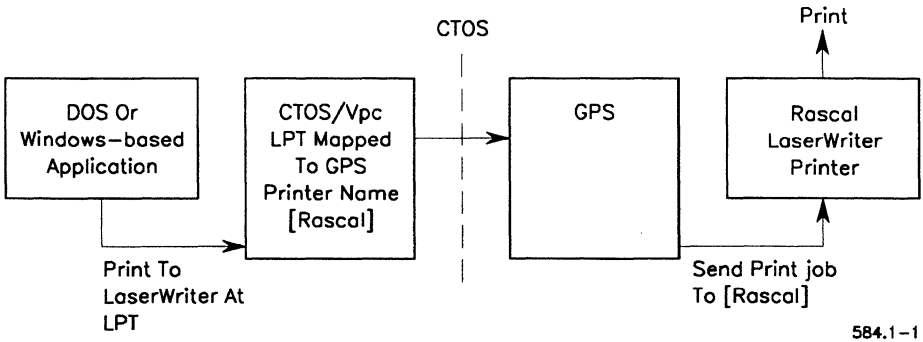
CTOS/Vpc Provides DOS/ROM BIOS Functions and CTOS/DOS Function Mapping

To enable DOS-based applications to run on CTOS, CTOS/Vpc performs three main functions:

- CTOS/Vpc makes MS-DOS and PC ROM BIOS functions available to DOS applications. CTOS/Vpc loads an actual PC ROM BIOS into memory, then boots the MS-DOS operating system. This provides DOS applications with the environment they need to run.
- CTOS/Vpc maps MS-DOS and PC ROM BIOS functions to corresponding CTOS functions. CTOS/Vpc intercepts the MS-DOS or ROM BIOS attempts to access hardware resources and issues the proper CTOS calls to carry out the desired task.
- CTOS/Vpc provides hardware emulation of some PC hardware components.

Figure 1-1 shows an example of this function mapping. In Figure 1-1, a DOS-based application sends a print job to a printer it thinks is attached to the workstation parallel port. Because the DOS parallel port *lpt* is mapped to the GPS printer *[Rascal]* in the *Pc.sys* file, CTOS/Vpc intercepts the attempt to print and calls the necessary CTOS Generic Print System (GPS) print functions to print the print job at the printer *[Rascal]*.

Figure 1-1. Mapping DOS Print Functions to CTOS GPS Print Functions



Note: *In the example shown above, CTOS/Vpc routes the print job to the GPS printer Rascal. However, if the DOS application is expecting to print to a LaserWriter, Rascal must either be a LaserWriter or a printer that emulates a LaserWriter.*

CTOS/Vpc and Disk Storage

CTOS/Vpc can use any of the following resources to store data or programs:

- Pseudovolumes
- DOS partitions on CTOS disk drives (native DOS partitions)
- DOS partitions on disk drives with no CTOS partition (DOS hard disks)

Each of these is described below.

Pseudovolumes

A pseudovolume is a CTOS file that serves as a hard disk for the MS-DOS environment. The pseudovolume has the file extension *.psv*.

MS-DOS treats the pseudovolume just like a hard disk on a PC; it can format the pseudovolume, search it for files, and so forth. Although the pseudovolume is a CTOS file, the files inside the pseudovolume cannot be directly accessed by CTOS; CTOS/Vpc or the CTOS MSDOS commands described in Section 6 are required for accessing files in a pseudovolume.

Pseudovolumes are not required by CTOS/Vpc; you can use native DOS partitions or DOS hard disks instead (these are described below). You can use up to two pseudovolumes for each CTOS/Vpc session.

Native DOS Partitions

You can use native DOS partitions on EISA/ISA workstations. A native DOS partition is that part of a CTOS hard disk that you reserve for a non-CTOS operating system when you format the disk under CTOS. After you finish the CTOS disk formatting, you must prepare this reserved partition for DOS using the DOS **fdisk** and **format** commands.

To DOS and DOS-based applications, native DOS partitions and pseudovolumes appear identical. To the CTOS Executive or other CTOS applications, a native DOS partition is not seen at all, whereas the pseudovolume appears as just another CTOS file.

Note: *Like pseudovolumes, native DOS partitions can be accessed from CTOS using the CTOS MSDOS commands described in Section 6, "Working With Files in the CTOS/DOS Environment."*

DOS Hard Disks

On EISA/ISA workstations, you can use DOS hard disks as additional workstation hard disks. A DOS hard disk is one that is partitioned entirely for DOS; there is no CTOS partition. In all other respects, the DOS hard disk functions the same as a native DOS partition.

Issues You Need to Be Aware Of

There are several issues you should be aware of when you use CTOS/Vpc:

- Performance
- PC compatibility
- CTOS/DOS configuration
- Software viruses
- Supported Windows versions
- Windows standard mode versus Windows enhanced mode operation
- Video and video drivers

These issues are discussed briefly below.

Performance Issues

CTOS/Vpc is a software emulation program. Like all such emulation programs, CTOS/Vpc does not provide performance identical to the performance of a PC running MS-DOS natively. Because of the necessary performance loss associated with emulating another environment, some tasks will take longer to complete than they do on a PC. This is particularly true with regard to printing.

However, in many cases you can significantly improve CTOS/Vpc performance by optimizing your environment. See Section 5, "Printing," and Section 9, "Disk Caching," for more information.

PC Compatibility

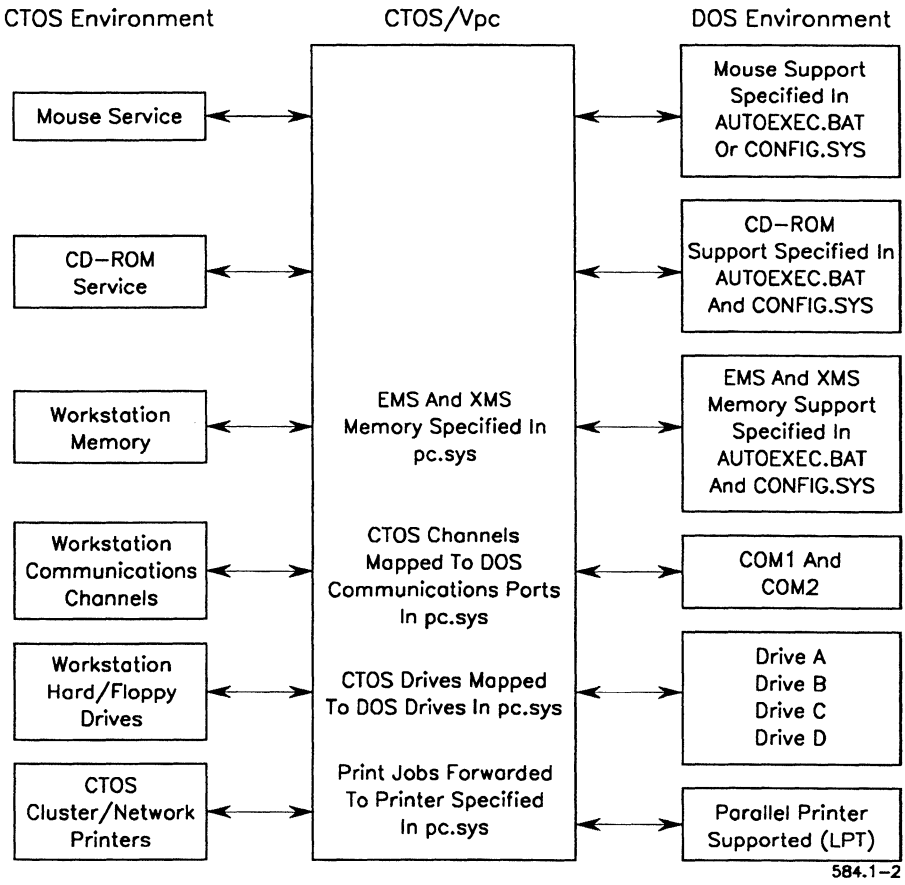
CTOS/Vpc works with most DOS-based and Windows-based software applications. However, some types of applications and usages are not compatible with CTOS/Vpc. For information about the current limitations of CTOS/Vpc, see the *CTOS / Vpc Product Family Software Release Announcement.*

CTOS/Vpc and CTOS/DOS Configuration

It is important to understand that under CTOS/Vpc, the only resources available to the DOS environment are the CTOS resources that CTOS/Vpc *makes available* to DOS. For example, a mouse is available for DOS applications only if a CTOS mouse is installed on the workstation, and the CTOS mouse service is installed in workstation memory. (Naturally, you also need to install the DOS mouse driver in MS-DOS.)

This means that you must coordinate the configuration of the DOS environment, CTOS/Vpc, and the CTOS environment. Figure 1-2 shows the interaction of these three elements. Notice that some types of DOS/CTOS interaction are handled by CTOS/Vpc automatically, and some types of interaction require explicit mapping in the *Pc.sys* file.

Figure 1-2. Interaction Between CTOS, DOS, and CTOS/Vpc



In general, you cannot use a hardware device under CTOS/Vpc unless CTOS is set up to support the device first. For example, if you want to use special hardware devices such as a mouse or CD-ROM drive with your DOS application, you must first install the CTOS system service that supports the device. Then, in a CTOS/Vpc session, you must boot MS-DOS and install the appropriate DOS driver for the device.

You may also have to edit the CTOS/Vpc configuration file called *Pc.sys* to provide desired CTOS hardware resources. Although you can use the default *Pc.sys* file provided with CTOS/Vpc, you must modify the file if you want to use CTOS cluster printers, SmartDrive disk caching, or other customized features.

Software Viruses

Software viruses are programs that can perform a range of destructive activities, from slowing down system performance to destroying files. Viruses are typically designed to self-replicate and spread from an "infected" system to other systems via diskettes or communications lines.

Viruses are primarily a concern for an MS-DOS environment, not for CTOS. In particular, viruses in the CTOS/Vpc MS-DOS environment *cannot* spread to CTOS and damage the CTOS environment.

However, because a virus can damage the MS-DOS environment created by CTOS/Vpc, you should use anti-virus software to detect and destroy viruses that try to invade. MS-DOS 6.2 and later versions include anti-virus programs (see your MS-DOS documentation for details).

Supported Windows Versions

Unisys has adapted a special version of Microsoft Windows to run under CTOS/Vpc. Off-the-shelf Windows versions are not supported by CTOS/Vpc.

Windows Standard Mode Versus Enhanced Mode Operation

CTOS/Vpc runs Microsoft Windows in standard mode; it does not run Windows in enhanced mode. This means that some applications requiring enhanced mode Windows can't run under CTOS/Vpc.

Note: *Some applications state that they require enhanced mode Windows; however, what may really be required is support for DOS protected mode interface (DPMI) memory. Because CTOS/Vpc provides DPMI memory, these applications may be able to run on standard mode Windows in CTOS/Vpc.*

Video and Video Drivers

DOS-based applications are restricted to the video drivers and resolutions provided by CTOS/Vpc. (See your *CTOS/Vpc Product Family Software Release Announcement* for more details.)

Windows-based applications running on an EISA/ISA workstation can use the native standard mode Windows VGA drivers provided for that workstation. X-Bus workstations, SG5000, SG2100-320 and SG1000 workstations are restricted to the video drivers and resolutions provided by CTOS/Vpc.

CTOS/Vpc Task Summary

The following table shows the tasks you need to complete in order to install, configure, and use CTOS/Vpc.

Task	Command and/or Configuration File	For More Information
Install workstation hardware, including peripherals such as a mouse.		See your workstation hardware manual.
Install the CTOS operating system and Standard Software.	**Installation Manager**	See the *CTOS System Software Installation Guide*, and the *CTOS System Administration Guide*.
Install CTOS system services, such as Mouse, CD-ROM, GPS on the hard disk.	**Installation Manager**	See the *CTOS System Software Installation Guide* and the *CTOS Generic Print System (GPS) Administration Guide*.

continued

Task	Command and/or Configuration File	For More Information
Install CTOS system services, such as Mouse, CD-ROM, GPS in workstation memory.	**Install Mouse Service** **Install CDROM Service** *SysInit.jcl file*	See the *CTOS System Administration Guide* and the *CTOS Generic Print System (GPS) Administration Guide.* See also Sections 4, 5, and 8 in this manual.
Install CTOS/Vpc from the distribution diskettes	**Installation Manager**	See Section 2 in this manual.
Configure CTOS/Vpc	CTOS **Editor** command *Pc.sys*	See Section 3 in this manual for disk drives. See Section 5 for printers. See Section 7 for serial communications. See Section 10 for memory.
Configure MS-DOS	MS-DOS **edit** command CONFIG.SYS AUTOEXEC.BAT	See Section 4 in this manual for mouse. See Section 8 for CD-ROM See Section 9 for disk caching. See Section 10 for memory.
Start and run CTOS/Vpc	CTOS **Vpc** command	See Section 2.
Install MS-DOS and DOS applications		See the *MS-DOS User's Guide*
Install Windows and Windows applications		See the *Microsoft Windows User's Guide*

Section 2
Installing, Configuring, and Using CTOS/Vpc

This section describes what you need to do to install and configure CTOS/Vpc.

Read the *CTOS/Vpc Product Family Software Release Announcement* for memory and disk space requirements and restrictions.

Before You Start

You should set up your CTOS workstation environment before you install CTOS/Vpc. For example, you should install

- Workstation hardware and any required peripheral devices, such as a mouse, CD-ROM drives, and printers
- The CTOS operating system and system software
- The CTOS Generic Print System (GPS), if you want to use CTOS print services
- The CTOS Standard Software DOS Utilities package
- The CTOS mouse service (if you are using a mouse)
- The CTOS CD-ROM service (if you want to use a CD-ROM drive)
- Context Manager or Presentation Manager (if you intend to use one of those environments)
- Keyboard decals; these are provided with CTOS/Vpc to help you quickly locate PC key equivalents on a CTOS-style keyboard. (Installation instructions are provided with the decals.)

CTOS installation of the mouse service and the CD-ROM service are described in Sections 4 and 8, respectively. For instructions on Context Manager or Presentation Manager see the documentation for those products.

Have You Partitioned Your Hard Disk?

If you intend to use a hard disk with a native DOS partition (supported only on EISA/ISA workstations), you must partition the disk before installing CTOS/Vpc. See "CTOS/Vpc and Disk Storage," in Section 1, if you do not understand what a disk partition is. See the *CTOS Executive Reference Manual* for information on using the **Format Disk** command to partition a disk.

What You Need To Do

To install and use CTOS/Vpc, you must complete the following steps, which are each explained in more detail later in this section.

1. If you are using a native DOS partition or a DOS hard disk as drive C, prepare it for CTOS/Vpc.
2. If you are using an existing pseudovolume as drive C, prepare it for CTOS/Vpc.
3. Install the CTOS/Vpc Software package on the workstation hard disk.
4. Install the CTOS/Vpc DOS Files package on the workstation hard disk.
5. Configure the *Pc.sys* file.
6. Start a CTOS/Vpc session.
7. If you installed the pseudovolume shipped with CTOS/Vpc, install MS-DOS.
8. Configure the MS-DOS environment, using the AUTOEXEC.BAT and CONFIG.SYS files.
9. Reboot MS-DOS.
10. If you want to use Windows applications, install Windows, and run the WINSTALL batch file from the *\VPC* directory.
11. Install applications.

Preparing a Native DOS Partition or DOS Hard Disk for CTOS/Vpc

If you choose to use a native partition or native device to install CTOS/Vpc successfully, you must prepare the DOS partition or DOS hard disk that you use for drive C by formatting it, installing MS-DOS, and creating a *\VPC* directory on it.

To prepare your native DOS partition or DOS hard disk for CTOS/Vpc,

1. With your workstation turned off, insert the first diskette of the MS-DOS installation diskettes in your workstation's first floppy drive (*[F0]*).
2. Turn on the workstation to boot MS-DOS.
3. If the hard disk or native DOS partition has not been partitioned and formatted for DOS, the MS-DOS installation partitions and formats it before installing DOS. Respond to any prompts provided during this process.
4. When the MS-DOS installation is finished, reboot your workstation by pressing **CTRL+ALT+DEL**.
5. Create the C:\VPC directory on the disk or native DOS partition; to do this, type **md vpc** and press **RETURN**.

Your hard disk or native DOS partition is prepared for CTOS/Vpc; you can now install the CTOS/Vpc package on the workstation from the CTOS Executive.

Caution

Do not run the DOS **memmaker** command! **Memmaker** is not supported by CTOS/Vpc.

Also, avoid using the DoubleSpace (**dblspace**) disk compression feature because it slows down performance somewhat. If you do use DoubleSpace, make sure the *\VPC* directory is located on the *uncompressed* portion of the disk! (See your MS-DOS documentation for details.)

Preparing an Existing Pseudovolume for CTOS/Vpc

If you use an existing pseudovolume for drive C, make sure that it has a *\VPC* directory and that MS-DOS is installed.

To prepare an existing pseudovolume for CTOS/Vpc, choose one of the following:

- If you already have a version of Vpc installed with a pseudovolume, follow the steps below

  1. Configure your *Pc.sys* file so that the pseudovolume is used as drive C. (See Section 3 of this manual for details.)
  2. Start CTOS/Vpc.
  3. If CTOS/Vpc successfully boots MS-DOS, create the *\VPC* directory (make sure you are in the root directory; then type **md vpc** and press **RETURN**).
  4. If MS-DOS is not booted and you are prompted to insert a system disk, insert the first MS-DOS installation diskette and install MS-DOS before creating the *\VPC* directory.
  5. Finish from CTOS/Vpc and install CTOS/Vpc as described under "Installing CTOS/Vpc on the Workstation," later in this section.

- If you don't have any version of CTOS/Vpc installed, but you are trying to use an existing pseudovolume you copied from another workstation, follow the steps below

  1. Install CTOS/Vpc as described below under "Installing CTOS/Vpc on the Workstation," but *do not* install the DOS Files package.
  2. Configure the *Pc.sys* file so that the pseudovolume is used as drive C (see Section 3 of this manual).
  3. Start CTOS/Vpc.
  4. If CTOS/Vpc successfully boots MS-DOS, create the *\VPC* directory (type **md vpc** and press **RETURN**).

5. If MS-DOS is not booted and you are prompted to insert a system disk, insert the first MS-DOS installation diskette and install MS-DOS before creating the *\VPC* directory.
6. Finish from CTOS/Vpc and install the DOS Files package as described under "Installing the DOS Files Package."

Installing CTOS/Vpc On the Workstation

The following instructions describe how to install CTOS/Vpc onto a hard disk that is located on the workstation where you are performing the installation procedure. If you want to install CTOS/Vpc onto a shared resource processor or as public software onto a server, see "Installing Public Software," later in this section.

The installation varies slightly depending on whether you are making a new installation of CTOS/Vpc or whether you are updating an existing version of CTOS/Vpc. Therefore, updates and new installations are described in separate procedures.

Updating an Existing Version of CTOS/Vpc

The following procedure installs CTOS/Vpc from floppy disks or server. It assumes that an earlier CTOS/Vpc version is or has been installed on your workstation.

1. Exit from Context Manager if Context Manager is running.
2. From the Executive, type **Installation Manager**; then press **GO**.
3. Select *Install new software*; then press **GO** to display the Install Media menu.
4. Select *Floppy installation* or *Install from server*; then, do one of the following:
   - If you selected *Floppy installation*, insert the diskette labelled "CTOS/Vpc Service;" then press **GO**
   - If you selected *Install from server*, press **GO** to display the list of publicly installed software. Select CTOS/Vpc; then press **GO**.

   The Installation Defaults menu appears.

5. Select *Continue Installation*; then press **GO**.
6. When prompted to add CTOS/Vpc to the Context Manager configuration file, choose one of the following:
   - If you want to run CTOS/Vpc from Context Manager, press **GO**
   - If you don't want to run CTOS/Vpc from Context Manager *or* if you don't want to modify your existing Context Manager configuration file press **N**; then press **GO**
7. When prompted for your signon user name, enter the name you normally use to sign on to your workstation; then press **GO**. (If you sign on simply by pressing **GO**, without using a signon name, leave this field blank; then press **GO** to continue.)
8. When prompted to install the DOS Files package, which contains special DOS drivers and other files that are required for certain applications, for example, running Windows, using CD-ROM drives, mouse, and so on, choose one of the following:
   - If you did prepare your pseudovolume as described earlier, press **Y**; then press **GO**
   - If you did not prepare your pseudovolume as described earlier, and, therefore, do not want to install the DOS Files package now, press **GO**. Complete the installation, go back and follow the instructions under preparing your pseudovolume; then install the DOS Files package separately as described earlier.
9. When prompted, insert the diskette containing the DOS Files package and press **GO**; then go to Step 6 under "Installing the DOS Files Package" to continue the installation.

Installing CTOS/Vpc New

The following procedure installs CTOS/Vpc from floppy disks or the server. It assumes that this is a new installation; that is, it assumes that CTOS/Vpc has not been installed previously on your workstation.

1. Exit from Context Manager if Context Manager is running.
2. From the Executive, type **Installation Manager**; then press **GO**.
3. Select *Install new software*; then press **GO** to display the Install Media menu.
4. Select *Floppy installation* or *Install from server*; then, do one of the following:
   - If you selected *Floppy installation*, insert the diskette labelled "CTOS/Vpc Service," then press **GO**.
   - If you selected *Install from server*, press **GO** to display the list of publicly installed software. Select CTOS/Vpc; then press **GO**.

   The Installation Defaults menu appears.
5. Select *Continue Installation*; then press **GO**.
6. When prompted to add CTOS/Vpc to the Context Manager configuration file, choose one of the following:
   - If you want to run CTOS/Vpc from Context Manager, press **GO**.
   - If you don't want to run CTOS/Vpc from Context Manager *or* if you don't want to modify your existing Context Manager configuration file press **N**; then press **GO**.
7. When prompted for your signon user name, enter the name you normally use to sign on to your workstation; then press **GO**. (If you sign on simply by pressing **GO**, without using a signon name, leave this field blank; then press **GO** to continue.)

   The name specified here is used for your *Pc.sys* file and your pseudovolume, if you install a pseudovolume. For example, if you specify a signon user name as Moe, your *Pc.sys* file will be named *Moepc.sys* and your pseudovolume will be named *Moe.psv*.

   (If you don't specify a user name, your *Pc.sys* file will be named *Pc.sys* and your pseudovolume will be named *.psv*.)

8. When prompted to select either an expandable pseudovolume or a native DOS partition, choose one of the following:

   - If you want to use the pseudovolume shipped with CTOS/Vpc, press **GO**. This pseudovolume is already formatted for DOS and has the *\VPC* directory; the pseudovolume occupies less than 1M byte of disk space originally; then expands automatically as more disk space is required, up to a maximum size of 127M bytes.
   - If you want to use a native DOS partition or a DOS hard disk, use the cursor keys to select "Native DOS partition," then press **GO**. When prompted, enter the device name *in brackets*, for example, *[D0]*. You cannot choose this selection unless you have previously prepared your native DOS partition or DOS hard disk as described earlier in this section under "Preparing a Native DOS Partition or a DOS Hard Disk for CTOS/Vpc."

   Note: *During installation, you can select a drive for drive C only. If you want a second drive (drive D) you must edit the Pc.sys file later (see Section 3).*

9. When prompted to install the DOS Files package, which contains special DOS drivers and other files that are required for certain applications, for example, running Windows, using CD-ROM drives, mouse, and so on, choose one of the following:

   - If you are using a pseudovolume, or, if you are using a native DOS partition and followed the instructions under "Preparing a Native DOS Partition or a DOS Hard Disk for CTOS/Vpc" earlier, press **Y**; then press **GO**, to install the DOS Files package and go on to Step 10.
   - If you do not want to install the DOS Files package, press **GO**. If you choose not to install the package, the CTOS/Vpc installation is complete; press **FINISH** when prompted; then configure your *Pc.sys* file as described under "Configuring the *Pc.sys* File."

10. When prompted, insert the diskette containing the DOS Files package and press **GO**; then go to Step 6 under "Installing the DOS Files Package" to continue the installation.

Installing the DOS Files Package

The following instructions describe installing the DOS Files package onto a hard disk located on the workstation where you are performing the installation. To install CTOS/Vpc onto a shared resource processor or as public software, see "Installing Public Software," later in this section.

To install the DOS Files package from floppy disks or server,

1. Exit from Context Manager if Context Manager is running.
2. From the Executive, type **Installation Manager**; then press **GO**.
3. Select *Install new software*; then press **GO** to display the Install Media menu.
4. Select *Floppy installation* or *Install from server*; then, do one of the following:
   - If you selected *Floppy installation*, insert the diskette labelled "DOS Files," then press **GO**.
   - If you selected *Install from server*, press **GO** to display the list of publicly installed software. Select DOS Files; then press **GO**.

   The Installation Defaults menu appears.
5. Select *Continue Installation*; then press **GO**.
6. When prompted to continue the installation only if the CTOS Standard Software DOS Utilities package is installed, choose one of the following:
   - If you are sure that the CTOS Standard Software DOS Utilities package is installed, press **GO** to continue the installation.
   - If the CTOS DOS Utilities package is *not* installed, or if you are unsure whether it is, press **N**; then press **GO** to exit.

     Install the CTOS DOS Utilities package (see the *CTOS System Software Installation Guide*) or use the **Installation Manager** command to determine whether the package is installed.

     To resume installing the DOS Files package, insert the DOS Files diskette into your floppy drive and use the **Installation Manager** command to install the package.

7. If prompted about whether the *\VPC* directory exists, choose one of the following:

   - If your existing pseudovolume, native DOS partition, or DOS hard disk has the *\VPC* directory, or if you installed the pseudovolume provided with CTOS/Vpc, press **GO**.
   - If your existing pseudovolume, native DOS partition, or DOS hard disk *does not* have the *\VPC* directory, press **N**; then press **GO** to exit.

     Create the *\VPC* directory as described earlier in this section under "Preparing a Native DOS Partition or DOS Hard Disk for CTOS/Vpc," or "Preparing an Existing Pseudovolume for CTOS/Vpc," then restart the installation of the DOS Files package.

8. If prompted to enter the pseudovolume name or the device name of the native DOS partition or DOS hard disk that you want to use as drive C, choose one of the following:

   - If you want to use a pseudovolume, enter the *full name* of that pseudovolume, including path and *.psv* suffix. For example, *[D1]<Sys>Spleef.psv*. If you don't give the full name, the DOS files will not be installed.
   - If you want to use a CTOS hard drive that has a native DOS partition enter the CTOS device name for the drive (see the *CTOS System Administration Guide* for information about device names).
   - If you want to use a DOS hard drive enter the CTOS device name for the drive. (The device name depends on the physical location of the drive in the workstation; it doesn't matter whether the drive is partitioned entirely for CTOS, for CTOS and DOS, or for DOS only.)

   After you enter your pseudovolume or device name, press **GO**.

9. If prompted to enter the device or volume password, choose one of the following:

   - For a DOS hard disk, you *must* enter its device name in this field. For example, if the DOS hard disk is *[D1]*, enter *D1* in this field.
   - For a pseudovolume or native DOS partition, you *may* (if you want to) enter the CTOS volume password, if the CTOS hard drive containing the pseudovolume or native DOS partition uses passwording.

     Normally, you give the CTOS volume password when you sign on to your workstation. (You can also give the volume password using the CTOS **Path** command.) However, because the password must be in effect before CTOS/Vpc can start, CTOS/Vpc lets you provide the password in the *Pc.sys* file as a convenience.

10. After you enter the device or volume password, press **GO** to copy the DOS files to your pseudovolume, native DOS partition, or DOS hard disk.
11. During the file copying process, you *may* be prompted to install the ATI drivers. Most workstations do not require these drivers; see the *CTOS / Vpc Product Family Software Release Announcement* to determine whether your workstation requires these drivers.
12. When the installation is complete, press **FINISH** to exit from the **Installation Manager**.

After you install CTOS/Vpc and the DOS Files package, you need to configure your *Pc.sys* file (see below under "Configuring the *Pc.sys* file").

Installing CTOS/Vpc Publicly Onto a Server

To make CTOS/Vpc available to client workstations for installation from the server, or to install CTOS/Vpc onto a shared resource processor, you need to perform a *public* installation onto the server.

To perform a public software installation, follow these steps:

1. From the Executive, type **Installation Manager**; then press **GO**.
2. Select *Install new software*; then press **GO** to display the Install Media menu.
3. Select *Floppy installation*; then insert the CTOS/Vpc diskette, and press **GO**.

   The Installation Defaults menu appears.
4. When the Installation Defaults menu appears, select *Examine / Change Defaults*; then press **GO**.
5. Type **Y** to set the Public option to Yes; then press **GO**.

   You may be prompted to supply the following information:

   - Software destination
   - Password
   - User name
   - Context Manager configuration file
   - Command file
6. Press **GO** to accept the default, as each field is displayed, or make changes as required. See the *CTOS Executive Reference Manual* for detailed information about each field.
7. Follow any additional instructions as they appear on the screen. For additional information, refer to the appropriate installation procedures earlier in this section.

   You are informed when the installation is complete.
8. Press **FINISH** to return to the Executive command line, and remove the CTOS/Vpc diskettes.

Configuring the Pc.sys File

The default *Pc.sys* file provides a working configuration for CTOS/Vpc. However, if you want to use GPS printers, XMS or EMS memory, serial communications, a second floppy or a second hard drive, you must edit the *Pc.sys* file to configure CTOS/Vpc. Most users start CTOS/Vpc and install MS-DOS and Windows before configuring *Pc.sys*. If you are familiar with CTOS/Vpc configuration, you can edit the *Pc.sys* file now, if you want to. Otherwise, go on to "Starting a CTOS/Vpc Session," below.

To edit the *Pc.sys* file,

1. Path to *[Sys]<Sys>*.
2. From the Executive, type **Editor**; then press **RETURN**.
3. In the "File name(s)" field, type *Yourpc*.**sys** (replace *Yourpc.sys* with the name of your own *Pc.sys* file); then press **GO.**
4. Edit the *Pc.sys* file as desired; then press **FINISH** to exit.

Where to Find More Configuration Information

For information on configuring *Pc.sys* for

- Printers, see Section 5
- Additional floppy or hard drives, see Section 3
- XMS or EMS memory, see Section 10
- Serial communications, see Section 7

Starting a CTOS/Vpc Session

If MS-DOS is not yet installed, insert the first MS-DOS diskette into CTOS floppy drive *[F0]*. (If you are using a drive other than *[F0]* for drive A, you must first reconfigure the *Pc.sys* file: see Section 3.)

Start a CTOS/Vpc session from the Executive command line by typing **Vpc**; then pressing **GO**. To start a CTOS/Vpc session from Context Manager or from Presentation Manager, see the documentation for those products.

Installing MS-DOS

If you use the pseudovolume shipped with CTOS/Vpc as drive C, you must install MS-DOS on it. To install MS-DOS, insert the first MS-DOS diskette into the floppy drive used for DOS drive A; then start CTOS/Vpc and follow the installation instructions as they appear on screen.

Caution

After the installation is completed, do not run the DOS **memmaker** command! **Memmaker** is not supported by CTOS/Vpc.

Also, avoid using the DoubleSpace (**dblspace**) or other disk compression programs because they slow down performance somewhat. If you do use disk compression, you cannot use the CTOS **MSDOS Read**, **MSDOS Write**, or **MSDOS Directory** commands.

Configuring MS-DOS

After installing MS-DOS, configure the DOS environment. At the very least, make sure the following lines appear in your CONFIG.SYS file:

```
DEVICE=C:\VPC\HIMEM.SYS

DOS=HIGH,UMB
```

Make sure the following line appears in your AUTOEXEC.BAT file:

```
C:\VPC\DPMIHOST.COM
```

See your MS-DOS documentation for instructions on editing the AUTOEXEC.BAT and CONFIG.SYS files.

You also need to configure MS-DOS if you want to use a mouse, XMS or EMS memory, or CD-ROM drives. For information on configuring for

- Mouse, see Section 4
- CD-ROM drives, see Section 8
- EMS or XMS memory, see Section 10

Installing, Starting, and Using Windows

Make sure you install the special Unisys version of Windows designed for CTOS/Vpc. Off-the-shelf Windows versions are not supported by CTOS/Vpc. (Instructions for installing Windows from floppy disk to your hard disk are provided in your Windows manual under the section on setting up Windows.)

When you start Windows, you must use the following command:

```
win /s
```

This starts Windows in standard mode. If you try to start Windows using the **win** command without the **/s** switch, Windows may attempt to start in enhanced mode (Windows won't run in enhanced mode under CTOS/Vpc).

Also, if you spend much time using Windows applications, you should use the SmartDrive disk caching provided by MS-DOS and by Windows (see Section 9 for more information).

Running the WINSTALL Batch File

After you install Windows, you should run the WINSTALL batch file. This batch file copies important drivers to the Windows directory.

To run the batch file,

1. Change to the /VPC directory.
2. Type **winstall**; then press **ENTER** to run the batch file. Respond to any prompts that are displayed. (Type all lowercase or all uppercase characters, and do *not* add the **.bat** file extension.)

Installing Applications

To install DOS- or Windows-based applications, follow the instructions provided by the applications.

Section 3
Working With Hard Drives and Floppy Drives

This section primarily describes how to configure CTOS/Vpc to support hard drives and floppy drives. However, it also describes how to work with pseudovolumes (creating, resizing, and copying as well), and also describes drive letter issues that arise if you split a DOS partition into a primary and an extended partition with logical drives.

What You Need to Do

To use hard drives and floppy drives with CTOS/Vpc, you must complete the following steps:

1. Configure the *Pc.sys* file to map CTOS drives to DOS drives. (This step may or may not be required, depending on your installation.)

   You must map CTOS floppy drives to DOS drive A or B; you must map a pseudovolume, native DOS partition, or DOS hard disk to DOS drive C or D.

2. If you are using a DOS hard disk with no CTOS partition, you must supply a device password, for example, *D0*, in the *Pc.sys* file. You may supply a volume password instead if you use CTOS passwording on a disk that contains a pseudovolume or native DOS partition.

3. If you want to provide a DOS drive (C or D) on the server to be shared by multiple users, make that drive read-only. Also, if you want to use the same DOS drive (C or D) in multiple CTOS/Vpc sessions, make that drive read-only.

4. If you are using a hard disk with a native DOS partition as DOS drive C, install MS-DOS, if you haven't already done so. In addition to installing DOS, the MS-DOS installation automatically runs the DOS **fdisk** and **format** commands on the hard disk if the hard disk hasn't yet been partitioned and formatted by DOS.

   If you are using a hard disk with a native DOS partition as DOS drive D, you must run the DOS **fdisk** and **format** commands yourself on the hard disk if the hard disk hasn't yet been partitioned and formatted for DOS.

These steps are described in more detail later in this section.

Mapping CTOS Drives to DOS Drives

During installation, CTOS/Vpc is configured to support a single floppy drive (DOS drive A) and a single hard drive (DOS drive C). During the installation, you specify the pseudovolume, native DOS partition, or DOS hard disk that is to be used as DOS Drive C: the CTOS floppy drive *[F0]* is automatically assigned for use as DOS drive A.

Note: *This section assumes that you know about CTOS drive device names. If you are unfamiliar with CTOS hard or floppy drive device names, see the* CTOS System Administration Guide.

In most cases, no additional configuration of the *Pc.sys* file is required; you don't need to do anything else in order to use hard drives and floppy drives. Additional configuration is required *only* if

- You are using a diskless workstation
- You want to use a floppy drive other than *[F0]* for DOS drive A
- You want to use a second floppy drive (DOS drive B)
- You want to use a pseudovolume, native DOS partition, or DOS hard disk for drive C other than the one selected during installation
- You want to use a second pseudovolume, native DOS partition, or DOS hard disk for DOS drive D

Information on configuring your system for each of these cases is provided in the following pages.

Configuring the Pc.sys File for Floppy Drives

To assign a CTOS floppy drive to DOS drive A or B, change the *:DriveA:* or *:DriveB:* lines in the *Pc.sys* file by including the desired floppy device name in brackets (see Table 3-1).

Table 3-1. Configuring Pc.sys For Floppy Drives

Workstation Type	Required Entry* in Pc.sys File
For floppy drive A:	
Workstation	:DriveA:[Fn]
Diskless Workstation**	:DriveA:
Server Workstation	Not Supported
For floppy drive B:	
Workstation	:DriveB:[Fn]
Diskless Workstation	:DriveB:
Server Workstation	Not Supported

*Replace Fn with the appropriate CTOS floppy device name.

For example, if you want to use the CTOS floppy drive *[F1]* as drive A, change the *:DriveA:* line to read as follows:

```
:DriveA:[F1]
```

Note: *Before adding support for drive B, make sure that a CTOS floppy drive is already assigned to drive A. A configuration that has drive B but no drive A is invalid.*

Caution

Do not assign the same CTOS floppy drive to drive A and to drive B. For example, the following configuration is invalid:

:DriveA:[F0]
:DriveB:[F0]

Configuring the Pc.sys File for Hard Drives

Note: *Drive C must be bootable (that is, it must have MS-DOS installed) unless you plan to boot from a floppy disk.*

During installation, the *Pc.sys* file is configured to support the pseudovolume, native DOS partition, or DOS hard disk that you specify as drive C. If you want to change this, or if you want to specify another pseudovolume, native DOS partition, or DOS hard disk as drive D, you must reconfigure the *Pc.sys* file.

Using a Pseudovolume

To assign a pseudovolume to DOS drive C or D, change the *:DriveC:* or *:DriveD:* lines in the *Pc.sys* file by including the path and name of the desired pseudovolume (see Table 3-2).

Table 3-2. Configuring Pc.sys For Pseudovolumes

Location of Pseudovolume	Required Entry* in Pc.sys File
If the pseudovolume is drive C:	
Workstation	:DriveC:[Dn]<DirectoryName>Psvname.psv
Server Workstation	:DriveC:[!Dn]<DirectoryName>Psvname.psv
Remote Node	:DriveC:{NodeName}[Dn]<DirectoryName>Psvname.psv
If the pseudovolume is drive D:	
Workstation	:DriveD:[Dn]<DirectoryName>Psvname.psv
Server Workstation	:DriveD:[!Dn]<DirectoryName>Psvname.psv
Remote Node	:DriveD:{NodeName}[Dn]<DirectoryName>Psvname.psv

*Replace NodeName, Dn, DirectoryName, and Psvname.psv with the appropriate node, device, directory, and pseudovolume names.

For example, if you want to use *Joseph.psv* on the *[Sys]* volume in the *<Sys>* directory, change the *:DriveC:* line to read as follows:

```
:DriveC:[Sys]<Sys>Joseph.psv
```

Using a Native DOS Partition

To assign a native DOS partition to DOS drive C or D, change the *:DriveC:* or *:DriveD:* lines in the *Pc.sys* file by including the CTOS drive device name in brackets (see Table 3-3). DOS automatically locates the DOS partition on it.

Table 3-3. Configuring Pc.sys For Native DOS Partitions

Location of Native DOS Partition	Required Entry* in Pc.sys File
If native DOS partition is drive C:	
Workstation**	:DriveC:[Dn]
Server Workstation**	:DriveC:[!Dn]
Remote Node**	:DriveC:{NodeName}[Dn]
If native DOS partition is drive D:	
Workstation	:DriveD:[Dn]
Server Workstation**	:DriveD:[!Dn]
Remote Node**	:DriveD:{NodeName}[Dn]

*Replace NodeName and Dn with the appropriate node and device names.

**Native DOS partitions can be used only on EISA/ISA workstations.

For example, if the CTOS device name for the disk is *[D1]*, change the *:DriveC:* line to read as follows:

```
:DriveC:[D1]
```

Note: *The CTOS device name is derived from the physical location of the hard disk; the device name is not affected by the way the disk is partitioned (CTOS-only, DOS-only, or split between CTOS and DOS).*

Using a DOS Hard Disk

To assign a DOS hard disk to DOS drive C or D, change the *:DriveC:* or *:DriveD:* lines in the *Pc.sys* file by including the CTOS drive device name in brackets (see Table 3-4).

Table 3-4. Configuring Pc.sys For DOS Hard Disks

Location of DOS Hard Disk	Required Entries* in Pc.sys File
If DOS hard disk is drive C:	
Workstation**	:DriveC:[Dn] :DriveCPassword:Dn
Server Workstation**	:DriveC:[!Dn] :DriveCPassword:Dn
Remote Node**	:DriveC:{NodeName}[Dn] :DriveCPassword:Dn
If DOS hard disk is drive D:	
Workstation	:DriveD:[Dn] :DriveDPassword:Dn
Server Workstation**	:DriveD:[!Dn] :DriveDPassword:Dn
Remote Node**	:DriveD:{NodeName}[Dn] :DriveDPassword:Dn

*Replace NodeName and Dn with the appropriate node and device names.

**DOS hard disks can be used only on EISA/ISA-bus workstations.

For example, if the CTOS device name for the disk is *[D1]*, and the disk is located at node *{Bungie}*, change the *:DriveC:* and *:DriveCPassword:* lines to read as follows:

```
:DriveC:{Bungie}[D1]

:DriveCPassword:D1
```

Using CTOS Passwording

If CTOS passwording is used on a CTOS hard disk that has either a pseudovolume or a DOS partition, *the volume password must be in effect before you start CTOS/Vpc.*

Normally, you supply the CTOS volume password when signing on to the workstation. You can also supply the volume password using the **Path** command from the CTOS Executive. If you don't want to use either of these methods of supplying the CTOS volume password, CTOS/Vpc allows you to supply the password in the *Pc.sys* file.

Note: *For more information about CTOS passwording, see the* CTOS System Administration Guide.

Supplying a Password for the Disk Used for Drive C

To supply the CTOS volume password for the CTOS disk that contains the pseudovolume or native DOS partition, change the *:DriveCPassword:* line to include your volume password. For example,

```
:DriveCPassword:YourVolumePasswordHere
```

Supplying a Password for the Disk Used for Drive D

To supply the CTOS volume password for the CTOS disk that contains the pseudovolume or native DOS partition, change the *:DriveDPassword:* line to include your volume password. For example,

```
:DriveDPassword:YourVolumePasswordHere
```

Making a Drive Read-Only

Making a drive read-only means that you (or other users) can access a drive to read files only; you cannot write to the drive or modify files on the drive.

Normally, you make a drive on the server workstation to be read-only if the drive is used simultaneously by multiple users.

You must also make a drive read-only if you want to access a single drive (pseudovolume, native DOS partition, or DOS hard disk) from multiple CTOS/Vpc sessions on your workstation.

Note: *If you make a drive read-only, that drive is read-only for* all *users or CTOS/Vpc sessions. You cannot make a drive read-only selectively for some users or CTOS/Vpc sessions.*

To make drive C read only, edit the *Pc.sys* file so that the read-only line is as follows:

```
:DriveCReadOnly?:Yes
```

To make drive D read only, edit the *Pc.sys* file so that the read-only line is as follows:

```
:DriveDReadOnly?:Yes
```

Working With Pseudovolumes

In addition to the pseudovolume shipped with CTOS/Vpc, CTOS/Vpc provides commands that allow you to create your own pseudovolume (for example, drive D) or resize an existing pseudovolume. This subsection describes creating and resizing pseudovolumes and how to migrate to a large pseudovolume.

Creating Pseudovolumes

If you want to create a pseudovolume, you can

- Create a dynamically expandable pseudovolume (large or small)
- Create a fixed-size pseudovolume (large or small)

Small and Large Dynamically Expandable Pseudovolumes

A dynamically expandable pseudovolume is less than 1M byte large when it is created, then automatically expands whenever more space is required. A *small* dynamically expandable pseudovolume is one that has a maximum size of 30M byes; a *large* dynamically expandable pseudovolume is one that has a maximum size of 127M bytes.

You specify the maximum size of the dynamically expandable pseudovolume in the *Pc.sys* file during the creation of the pseudovolume (this is described later).

Note: *A pseudovolume that was created with a maximum size of 30M bytes cannot be resized later to a size greater than 30M bytes.*

Small and Large Fixed-Size Pseudovolumes

A fixed-size pseudovolume is one that is fixed in size: it does not expand automatically. (You can increase the size later on by using the CTOS **Size PSV** command.) A *small* fixed-size pseudovolume is one that is originally created to be 30M bytes or less, using the CTOS **Size PSV** command; a *large* fixed-size pseudovolume is one that is originally created to be *greater* than 30M bytes, using the CTOS **Size PSV** command.

Note: *A pseudovolume that was created with a size less than 30M bytes cannot be resized later to a size greater than 30M bytes.*

Creating a Dynamically Expandable Pseudovolume

There are several ways to create a dynamically expandable pseudovolume, depending on your configuration. The following instructions describe only one of the methods you could use; however, the method described will work for any configuration you might have.

Note: *If you need or want to use disk compression software such as the DoubleSpace program provided by MS-DOS, you cannot use a dynamically expandable pseudovolume.*

To create a dynamically expandable pseudovolume,

1. If you are creating a pseudovolume for use as drive C, create a bootable MS-DOS diskette that has the **fdisk** and **format** commands. To do this,

   a. Insert a floppy disk in drive A, and enter the command **sys a:** to make the diskette bootable.

   b. Copy the DOS files FDISK.EXE and FORMAT.EXE to the diskette.

2. Make sure CTOS/Vpc is installed and configured on your system.

3. Use the CTOS **Editor** command to edit your *Pc.sys* file and change the *:DriveC:* line if you are creating drive C (or the *:DriveD:* line if you are creating drive D). Make the following changes in the *Pc.sys* file:

   ```
   :DriveC:[Volume]<Directory>YourNew.psv
   ```

   Replace *Volume* and *Directory* with the desired CTOS volume and directory names. Replace *YourNew* with the name you want to give your new pseudovolume. (Make sure you don't use the name of an existing pseudovolume, otherwise you may overwrite that existing pseudovolume.)

4. Decide on a maximum size for your pseudovolume: you can choose either a 30M byte or a 127M byte size maximum:

   a. If you want a maximum size of 127M bytes, proceed to the next step. (The 127M byte size maximum is the default; you don't have to change the configuration of the *Pc.sys* file.)

   b. If you want a maximum size of 30M bytes, use the CTOS **Editor** command to change the :CreateLargePsv?: line to the following:

      ```
      :CreateLargePSV?:No
      ```

      Remember that any pseudovolume that is created with a maximum size of 30M bytes cannot be increased later to a larger size.

5. Make sure your workstation is booted and is running the environment (Executive, Context Manager, Presentation Manager) from which you normally start CTOS/Vpc.

6. If you are creating a pseudovolume to be used as drive C, insert the bootable floppy disk created in Step 1 into drive A. Otherwise, continue on to the next step.

7. Start CTOS/Vpc.

8. After MS-DOS is booted, the DOS prompt appears. At the prompt, type **fdisk**, and press **RETURN**.

9. If you are creating drive D, select option **5** to change the current fixed disk drive, then type **2** to change the current drive to drive D.

10. From the main **fdisk** menu, select option **1** to create a DOS partition. From the submenu, select option **1** to create a primary DOS partition.

11. Type **Y** to use the maximum available size for a primary DOS partition, and make the partition active. (If you are using **fdisk** to partition drive D, you cannot make any partition active.)

12. Exit **fdisk**. (MS-DOS reboots automatically, so if you are creating drive C make sure the boot diskette is still inserted in drive A.)

13. When the DOS prompt appears, you must format your new pseudovolume.

    a. If you are creating drive C, give the command **format c: /s** to format the pseudovolume and make it bootable.

    b. If you are creating drive D, type **format d:** to format the pseudovolume.

14. Press **ENTER**. The following message appears:

```
WARNING, ALL DATA ON NON-REMOVABLE
DISK DRIVE C: WILL BE LOST!
Proceed with Format (Y/N)
```

    The **format** command operates entirely within the pseudovolume file, so this message applies to the pseudovolume only, not to the CTOS hard disk. (You won't destroy any CTOS data on the CTOS volume.)

15. Type **Y**. Then press **ENTER** to begin formatting.

    Formatting a pseudovolume takes only a few seconds. You are informed when formatting is complete.

16. If you are creating drive C, install MS-DOS now.

17. Install any other PC applications you want.

Creating a Fixed-Size Pseudovolume Using Size PSV

You can use the CTOS **Size PSV** command to create a new pseudovolume that has a fixed size.

To create a new pseudovolume,

1. If you are creating a pseudovolume for use as drive C, create a bootable MS-DOS diskette that has the **fdisk** and **format** commands. To do this,

    a.. Insert a floppy disk in drive A, then enter the command **sys a:** to make the diskette bootable.

    b. Copy the DOS files FDISK.EXE and FORMAT.EXE to the diskette.

2. From the Executive command line, type **Size PSV**, then press **RETURN** to display the following command form.

```
Size PSV
 Psv File Name                 _____________________________
 New Size (in Megabytes)       _____________________________
```

3. Fill in the **Size PSV** command form to provide pseudovolume name and size. Command form parameter fields are described below:

   Psv File Name. In this field, enter the path and file name for the new pseudovolume. (The file name must have a *.psv* extension.) For example, *[D1]<Sys>Joseph.psv.*

   New Size. In this field, enter any integer number from 1 to 127 (this specifies the size in megabytes). If you create a pseudovolume that is less than 30M bytes using the **Size PSV** command, the pseudovolume cannot be resized later on to a size greater than 30M bytes.

4. Press **GO.**

5. Assign the new pseudovolume as drive C or drive D by modifying the appropriate line in the *Pc.sys* file.

6. If the new pseudovolume is drive C, insert the bootable MS-DOS diskette in drive A and start the CTOS/Vpc session. Then install MS-DOS and any other PC application software.

7. If the new pseudovolume is drive D, don't install MS-DOS.

The size of the new pseudovolume equals the size specified in the *New Size* field. The pseudovolume is already formatted.

Resizing a Pseudovolume With the Size PSV Command

You can change the size of an existing pseudovolume. The maximum size of the resized pseudovolume depends on the original method of creation. Table 3-5 shows the maximums of each pseudovolume type.

Table 3-5. Resizing Pseudovolumes: Size Limitations

Originally Created As	Original Size/ Max Size (M Bytes)	Maximum Size Using Size PSV (M Bytes)
Large Dynamic Expandable (:CreateLargePsv?:Yes)	127	127
Small Dynamic Expandable (:CreateLargePsv?:No)	30	30
Size PSV	Between 0 and 30	30
Size PSV	Between 31 and 127	127

To increase the size of a pseudovolume,

1. Use the Executive **Volume Status** command to find out how much disk space is available on the CTOS volume where the pseudovolume is located. See the *CTOS Executive User's Guide* if you are not familiar with that command.
2. From the Executive command line, type **Size PSV**; then press **RETURN** to display the following command form.

```
Size PSV
 Psv File Name                _____________________________
 New Size (in Megabytes)      _____________________________
```

3. Fill in the **Size PSV** command form to provide pseudovolume name and size. Command form parameter fields are described below:

   Psv File Name. In this field, enter the path and file name of the pseudovolume that you want to resize. For example, *[D1]<Sys>Kristi.psv.*

   New Size. In this field, enter any integer number from 1 to 127 (this specifies the size in megabytes). If the pseudovolume is less than 30M bytes in size, the pseudovolume can have a maximum size of 30M bytes. If the pseudovolume is greater than 30M bytes in size, the pseudovolume can have a maximum size of 127M bytes.

4. Press **GO**.

You can also use the **Size PSV** command to decrease the size of a pseudovolume, as long as the pseudovolume space you want to eliminate contains no data. (The **Size PSV** command won't let you destroy data during the size decrease process.)

The only way to determine whether the pseudovolume space you want to eliminate contains data is to execute the **Size PSV** command. The following message is displayed if the pseudovolume cannot be decreased to the size you specify:

```
The PSV has used data beyond the requested size.  The PSV will
not be changed.
```

Migrating to a Large Pseudovolume

If you have a bootable pseudovolume from an earlier release of CTOS/Vpc, it may be a small pseudovolume that cannot be resized to a size greater than 30M bytes. Therefore, to migrate the contents of your small pseudovolume to a large bootable pseudovolume (a pseudovolume that is 31M bytes or greater) you must use the following procedure:

1. If you haven't already done so, create a large bootable pseudovolume as described above under "Creating a Dynamically Expandable Pseudovolume" or "Creating a Fixed-Size Pseudovolume Using Size PSV." These instructions assume that you have already created the large pseudovolume and have made it bootable by installing MS-DOS on it.
2. In the *Pc.sys* file, assign the small pseudovolume as drive C and the large pseudovolume as drive D. (Drive C, the small pseudovolume, must be bootable.)
3. Start a CTOS/Vpc session.
4. At the MS-DOS prompt, change to drive D (the large pseudovolume).
5. Type **chkdsk/f** and press **RETURN**.
6. If you have Windows,
   a. Start Windows and run File Manager.
   b. Make sure drive C is the current drive, then select Copy from the File menu.
   c. When the Copy menu appears, type **D:** in the *to:* field and click on the **OK** button. This will copy the entire contents of drive C, including all subdirectories, hidden files, and system files to drive D.

7. If you don't have Windows,

   a. Use the MS-DOS **xcopy** command to copy the entire small pseudovolume to the large pseudovolume as follows:

      ```
      XCOPY C:\  D:\  /S  /E
      ```

      This copies the entire contents of drive C, including all subdirectories, to drive D, *except for hidden files and system files*. (See your MS-DOS manual for more information about **xcopy**.)

   b. You probably don't have hidden files. However, if you have created files and assigned the hide attribute, you must clear the hide attribute before using XCOPY, then reset the attribute after the copying is finished. See your MS-DOS manual for more information about clearing and setting file attributes.

   c. To copy the system files to the large pseudovolume, give the following command:

      ```
      sys D:
      ```

8. Exit CTOS/Vpc

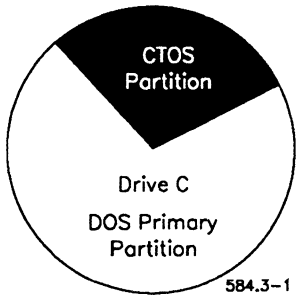
9. Edit the *Pc.sys* file so that the new, large pseudovolume is assigned to drive C and no drive is assigned to drive D.

10. You can now restart CTOS/Vpc and use the new, large pseudovolume with your original files and programs.

Splitting a DOS Partition Into Primary and Extended Partitions

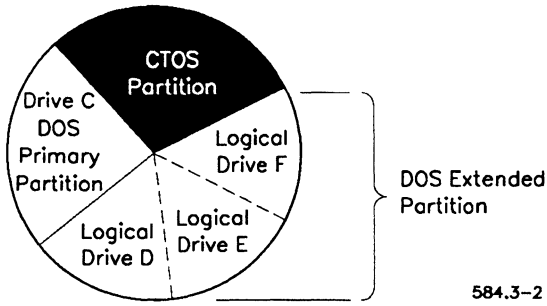
When you use the DOS **fdisk** command to create a DOS partition, you have the option of using the entire DOS partition as the primary partition (see Figure 3-1) or splitting the DOS partition into a primary partition and an extended partition (see Figure 3-2).

Figure 3-1. CTOS Hard Disk With Entire DOS Partition as Primary



As shown in Figure 3-2, the extended partition itself can be divided into several smaller logical drives. (It can also be a single logical drive.)

Figure 3-2. CTOS Hard Disk With Primary and Extended DOS Partitions



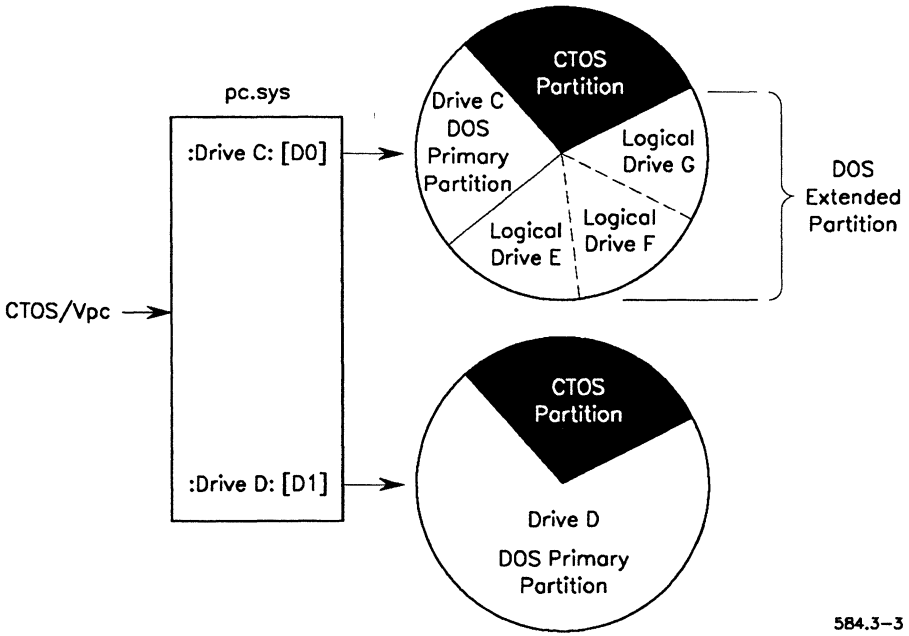
Logical Drives, Drive Letters and CTOS/Vpc

There is a difference between the DOS drive letters assigned to the primary and extended DOS partition and the drive letters you assign in the *Pc.sys* file of CTOS/Vpc. Under DOS, drive letters are assigned in sequence from the first primary partition.

In Figure 3-3, for example, the first primary partition is DOS drive C, and the second primary partition is DOS drive D. The first logical drive is drive E, the second logical drive is drive F, and the third logical drive is drive G.

CTOS/Vpc, however, can be configured only for drive letters C and D in the *Pc.sys* file. What happens in the case of our example where a single disk consists of several DOS drives? As shown in Figure 3-3, CTOS/Vpc handles the entire disk drive as *one drive*, drive C, even though DOS sees the disk as consisting of DOS drives C, E, F, and G.

Figure 3-3. CTOS/Vpc and Extended DOS Partition Drive Letters



Section 4
Setting Up and Using a Mouse

This section describes setting up the CTOS and DOS environments to provide mouse support for DOS applications.

What You Need to Do

To use a mouse in a CTOS/Vpc session, you must complete the following tasks:

1. Connect a mouse device to your CTOS workstation.
2. Install the CTOS mouse service.
3. Set up the system initialization file (*SysInit.jcl*) to load the mouse service automatically.
4. If you want to use a mouse in non-Windows applications, install the mouse driver in MS-DOS.
5. If you use Microsoft Windows, install a Windows mouse driver.

Each of these tasks is described below in more detail.

Connecting a Mouse Device

You must use a mouse that is designed to work with your CTOS workstation mouse port (on EISA/ISA workstations) or I-bus port (on B38/B39 workstations). You cannot use a serial mouse or a bus mouse, which is a mouse connected to an expansion card placed in the I/O bus of an EISA/ISA workstation.

On EISA/ISA workstations, the mouse must be connected to the mouse port. Do not attempt to connect a mouse to a serial port. Refer to your hardware documentation for information about the location of the mouse port.

For instructions on installing a mouse on your CTOS workstation, refer to your hardware documentation.

Installing the CTOS Mouse Service

The mouse service may already be installed in workstation memory. To determine whether the mouse service is installed, use the Executive **Partition Status** command to display the installed system services. If the mouse service is not installed, install it now using the **Install Mouse Service** command, then edit the *SysInit.jcl* file so that the mouse service is loaded automatically (see below).

Note: *If your attempt to use the* ***Install Mouse Service*** *command fails with the error message "No Such Command," you must install the mouse service on your workstation hard disk. To do this, see the* CTOS System Software Installation Guide.

Using the SysInit.jcl File to Load the Mouse Service Automatically

You should use the *SysInit.jcl* file to load the mouse service automatically. The *SysInit.jcl* file is a file whose contents are read and executed whenever a CTOS workstation is booted. This file is very useful for automatically loading into memory the system services that you use all the time, such as printing, mail, or mouse.

To use *SysInit.jcl* to load the mouse automatically, use the CTOS **Editor** command to edit your existing *SysInit.jcl* file or to create one if you don't have such a file (see the CTOS Executive Reference Manual for information on the **Editor**). The file must be located in the *[Sys]<Sys>* volume and directory.

Example 4-1 shows a sample *SysInit.jcl* file. Your file may vary, but it must start with *Job SysInit* and end with *End* as shown, and it must have the *MouseService.run* line if you want to load the mouse.

Example 4-1. Sample SysInit.jcl File That Loads the Mouse Service

```
Job SysInit
ContinueOnError
Run [Sys]<Sys>Xbif.run
Run [Sys]<Sys>InstallQMgr.run
Run [Sys]<Gps>GpsInstall.run
Run [Sys]<Sys>MailServer.run
Run [Sys]<Sys>ModemServer.run
Run [Sys]<Sys>InstallSeqService.run
Run [Sys]<Sys>CdRomService.run
Run [Sys]<Sys>MouseService.run
End
```

Installing the Mouse Driver in MS-DOS

You can use either of two different mouse drivers in CTOS/Vpc:

- The mouse driver included with your mouse
- The mouse driver included with CTOS/Vpc

If mouse driver software (DOS-based) is included with your mouse, or with your workstation, you should install that mouse driver in DOS because it provides the best performance for your particular workstation. DOS-based mouse driver software is available for most EISA/ISA workstations.

If you don't have any other mouse driver software, you can install the mouse driver that is included in the CTOS/Vpc DOS Files package.

Installing the Mouse Driver Included With Your Mouse

The DOS-based mouse driver software included with your mouse should contain a text file that contains instructions for installing the mouse driver. Follow those instructions to install the mouse driver.

If no such instructions are provided with your mouse driver software, add the following lines to the end of your AUTOEXEC.BAT file:

```
C:\YOURMOUSEDIRECTORY\YOURMOUSEDRIVER.COM
```

Replace *YourMouseDirectory* and *YourMouseDriver* with the directory where your mouse driver is installed and with the name of your mouse driver, respectively. (If you don't know how to edit the AUTOEXEC.BAT file, see your MS-DOS documentation for instructions.)

Installing the Mouse Driver Included With CTOS/Vpc

The mouse driver is installed on your hard disk when you install the CTOS/Vpc DOS Files package. The driver software is installed in the directory C:\VPC. (If you haven't installed the CTOS/Vpc DOS Files package, do so now, following the instructions provided in Section 2.)

To install the mouse driver in your MS-DOS environment, add the following lines to the end of your AUTOEXEC.BAT file:

```
C:\VPC\CMOUSE.COM
```

If you don't know how to edit the AUTOEXEC.BAT file, see your MS-DOS documentation for instructions.

Note: *To free up more conventional memory, you can load the mouse driver into the upper memory blocks by using the CONFIG.SYS file instead of the AUTOEXEC.BAT file. To do this, simply edit the CONFIG.SYS file following the above procedures, adding the following lines:*
device=c:\vpc\himem.sys
devicehigh=c:\vpc\cmouse.sys
(If you aren't using the CTOS/Vpc mouse driver, replace the last line with one that has the path and name of your mouse driver.)

Installing a Mouse in Windows

Mouse driver installation for Windows is normally performed during the installation of Windows. If you want to install or change mouse drivers after Windows is installed, you can use the Windows Setup program. See your Microsoft Windows documentation for information.

If you use a mouse driver installed in MS-DOS in addition to your Windows mouse driver, make sure you use the same mouse driver for both. For example, if you load the CMOUSE.COM (or CMOUSE.SYS) mouse driver shipped with CTOS/Vpc, you should use the Unisys mouse driver with Windows. Likewise, if you install the Microsoft mouse driver in MS-DOS, you should use the Microsoft mouse driver for Windows.

Section 5
Printing

This section describes how to configure CTOS/Vpc to support printing from applications running under MS-DOS, including Windows. It also describes how to change printer support during a CTOS/Vpc session.

What You Need to Do

To print from your application, you must

1. Make sure the printer you want to use is supported by your application or by Windows (if it is a Windows application).
2. Determine whether you want to print directly to a printer at your workstation using DOS printing or whether you want to take advantage of CTOS print services.
3. Make sure printers are connected properly.
4. If you decide to use CTOS print services, make sure the Generic Print System (GPS) is installed and configured.
5. Configure the *Pc.sys* file to support the printer you want to use.
6. Configure your application or Windows to support the printer.

Each of these tasks is described below in more detail.

Making Sure Your Printer is Supported

The printer you use must be supported by the PC application. (If you want to print from a Windows application, the printer must be supported by Windows.) If the printer is not supported by the PC application, you cannot use the printer.

To determine whether your application supports a particular printer, refer to your application documentation (or to your Windows documentation if the application is a Windows application).

Using DOS or CTOS Printing

CTOS/Vpc gives you the choice of using DOS printing or using CTOS print services to carry out your DOS print jobs. Because there is a performance versus features trade-off, you need to consider your choice carefully. Both DOS and CTOS printing are described below.

Using DOS Printing

If you configure the *Pc.sys* file to support DOS printing, CTOS/Vpc performs minimal processing of print jobs for DOS applications before sending print jobs to the printer attached to the client workstation parallel port. Using this type of printing eliminates the delays associated with using shared cluster resources and the CTOS Generic Print System (GPS).

Because CTOS/Vpc processing is kept to a minimum, DOS printing is the fastest way to print under CTOS/Vpc. Therefore, if fast performance is very important to you, you might want to use this method of printing under CTOS/Vpc.

There are, however, some drawbacks to using DOS printing. One of the main drawbacks is that other users cannot share the printer attached to your workstation. Moreover, features provided by GPS, such as print queuing or access to printers at remote nodes, are not available.

Note: *You cannot install GPS in workstation memory if you want to use DOS printing to print to a printer attached to that workstation. This means that no other users in the cluster can print to that printer. (However, your CTOS applications can still use GPS printers at other workstations.)*

Using CTOS Printing

If you configure the *Pc.sys* file to support CTOS printing, CTOS/Vpc forwards DOS print jobs to the Generic Print System (GPS). Print jobs are then sent to the GPS printer that you specify in the *Pc.sys* file.

The advantage of using CTOS printing is that you can use all of the features provided by GPS. For example, you can

- Share printers with other users
- Print to printers located at other workstations in the cluster
- Print to printers at remote nodes
- Use GPS print queuing to free your workstation from waiting on large print jobs

However, if you use CTOS printing, print jobs will take somewhat longer to complete.

A Note About Pre-GPS CTOS Printing: Spooling

Spooling is a method of CTOS printing that predates the GPS product. Although the use of GPS is highly recommended, you can use spooling with CTOS/Vpc if you need to. Instructions on configuring the *Pc.sys* file for spooling are provided later in this section.

Connecting Printers

If your printer is not yet connected to your workstation or cluster server, connect it now. See your workstation hardware documentation for information about connecting printers.

About Printer Cables

CTOS SuperGen workstations use standard PC-type printer cables. The B38, B39, and SG2100-320 do not.

> **Caution**
>
> B38, B39, and SG2100-320 workstations do not use PC-style printer cables. **Using a standard IBM PC printer cable on these workstations can cause serious damage to your printer.** Consult the *CTOS Generic Print System Administration Guide* before connecting a printer cable to these workstations.

Installing and Configuring GPS

If you are using CTOS printing through GPS, make sure GPS is properly installed and properly configured for the printer you want to use. See the *CTOS Generic Print System Administration Guide* for information.

Configuring the Pc.sys File for DOS Printing

If you want to use DOS printing to print directly to a printer that is connected to your workstation, you do not need to reconfigure the default *Pc.sys* file. By default, direct DOS printing is supported. Example 5-1 shows the default file with the printer configuration line in bold (*:LPT1:[lpt]*).

Example 5-1. Printer Configuration in the Default Pc.sys Configuration File

```
:DriveA:[F0]
:DriveB:
:DriveC:[Sys]<Sys>PsvName.psv
:DriveCReadOnly?:No
:DriveD:
:DriveDReadOnly?:
:LPT1:[lpt]
:COM1:[comm]b
:ExtendedMemory:64K
:GraphicsAdapter:vga
```

Configuring the Pc.sys File for CTOS Printing

If you want to use CTOS printing to take advantage of all of the features of GPS, you must change the *:LPT1:* line in the *Pc.sys* file: you must replace *[lpt]* with the name of the GPS printer you want to use. (Remember to put brackets around the printer name.)

For example, if you want to use the GPS printer *Rascal*, you must change the *:LPT1:* line as follows:

```
:LPT1:[Rascal]
```

To display the names of the CTOS printers currently available to you, use the **Print Manager** command.

Note: *The Print Manager command is part of the Generic Print System (GPS); you cannot use it unless GPS is installed on the cluster server.*

Configuring Pc.sys for CTOS Printing Using Spooler

If you must use CTOS spooling instead of GPS, change the *:LPT1:* line in the *Pc.sys* file to

```
:LPT1:{NodeName}[PrinterName]
```

Replace *NodeName* with the name of your cluster server; replace *PrinterName* with the name of the printer you want to use.

You should also add the following line to the *Pc.sys* file:

```
:AutomaticPrintFlush?:Yes
```

Reconfiguring the Pc.sys File During a CTOS/Vpc Session

If you want to temporarily change printers during a CTOS/Vpc session, you can use the CTOS/Vpc pop-up menu. Simply press **ACTION-M**, then select *Reconfigure Current Vpc Session* from the pop-up menu. Change the *:LPT1:* line as desired, following the instructions given above under "Configuring the *Pc.sys* File for DOS Printing," and "Configuring the *Pc.sys* File for CTOS Printing."

Using PC Network Printers

CTOS/Vpc allows you to access PC network printers if you use the CTOS LANce/pc and CTOS LANce/LM software products. See the *CTOS LANce/pc and LANce/LM Administration and Programming Guide* for more information.

Section 6
Working With Files in the CTOS/DOS Environment

This section describes how to transfer files between the CTOS and the MS-DOS environment and how to examine the contents of a DOS disk from CTOS using the **MSDOS Read**, **MSDOS Write**, and **MSDOS Directory** commands provided by the CTOS DOS package included in the CTOS Standard Software.

This section does not describe installing the Standard Software DOS package, it assumes that you have already installed the DOS package. (The DOS package must be installed in order to install CTOS/Vpc.) Moreover, this section does not describe MS-DOS or CTOS file naming conventions. For information on these conventions, see the MS-DOS documentation and the *CTOS Executive User's Guide.*

If you need more extensive CTOS/DOS file sharing than is provided by the CTOS DOS package, you should consider using the CTOS LANce/pc and CTOS LANce/LM software products. Among other functions, these products allow users on different workstations in a cluster to exchange DOS files.

Note: *If you use disk compression such as the MS-DOS* ***dblspace*** *(DoubleSpace) command, you cannot use the CTOS* ***MSDOS Read, MSDOS Write,*** *or* ***MSDOS Directory*** *commands. The MSDOS commands provided by the CTOS DOS package do NOT work on compressed DOS disks.*

What You Need to Do

To transfer files between CTOS and MS-DOS, you may need to use the **MSDOS Read**, the **MSDOS Write**, or the **MSDOS Directory** commands.

- The **MSDOS Read** command copies DOS files from a DOS disk to a CTOS disk
- The **MSDOS Write** command to copies CTOS files from a CTOS disk to a DOS disk
- The **MSDOS Directory** command examines the directories on a DOS disk from CTOS, similar to using the DOS **dir** command

Each of these commands is described below.

Using the MSDOS Read Command

The **MSDOS Read** command copies MSDOS files from a DOS disk (floppy disk, pseudovolume, native DOS partition, or DOS hard disk) to a CTOS disk. To use it, follow these steps:

1. If you are copying files from a pseudovolume that is currently being used in a CTOS/Vpc session, make sure you exit from that CTOS/Vpc session before copying. The **MSDOS Read** command cannot copy from a pseudovolume that is currently in use by CTOS/Vpc.
2. If you are copying files from a floppy disk, insert the disk into a floppy drive.
3. On the Executive command line, type **MSDOS Read**, then press **RETURN** to display the command form.

4. Fill in the command form (see the following example and the description of the command form parameter fields listed below); then press **GO** to execute the command.

```
MSDOS Read
  [DOS file mask(s)]                          Halgrimmar
  [From MSDOS Drive or Psv, default [F0]]     [D0]<Sys>My.psv
  [Drive password]
  [Map CR/LF to newline?]
  [Directory prefix from]                     \Iceland\Names
  [Include files from subdirectories?]        n
  [File prefix to]                            [D1]<Scandinavia>
  [Overwrite OK?]
  [Print file]
  [DOS partition number]
```

In the example, the file *Halgrimmar* is copied from the pseudovolume *My.psv* located in the *<Sys>* directory on CTOS drive *[D0]*.

The file *Halgrimmar* is located in the pseudovolume in the path *\Iceland\Names*. No other subdirectories were to be searched for the file *Halgrimmar*.

The file *Halgrimmar* is copied to the directory *<Scandinavia>* on CTOS drive *[D1]*.

Parameter Field Descriptions for MSDOS Read

[DOS file mask(s)]

Default: If no file names are specified, the command copies every file in the root directory of the MS-DOS drive you specify in the *[From MSDOS drive]* field.

Enter the MS-DOS file name(s) you want to copy. File names can contain a maximum of eight characters for the base name and three characters for the extension, for example, PROGRAM1.DAT. You can include the wild-card characters (* and ?).

[From MSDOS Drive or Psv, default [F0]]

Default: *[F0]*

Enter the name of the DOS disk you want to copy from (pseudovolume, native DOS partition, or floppy disk) as follows:

- If the drive is a floppy drive, enter CTOS name of the floppy drive, for example, *[F0]*
- If the drive is a pseudovolume, enter the name of the pseudovolume along with the CTOS drive and directory where the pseudovolume is located, for example, *[D0]<Sys>My.psv*
- If the drive is a native DOS partition or a DOS hard disk, enter the CTOS name of the drive, for example, *[D1]*

[Drive password]

Default: No password

If you are using an MS-DOS hard disk that has no CTOS partition on it, you must enter the device password. (The device password is the same as the device name, for example *D1*.

If you are using CTOS disk that has a pseudovolume or a native DOS partition and CTOS passwording is enabled, you can enter the CTOS volume password here.

[Map CR/LF to newline (default no)?]

Default: CR/LF pairs are not changed.

Carriage return and line feed pairs (CR/LF) are used by DOS files; CTOS files use the single line feed (LF) character, also called *newline*. If you are copying a DOS text file to a CTOS disk, you may want to change the default so that CR/LF pairs are converted to the CTOS LF character. That way, there will be less extraneous characters when you open the text file in an editor or word processor.

If you want to convert carriage return and line feed pairs (CR/LF) that are used by DOS files to the single line feed (LF) used by CTOS files, enter **Yes**.

If you enter **No** or leave this field blank, CR/LF pairs are not changed.

[Directory prefix from]

Default: **MSDOS Read** checks only the root directory on the source pseudovolume, native DOS partition, or floppy drive for the files you want to copy.

If the files to be copied are in a subdirectory, enter the path name for the files so that **MSDOS Read** can locate them. For example:

```
\YourSubdirectory
```

Notice that the DOS drive name is *not* given (for example *C:\YourSubdirectory*). The reason for this is that you have already specified the DOS drive in the second parameter above (see *"[From MSDOS Drive or Psv, default [F0]]"*).

[Include files from subdirectories?]

Default: No

If you specified a directory prefix in the *[Directory prefix from]* field, this field is ignored, whether you enter **Yes** or **No**.

If you enter **Yes**, **MSDOS Read** looks in all subdirectories for the specified file or files.

If you specify **No** or leave this field blank, **MSDOS Read** looks only in the root directory.

[File prefix to]

Default: The files are copied from the DOS disk (floppy disk, pseudovolume, native DOS partition or DOS hard disk) to your current directory. For example, if you are currently in *[D0]<Sys>*, the files are copied to *[D0]<Sys>*.

If you want the files to be copied to a different CTOS volume or directory, enter drive name and the directory name. For example,

[D1]<DustBin>

[Overwrite OK?]

Default: Ask for confirmation before overwriting existing files of the same name.

If you enter **Yes** and the destination file already exists, the existing file is deleted and the MSDOS Read operation continues.

If you enter **No** and the destination file already exists, that file is not copied.

If you leave the field blank, the Executive prompts you for confirmation before the existing file is deleted. Press **GO** to confirm, **CANCEL** to deny, or **FINISH** to stop copying files.

[Print file]

Default: The output is printed to screen only

If you want a record of the files that are copied, enter the name of the file or printer you want to "print" to; this gives you a record of the files that are successfully copied. If the file you specify does not exist, it is created. If it already exists, the new output is appended to the existing file. If you leave this field blank, output is sent to the screen only.

[DOS partition number]

Default: 1

Enter the number of the DOS partition to read on a hard drive that has multiple DOS partitions.

In MSDOS, you can partition hard disks so that they contain multiple logical drives. For example, a DOS hard disk (or a native DOS partition) might have only a single DOS partition, or it might have a primary DOS partition and one extended DOS partition that contains one or more additional logical drives. This parameter identifies which DOS partition to read if there is more than one DOS partition on the disk.

Using the MSDOS Write Command

MSDOS Write copies the specified CTOS file(s) to a pseudovolume, DOS partition, DOS hard drive, or floppy disk. To use it, follow these steps:

1. If you are copying files to a pseudovolume that is currently being used in a CTOS/Vpc session, make sure you exit from that CTOS/Vpc session before copying. The **MSDOS Write** command cannot copy to a pseudovolume that is currently in use by CTOS/Vpc.
2. If you are copying files to a floppy disk, insert the disk into a floppy drive.
3. On the Executive command line, type **MSDOS Write**, then press **RETURN** to display the command form.
4. Fill in the command form (see the following example and the description of the command form parameter fields listed below); then press **GO** to execute the command.

```
MSDOS Write
  [Filename(s)]                          Gnarly.bug
  [To MSDOS Drive or Psv, default [F0]   [D0]<Sys>My.psv
  [Drive password]
  [Map newline to CR/LF?]
  [File prefix from]                     [D1]<Snafus>
  [Directory prefix to]                  \BugFixes
  [Overwrite OK?]
  [Print file]
  [DOS partition number]
```

In the example, the file *Gnarly.bug* is copied *from* the directory *<Snafus>* on the CTOS volume *[D1]*.

The file *Gnarly.bug* is copied *to* a pseudovolume (*My.psv*) that is located in the *<Sys>* directory of the CTOS drive *[D0]*.

The file *Gnarly.bug* is placed in the pseudovolume directory named *\bugfixes*.

Parameter Field Descriptions for MSDOS Write

Filename(s)

Enter the file name(s) of the CTOS file(s) you want to copy to a DOS disk (not the full file specification). You may have to rename or shorten some of your CTOS file names in order to fit DOS requirements because the file names you specify must be valid MS-DOS file names.

Valid DOS file names can have a maximum of eight characters and can have a file extension of up to three characters added to this eight-character maximum, for example, PROGRAM1.DAT.

Also, the file name must not contain characters reserved for use by the MS-DOS file system. See your MS-DOS manuals for information about reserved MS-DOS file names.

[To MSDOS Drive or Psv, default [F0]]

Default: *[F0]*

Enter the name of the DOS disk you want to copy to (pseudovolume, native DOS partition, DOS hard disk, or floppy disk as follows:

- If the drive is a floppy drive, enter CTOS name of the floppy drive, for example, *[F0].*
- If the drive is a pseudovolume, enter the name of the pseudovolume along with the CTOS drive and directory where the pseudovolume is located, for example, *[D0]<Sys>My.psv*.
- If the drive is a native DOS partition or a DOS hard disk with no CTOS partition, enter the CTOS name of the drive, for example, *[D1].*

[Drive password]

Default: No password

If you are using an MS-DOS hard disk that has no CTOS partition on it, you must enter the device password. (The device password is the same as the device name, for example *D1*.

If you are using CTOS disk that has a pseudovolume or a native DOS partition and CTOS passwording is enabled, you can enter the volume password here.

[Map newline to CR/LF?]

Default: CTOS line endings (a single LF character) are not converted to CR/LF pairs.

Carriage return and line feed pairs (CR/LF) are used by DOS files; CTOS files use the single line feed (LF) character, also called *newline*. If you are copying a CTOS text file to a DOS disk, you may want to change the default so that the LF characters are converted to the DOS CR/LF character pairs. Doing so will preserve the expected line breaks when you open the text file in an editor or word processor.

If you want to convert the single line feed (LF) used by CTOS files to the carriage return and line feed pairs (CR/LF) that are used by DOS files, enter **Yes**.

If you enter **No** or leave this field blank, the CTOS LF line ending is not changed.

[File prefix from]

Default: **MSDOS Write** searches for files and copies files only from the current directory.

If the files to be copied are in another CTOS volume or directory, enter the path name so that **MSDOS Write** can locate them. For example:

[D1]<status>

[Directory prefix to]

Default: MSDOS Write copies files to the root directory of the pseudovolume, floppy disk, DOS hard disk, or native DOS partition.

If you want to copy files to a subdirectory on your DOS disk, enter the path to that subdirectory. For example,

```
\YourSubdirectory
```

Notice that the DOS drive name is *not* given (for example *C:\YourSubdirectory*). The reason for this is that you have already specified the drive in the second parameter above (see *"[To MSDOS Drive or Psv, default [F0]]"*).

[Overwrite OK?]

Default: Ask for confirmation before overwriting existing files of the same name.

If you enter **Yes** and the destination file already exists, the existing file is deleted and the MSDOS Write operation continues.

If you enter **No** and the destination file already exists, that file is not copied.

If you leave the field blank, the Executive prompts you for confirmation before the existing file is deleted. Press **GO** to confirm, **CANCEL** to deny, or **FINISH** to stop copying files.

[Print file]

Default: The output is printed to screen only

If you want a record of the files that are copied, enter the name of the file or printer you want to "print" to. If the file you specify does not exist, it is created. If it already exists, the new output is appended to the existing file. If you leave this field blank, output is sent to the screen only.

[DOS partition number]

Default: 1

Enter the number of the DOS partition to read on a hard drive that has multiple DOS partitions.

In MS-DOS, you can partition hard disks so that they contain multiple logical drives. For example, a DOS hard disk might have only a single DOS partition, or it might have a primary DOS partition and one extended DOS partition that contains one or more additional logical drives. This parameter identifies which DOS partition to read if there is more than one DOS partition on the disk.

Using MSDOS Directory

The **MSDOS Directory** command displays the files in a pseudovolume, native DOS partition, DOS hard disk, or DOS floppy disk. To use it, follow these steps:

1. If you are displaying files on a pseudovolume that is currently being used in CTOS/Vpc session, make sure you exit from that CTOS/Vpc session before copying. The **MSDOS Directory** command cannot copy from a pseudovolume that is currently in use by CTOS/Vpc.
2. If you are displaying files on a floppy disk, insert the disk into a floppy drive.
3. On the Executive command line, type **MSDOS Directory**, then press **RETURN** to display the command form.
4. Fill in the command form (see the following example and the description of the command form parameter fields listed below); then press **GO** to execute the command.

```
MSDOS Directory
  [From MSDOS Drive or Psv, default [F0]] [F1]
  [Drive password]
  [Directory prefix]                     \oldjunk
  [Device details?]
  [Print file]
  [DOS partition number]
```

The example displays the contents of the DOS directory *\oldjunk* on the DOS floppy disk that is inserted in the CTOS drive *[F1]*.

Parameter Field Descriptions for MSDOS Directory

[From MSDOS Drive or Psv, default [F0]]

Default: *[F0]*

Enter the name of the DOS disk whose directory contents you want to display (pseudovolume, native DOS partition, DOS hard disk, or floppy disk) as follows:

- If the drive is a floppy drive, enter CTOS name of the floppy drive, for example, *[F0]*.
- If the drive is a pseudovolume, enter the name of the pseudovolume along with the CTOS drive and directory where the pseudovolume is located, for example, *[D0]<Sys>My.psv*.
- If the drive is a native DOS partition or a DOS hard disk that has no CTOS partition, enter the CTOS name of the drive, for example, *[D1]*.

[Drive password]

Default: No password

If you are using an MS-DOS hard disk that has no CTOS partition on it, you must enter the device password. (The device password is the same as the device name, for example *D1*.

If you are using CTOS disk that has a pseudovolume or a native DOS partition and CTOS passwording is enabled, you can enter the volume password here.

[Directory prefix]

Default: **MSDOS Directory** displays only the files in the root directory on the pseudovolume, native DOS partition, DOS hard disk, or floppy drive.

If you want to display files in a DOS subdirectory, enter the path name for the files so that **MSDOS Directory** can locate them. For example:

```
\YourSubdirectory
```

Notice that the DOS drive name is *not* given (for example *C:\YourSubdirectory*). The reason for this is that you have already specified the drive in the second parameter above (see *"[From MSDOS Drive or Psv, default [F0]]"*).

[Device details?]

Default: No

Enter Yes if you want to see information on the following DOS disk drive information:

- Volume serial number
- Volume label
- Media descriptor byte
- Sectors per track
- Number of heads
- Sector size (bytes)
- Cluster size (bytes)
- Total sectors in volume
- Total clusters in volume
- Reserved sectors
- Number of file allocation tables (FATs)
- Number of sectors per FATs
- Total files in root directory

- Root directory starting sector
- Data starts at sector
- Number of hidden sectors
- Physical drive number
- Extended boot signature

Also, file name, size, date, time, and type are listed.

[Print file]

Default: The output is printed to screen only

If you want a record of the files that are displayed, enter the name of the file or printer you want to "print" the record to; this gives you a record of the files that were found in the directory. If you specify a file and the file does not exist, it is created. If it already exists, the new output is appended to the existing file. If you leave this field blank, output is sent to the screen only.

[DOS partition number]

Default: 1

Enter the number of the DOS partition to read on a hard drive that has multiple DOS partitions.

In MS-DOS you can partition hard disks so that they contain multiple logical drives. For example, a DOS hard disk might have only a single DOS partition, or it might have a primary DOS partition and one extended DOS partition that contains one or more additional logical drives. This parameter identifies which DOS partition to read if there is more than one DOS partition on the disk.

Section 7
Using Serial Communications Channels

This section describes how to set up CTOS/Vpc to support DOS data communication over asynchronous serial communication lines. It also provides information about baud rates.

What You Need to Do

To use CTOS asynchronous communications channels in a CTOS/Vpc session, you must

1. Select the workstation communications channel(s) you want to use.
2. Connect the required data communications hardware to the selected workstation serial port(s).
3. Configure the *Pc.sys* file to support the desired communications channel(s) and to provide the proper transmission flow controls *if required.*
4. Install and configure your MS-DOS- or Windows-based communication software.

These tasks are described in detail later in this section.

Selecting a Communications Channel

Most CTOS workstations provide two asynchronous communications channels, which are called *[comm]a* and *[comm]b*. On SuperGen Series 5000 workstations, three channels are available: *[comm]a*, *[comm]b,* and *[comm]c*. On port expander modules, four channels are available: *[comm]1a*, *[comm]1b*, *[comm]1c*, and *[comm]1d*. You must consult your hardware documentation to match the port connectors on your workstation or port expander module to communication channel names.

You can use any of the asynchronous channels for DOS data transmission; all of the channels provide the same signalling capabilities and performance. You can use two different asynchronous channels simultaneously if you want.

Connecting Data Communications Hardware

You can connect standard serial communications devices (modems) or transmission lines (null modems) to the asynchronous channel ports on a CTOS workstation. See your workstation hardware documentation or modem documentation for details.

If you are connecting two systems using a serial transmission line (null modem), make sure the line does not exceed 50 feet in length. Also, you should determine how many RS-232 signals are supported by that transmission line; some lines provide only the minimum 3 signals required with no flow control, other lines provide more signals for hardware flow control (flow control is discussed later under "Configuring the *Pc.sys* File for Communications.")

Configuring the Pc.sys File for Communications

To use CTOS communications channels in CTOS/Vpc, you must edit the *Pc.sys* file to assign a CTOS communications channel to MS-DOS COM1 and to assign a different channel to COM2 (if you are using two COM ports). See Section 2 for instructions on using the CTOS **Editor** command to edit the *Pc.sys* file.

You can also edit the *Pc.sys* file to assign some type of hardware flow control if you need to.

Assigning a Channel to a DOS COM Port

To assign a CTOS communications channel to a DOS COM port, you may have to modify or add a line to the *Pc.sys* file. Example 7-1 shows the default *Pc.sys* file, with the default *:COM1:* setting in bold text.

Example 7-1. Default Pc.sys Configuration File

```
:DriveA:[f0]
:DriveB:
:DriveC:[sys]<sys>PseudovolumeName.psv
:DriveCReadOnly?:No
:DriveD:
:DriveDReadOnly?:
:LPT1:[lpt]
:COM1:[comm]b
:ExtendedMemory:64K
:GraphicsAdapter:vga
```

Assigning COM1

To assign a different CTOS communications channel to MS-DOS COM1, change the default *:COM1:* line. For example, if you want to assign CTOS channel *a* to COM1, change the line to:

```
:COM1:[comm]a
```

Restart CTOS/Vpc to put the change in effect.

Assigning COM2

To assign a CTOS communications channel to MS-DOS COM2, add the following line to the *Pc.sys* file:

```
:COM2:[comm]channelname
```

Replace *channelname* with the name of the CTOS channel you want to use, for example, *b*.

Restart CTOS/Vpc to put the change in effect.

Caution

You cannot assign both COM1 and COM2 to the same channel.

Assigning COM1 or COM2 During a CTOS/Vpc Session

If you want to temporarily change to a different communications device during a CTOS/Vpc session, you can use the CTOS/Vpc pop-up menu. Simply press **ACTION-M**, then select *Reconfigure Current Vpc Session* from the pop-up menu. Change the *:COM1:* or *:COM2:* line as desired.

Assigning Flow Control in the Pc.sys File

Flow control helps prevents data overflow conditions that can occur if the amount of data transmitted in a given time frame exceeds the receiving system's capacity to buffer and process the data. Flow control *may* be required at high data rates because such overflow conditions can result in errors and time-consuming data retransmissions.

Flow control detects data overflow conditions *before* they occur and stops the transmission of data until the receiver's buffer and processor are able to handle more incoming data.

Note: *You shouldn't use flow control unless you have to; if you use flow control you may have to use a lower baud rate.*

Although most Windows-based and DOS-based communication programs allow you to set software flow control (such as XON/XOFF or CTS), you still need to set up CTOS/Vpc to support flow control.

Types of CTOS/Vpc Flow Control: XON/XOFF and RTS/CTS

CTOS/Vpc uses either of two methods of flow control: XON/XOFF or RTS/CTS (ready to send/clear to send).

In XON/XOFF mode, the XOFF character (13h) and XON character (11h) represent busy and ready respectively. The XON/XOFF characters are not part of the standard alphanumeric character set that most files contain, so this type of flow control can be used in most instances. However, if the data being transmitted does happen to contain the XOFF and XON characters (as could happen in some types of graphics files), you shouldn't use this type of flow control.

In RTS/CTS mode, the RS-232 signal CTS is dropped to indicate busy and is raised to indicate ready.

> **Caution**
>
> Both the transmitting system and the receiving system must use the same type of flow control. That is, both systems must use RTS/CTS, or both systems must use XON/XOFF. If the receiving system uses flow control and the transmitting system does not, overflow conditions can still occur.

Editing the Pc.sys File to Assign Flow Control

Assigning Flow Control to COM1

To assign RTS/CTS flow control to COM1, add the following line to the *Pc.sys* file:

```
:ReadyBusy:CTS
```

To assign XON/XOFF flow control to COM1, change the *:ReadyBusy:* line (or add the line, if it is not present) in the *Pc.sys* file to:

```
:ReadyBusy:Xon/Xoff
```

Assigning Flow Control to COM2

To assign RTS/CTS flow control to COM2, add the following line to the *Pc.sys* file:

```
:ReadyBusy2:CTS
```

To assign XON/XOFF flow control to COM1, change the *:ReadyBusy2:* line (or add the line, if it is not present) in the *Pc.sys* file to:

```
:ReadyBusy2:Xon/Xoff
```

Maximum Baud Rates Supported by CTOS/Vpc

Under CTOS/Vpc, you *may* be able to use maximum baud rates of 9600 baud to 19.2K baud. However, in order to be assured of obtaining maximum baud rates of 9600 baud or 19.2K baud, you must have

- At least an 80486-based (client workstation running at 33Mhz or faster
- Communications software that is two years old or newer
- No other applications running on the workstations during transmit/receive operations

You *may* be able to obtain maximum baud rates of 9600 baud or 19.2K baud even if you have a less powerful workstation (for example, an 80386-based workstation), or even if your communications software is older than two years, or even if other programs are running during communications operations. Try using the desired baud rate; if you get too many errors and retransmissions, you may have to use lower baud rates.

Note: *You must select baud rates within your Windows- or DOS-based communications software; you cannot select baud rates in the* Pc.sys *file.*

Maximum Baud Rates Using Two Communications Channels

The maximum baud rate you can use is slightly affected by the use of two communications channels simultaneously, due to the overhead associated with resource management. However, if you are able to run at 9600 baud with one channel, you *may* still be able to run at 9600 baud with two channels (both channels running at 9600 baud). Again, try using the desired baud rate; if you get too many errors and retransmissions, you may have to use lower baud rates.

Section 8
Using CD-ROM Drives

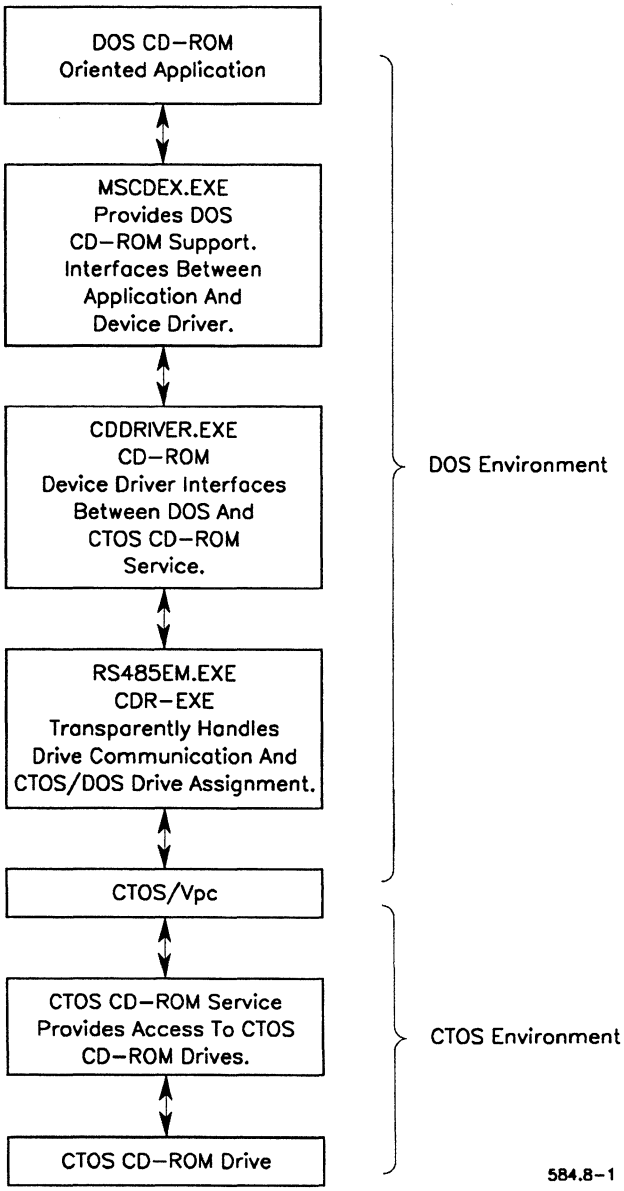
CTOS/Vpc allows you to use a CD-ROM drive installed on your client workstation, on the server, or on servers at remote nodes. This section describes setting up the CTOS and DOS environments to provide support for CD-ROM drives and provides a brief overview of the interoperation of the CTOS and DOS elements required for accessing CD-ROM drives.

Note: *This section assumes that the CTOS CD-ROM drive and the CD-ROM package have already been installed. If you haven't installed them, do so before proceeding. (See the* CTOS System Software Installation Guide *for instructions on installing the CD-ROM package).*

CTOS/DOS Interoperation in Accessing CD-ROM Drives

Figure 8-1 shows the interaction that occurs between DOS and CTOS whenever a DOS- or Windows-based CD-ROM oriented program accesses a CD-ROM drive.

Figure 8-1. Accessing a CD-ROM: Interoperation between CTOS and DOS



As shown in Figure 8-1, the CD-ROM oriented program's request to access CD-ROM is handled by the Microsoft CD-ROM extension, MSCDEX.EXE.

The MSCDEX.EXE extension then issues the proper instructions to the device driver CDDRIVER.EXE, which is a special device driver designed to work with the CTOS CD-ROM service.

Notice the RS485EM.EXE and CDR.EXE programs: these transparently handle communication and CD-ROM drive assignment for the CDDRIVER.EXE driver so that CDDRIVER.EXE's instructions can be directed to the proper CTOS CD-ROM drive.

The final leg of the journey between the DOS CD-ROM oriented program and the CTOS CD-ROM is carried out by the CD-ROM service, which performs the actual drive access on the CD-ROM drive.

What You Need to Do

To set up a CD-ROM drive for use by a Window- or DOS-based application running under CTOS/Vpc, you must

1. Make sure the CD-ROM drivers included with the CTOS/Vpc package are installed on your hard disk, along with the Microsoft MSCDEX.EXE file.
2. Install the CTOS CDROM service in workstation memory (only on the workstation that has the CD-ROM drive).
3. Set up the *SysInit.jcl* file to load the CD-ROM service automatically.
4. Add the required CD-ROM support programs to the MS-DOS CONFIG.SYS and AUTOEXEC.BAT files.

Each of these tasks is described below in more detail.

Locating the CD-ROM Extension and CD-ROM Drivers

When you first install CTOS/Vpc, the required CD-ROM drivers and support software are copied to the *\VPC* directory on drive C. The following files must be in the *\VPC* directory:

- CDDRIVER.EXE
- CDR.EXE
- RS485EM.EXE

If these files are not currently installed in the *C:\VPC* directory, install them from the CTOS/Vpc DOS Files package.

During the installation of MS-DOS 6.2, or CTOS LANce/pc, the Microsoft CD-ROM extension file MSCDEX.EXE is copied to your hard disk. If you have MS-DOS 6.2 or greater, make sure MSCDEX.EXE is located in the *\DOS* directory. If you have CTOS LANce/pc make sure this file is located in the *\CDROM* directory.

Note: *The MSCDEX.EXE file may be included with your CD-ROM drive. If it is not, you must obtain this file by upgrading to MS-DOS version 6.2 or greater or by ordering the CTOS LANce/pc software.*

Caution

You must use the CDDRIVER.EXE device driver shipped with CTOS/Vpc. CDDRIVER.EXE is a special driver designed to work with the CTOS CDROM service.

Do not use another CD-ROM device driver even if one is included with your CD-ROM drive.

Installing the CTOS CD-ROM Service

You must load the CD-ROM service into memory on the workstation that has the CD-ROM installed. If the CD-ROM is installed on the server workstation, load the CD-ROM service only in the server workstation's memory.

Note: *On multiprocessor workstations, the CD-ROM Service must be installed on the main processor.*

The CD-ROM service may already be installed in workstation memory. To determine whether the CD-ROM service is installed, use the Executive **Partition Status** command on the workstation that has the CDROM drive(s) to display the installed system services.

If the service is not installed, install it now using the **Install Cdrom Service** command (you don't need to fill out the command form), then edit the *SysInit.jcl* file so that the service is loaded automatically (see below).

Note: *If your attempt to use the* ***Install Cdrom Service*** *command fails with the error message "No Such Command," you must install the CD-ROM service on your workstation hard disk. To do this, see the* CTOS System Software Installation Guide.

Using the SysInit.jcl File to Load the CD-ROM Service Automatically

You should use the *SysInit.jcl* file to load the CD-ROM service automatically. The *SysInit.jcl* file is a file whose contents are read and executed whenever a CTOS workstation is booted. This file is very useful for automatically loading into memory the system services that you use all the time, such as printing, mail, mouse, or CD-ROM drives.

To use *SysInit.jcl* to load the CD-ROM service automatically, use the CTOS **Editor** command to edit your existing *SysInit.jcl* file or to create one if you don't have such a file (see the *CTOS Executive Reference Manual* for information on the **Editor**). The file must be located in the *[Sys]<Sys>* volume and directory.

Example 8-1 shows a sample *SysInit.jcl* file. Your file may vary, but it must start with *Job SysInit* and end with *End* as shown, and it must have the *CdromService.run* line if you want to load the CD-ROM service.

Example 8-1. Sample SysInit.jcl File That Loads the CD-ROM Service

```
Job SysInit
ContinueOnError
Run [Sys]<Sys>Xbif.run
Run [Sys]<Sys>InstallQMgr.run
Run [Sys]<Gps>GpsInstall.run
Run [Sys]<Sys>MailServer.run
Run [Sys]<Sys>ModemServer.run
Run [Sys]<Sys>InstallSeqService.run
Run [Sys]<Sys>CdromService.run
Run [Sys]<Sys>MouseService.run
End
```

Setting Up AUTOEXEC.BAT and CONFIG.SYS to Support CD-ROM

To support CD-ROM drives in MS-DOS, you must modify the following two DOS environment configuration files:

- CONFIG.SYS
- AUTOEXEC.BAT

The required modification for each file is described below.

Modifying the CONFIG.SYS File for CD-ROM

If you don't know how to edit the CONFIG.SYS file, see your MS-DOS documentation for instructions. You must add the following lines to the end of your CONFIG.SYS file:

```
LASTDRIVE=Z

FILES=20

BUFFERS=30

DEVICE=C:\VPC\CDRIVER.EXE /D:CT-CDROM /N:1
```

On the last line, notice the */N:1* statement (called a "switch"). This indicates the number of CD-ROM drives your workstation is able to access. For example, if your workstation is able to access three different CD-ROM drives, change the */N:1* switch to */N:3*.

Modifying the AUTOEXEC.BAT File for CD-ROM

If you don't know how to edit the AUTOEXEC.BAT file, see your MS-DOS documentation for instructions. At the very least, you must add the following lines to the end of your AUTOEXEC.BAT file:

```
C:\VPC\RS485EM

C:\DOS\MSCDEX.EXE /D:CT-CDROM /L:L /M:4 /V /E

CDR ASSIGN L: {LOCAL}[CDROM]0
```

The lines shown above allow you to use a single CD-ROM drive on a client workstation, with the drive assigned the DOS drive letter L. If you want to use more than one CD-ROM drive, or use a CD-ROM drive on a server or on another node, you need to modify the *MSCDEX.EXE* and *CDR ASSIGN* lines in the AUTOEXEC.BAT file.

Modifying the MSCDEX.EXE Line

The *MSCDEX.EXE* line allows you to set the following options:

- The entry after */D:*

  This entry must be the same as you used in the device statement of the CONFIG.SYS file. This specifies the name of the DOS CD-ROM device driver, which is CT-CDROM in our examples.

- The entry after */L:*

  This indicates that the DOS drive letter assignments for CD-ROM modules will start at *L* (*L* is the standard drive assignment for CD-ROM modules). If you do not specify a drive letter, the module will be assigned the next available drive letter (probably *E*). This guide assumes you selected *L*.

- The entry after */M:*

  This specifies the number of buffers allocated to the CD-ROM software. Specify four buffers for each CD-ROM module you want to access. For example, if you want to access three CD-ROM modules, enter **/M:12**.

- The entry */V*

  This entry specifies verbose mode, that displays information about memory usage when DOS is booted. This is sometimes useful for debugging purposes.

- The entry */E*

  This entry enables you to use expanded memory, if available.

Modifying the CDR ASSIGN Lines

The **CDR Assign** command line(s) must appear in the AUTOEXEC.BAT file after the command line that loads the CD-ROM software.

Using Multiple CD-ROM Drives

Each available CD-ROM module must have its own **CDR Assign** command line in the AUTOEXEC.BAT file. For example, if you have two CD-ROM drives on your workstation, you must have one *CDR ASSIGN* line for each drive, as shown below

```
CDR Assign L: {LOCAL}[CDROM]0
CDR Assign M: {LOCAL}[CDROM]1
```

You can assign drive letters to modules in any order. Remember to increment the drive letters when appropriate (*L, M, N* and so forth), and to indicate the correct location of the modules on the workstation (*0, 1, 2* and so forth).

Using a CD-ROM Drive On the Server

If you are using a CD-ROM drive on the server, the *CDR ASSIGN* line must indicate that the drive is on the server by specifying *{Master}* rather than *{Local}*. In the following example, the first CD-ROM drive is on the server and is assigned the DOS drive letter *L*:

```
CDR Assign L: {MASTER}[CDROM]0
```

Using a CD-ROM Drive On Another Node

If you are using a CD-ROM drive on another node the server, the *CDR ASSIGN* line must indicate the node name where the drive is located by specifying {*Nodename*} rather than *{Local}*. In the following example, the third CD-ROM drive is located on a server at the node called *NewZealand*:

```
CDR Assign N: {NewZealand}[CDROM]2
```

The node name is the BNet node name.

Section 9
Disk Caching

This section describes what you need to do in order to use disk caching under CTOS/Vpc. This section also explains what disk caching is, when you should use it, which types of caching are available, and which types best suit your particular needs.

What You Need To Do

In order to use disk caching properly under CTOS/Vpc, you must

1. Make sure you understand what disk caching is and what your caching options are under CTOS/Vpc.
2. Analyze your current system usage to determine which type of cache to use and how much cache to use.
3. Set up your system for the desired disk caching (CTOS and/or DOS SmartDrive caching)

What Is Disk Caching?

A disk cache is an area of memory reserved for storing information that is read from a disk by an application. The cache holds information frequently retrieved or recently retrieved from disk so that the application can fetch that information directly from system memory rather than go through the relatively time-consuming process of retrieving it from a disk.

The disk cache can also hold information that the application writes to disk: in this case the information is written directly to the cache first, then the cache writes the information to the disk later when the system is momentarily idle.

If you use disk caching, you can free your applications from much of the overhead of reading and writing to disk. That is, if you use disk caching, you obtain better application performance.

When Should I Use Disk Caching?

Nearly every application performs better if you use disk caching. Moreover, if an application accesses a disk frequently, or opens and closes disk files frequently, disk caching is really needed to obtain good performance. A database application, for example, should not be run without a disk cache. Similarly, Windows applications should be used along with a disk cache.

What Types of Disk Caching Are Available?

Under CTOS/Vpc, two types of disk caching are available:

- CTOS disk caching
- SmartDrive disk caching provided by Windows (or DOS 6.2 or later)

You can use one type of disk caching or the other, or you can use both types of caching together.

CTOS Disk Caching

In CTOS disk caching, frequently used or recently used sectors of information are kept in the cache. If you enable CTOS caching, information from any CTOS volume (hard disks or floppy disks, for example) is automatically cached, unless you reserve the cache for a specific file or files.

Because CTOS/Vpc is a CTOS application, using CTOS disk caching improves both the performance of CTOS/Vpc and the performance of DOS or Windows applications running under CTOS/Vpc. (Using CTOS disk caching also improves the performance of other CTOS applications.)

Note: *Using CTOS disk caching does not improve the performance of the floppy drive under CTOS/Vpc; only SmartDrive provides that feature.*

For instructions on using CTOS disk caching, see the section that describes the file system cache in the *CTOS System Administration Guide*. (In CTOS documentation, a disk cache is called a file system cache.)

SmartDrive Disk Caching

Windows 3.1 and DOS 6.2 and later versions provide a disk cache program called SmartDrive (SmartDrv). Like CTOS disk caching, frequently used or recently used information is kept in the cache. Unlike CTOS caching, SmartDrive may require you to specify which drives are cached and whether a drive is both read and write cached.

SmartDrive caching is used only by DOS or Windows applications; CTOS applications cannot use SmartDrive caching. In addition, SmartDrive provides a bigger performance improvement for DOS and Windows applications than the CTOS cache does.

For instructions on using SmartDrive, see your Windows or DOS documentation.

Improving Floppy Drive Performance

Under DOS, reading from and writing to a floppy drive can be tediously slow. This is especially the case when you install Windows applications from floppy drives. The reason for this is that DOS reads and writes only relatively small amounts of information at a time to the floppy drive.

If you use SmartDrive to cache your floppy drives, you can improve floppy drive performance dramatically. Under SmartDrive, much larger amounts of information are read and written at a time.

Note: *CTOS/Vpc reads and writes to floppy disks directly, bypassing the CTOS disk cache; there is no CTOS caching for floppy drives. Therefore, in order to obtain floppy drive caching, you must use SmartDrive.*

Using Both CTOS and SmartDrive Disk Caching

If you have plenty of memory available, you can use both CTOS disk caching and SmartDrive caching. This provides disk caching for CTOS applications and lets you use SmartDrive for DOS and Windows applications.

Note: *SmartDrive provides better performance for DOS and Windows applications running under CTOS/Vpc than does CTOS disk caching. However, using CTOS caching together with SmartDrive does not provide better performance for DOS or Windows applications than if you simply used SmartDrive by itself.*

Which Type of Disk Caching Should I Use?

The optimal type of disk caching for your particular case depends on several factors, such as

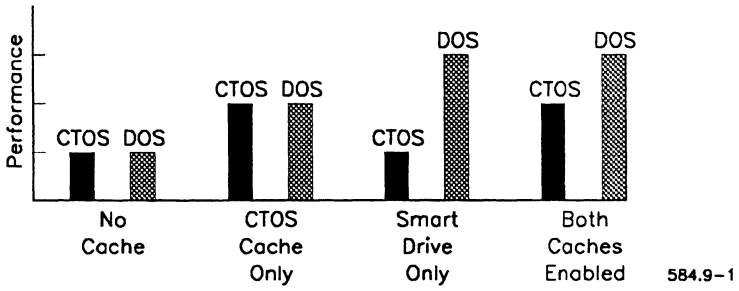
- How much workstation memory you can afford to reserve for caching
- Whether you spend most of your time in CTOS applications or in Windows/DOS applications
- The type of applications you use

If your system has plenty of memory available, you might want to use both CTOS caching and SmartDrive caching. This provides optimal performance for both CTOS applications and for Windows and DOS applications.

If you have a limited amount of memory available, you may need to choose between CTOS and SmartDrive caching. If this is the case, use SmartDrive if you spend most of your time in DOS or Windows applications. If you spend most of your time in CTOS applications, or spend an equal amount of time in CTOS and in DOS or Windows applications, you might want to use CTOS caching.

Figure 9-1 shows the relative performance levels of CTOS and DOS (or Windows) applications under the various types of caching.

Figure 9-1. Application Performance and Disk Caching Type



Note: *Figure 9-1 illustrates caching options only. It is not intended to provide any actual performance benchmarks.*

How Much Cache Do I Need?

The amount of disk cache you should specify depends on the type of application you use and the amount of memory available to you. For disk intensive programs such as databases, you should use at least 512K bytes to 1M byte in the cache, or even more if you have plenty of memory. If your main program is a word processor and you have a limited amount of available memory, a cache of 256K bytes might be enough to provide a significant improvement in performance.

Section 10
Memory

This section describes how much workstation memory you need for CTOS/Vpc, the types of PC memory that are supported by CTOS/Vpc, and what you need to do to obtain those memory types. This section also provides a brief overview of how CTOS/Vpc allocates memory.

Note: *For specific details about minimum workstation memory requirements, see the* CTOS/Vpc Product Family Software Release Announcement.

Workstation Memory and CTOS/Vpc

The amount of workstation memory that is available for CTOS/Vpc depends on two factors: (1) the amount memory in the workstation and (2) the amount of memory occupied by other programs such as the operating system and system services.

Determining the Amount of Workstation Memory

To determine how much memory is installed in the workstation, use the **Display Configuration** command from the Executive command line. This displays the amount of memory (in K bytes) installed in the workstation.

Determining the Amount of Memory Occupied by Programs

To determine how much memory is occupied by programs, and how much is unused and available for use, use the **Partition Status** command from the Executive command line. (For information on using the **Partition Status** command, see the *CTOS Executive Reference Guide*.)

What If There is Not Enough Unused Memory for CTOS/Vpc?

CTOS/Vpc needs about 2500K bytes of free (unused) memory; about 3500K bytes if you use Windows. If other programs occupy all or most of workstation memory, leaving an insufficient amount for CTOS/Vpc, CTOS/Vpc can still load and operate. However, it may operate at the expense of other programs; that is, it may take memory resources that were previously used by other programs, resulting in decreased overall performance.

If there is not enough unused workstation memory available for CTOS/Vpc, you can

- Install more workstation memory
- Deinstall some of the other programs currently in memory
- Run CTOS/Vpc anyway, if the performance is satisfactory

Reserving Memory for CTOS/Vpc

Because CTOS/Vpc runs on the CTOS III virtual memory operating system, it is not necessary to reserve workstation memory for CTOS/Vpc. Whether you run CTOS/Vpc from the Executive command line, the Context Manager, or the Presentation Manager, CTOS/Vpc gets as much memory as it needs from the operating system.

Restricting CTOS/Vpc to a Specific Amount of Memory

In some instances you might want to restrict CTOS/Vpc to a specific memory size, so that it does not "take away" memory from other programs. To do this, you must modify the Context Manager configuration file to assign a fixed size partition to CTOS/Vpc. (See your Context Manager documentation for instructions.)

The Amount of CTOS/Vpc Memory Available for DOS

Keep in mind that not all of the workstation memory that is available for CTOS/Vpc is available for MS-DOS and PC applications. A significant portion of this memory is used by the CTOS/Vpc program (run file) itself and is not available for use by MS-DOS and PC applications.

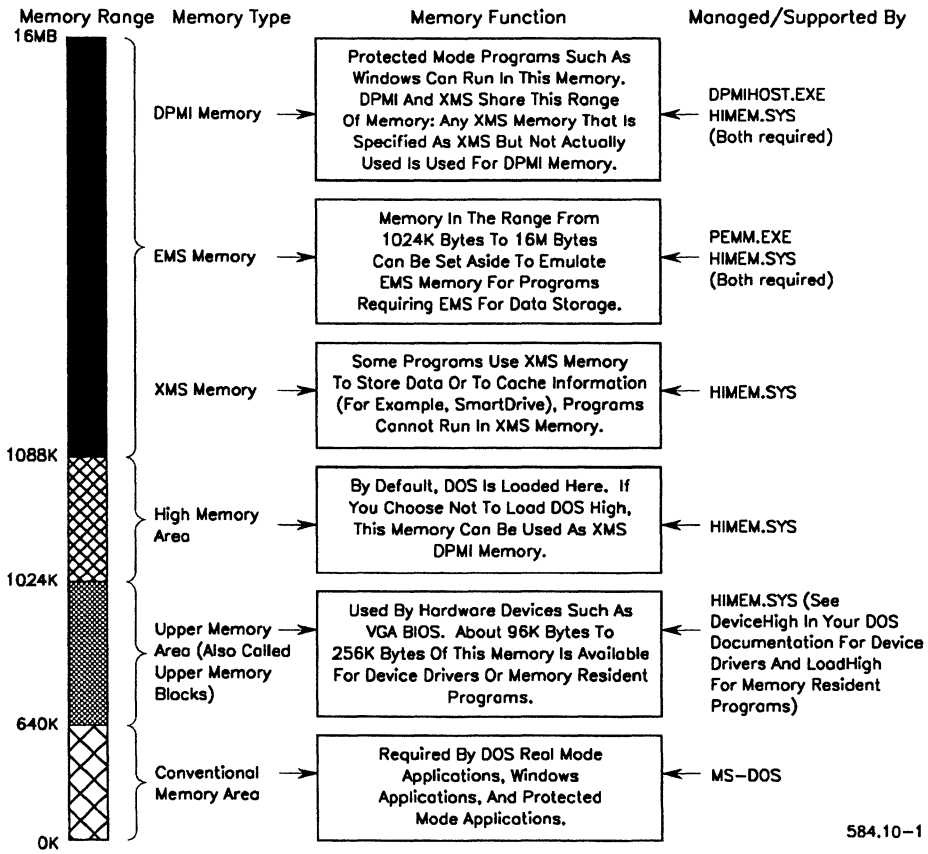
Supported Types of MS-DOS Memory

CTOS/Vpc supports the following types of MS-DOS memory:

- Conventional
- EMS
- XMS, including the high memory area (HMA)
- The upper memory area, including the upper memory blocks (UMBs)
- DPMI

Figure 10-1 shows the linear relationship between these types of memory. (Each memory type is discussed in more detail later in the section.)

Figure 10-1. DOS Memory Types



Conventional Memory

Conventional memory refers to the first 640K bytes of memory. Many PC applications (real-mode applications) are designed to run in this area of memory, which makes this memory particularly valuable. (At one time, MS-DOS applications were limited to this first 640K bytes of memory.)

A common configuration for maximum performance is to free up as much of this memory as possible for applications by loading MS-DOS, device drivers, and memory resident programs in other areas of memory. (See the descriptions of the **LoadHigh** and **DeviceHigh** commands in the MS-DOS documentations.)

Obtaining Conventional Memory

Under CTOS/Vpc, you don't need to take any additional steps to obtain the full 640K bytes of conventional memory, this is provided automatically.

Upper Memory Area and Upper Memory Blocks

The upper memory area, also called upper memory blocks (UMBs), is the memory between the 640K bytes of conventional memory and the 1024K-byte starting point of extended memory. This area is reserved to support hardware-related features and cannot be used by most executable programs.

Normally, 96K bytes to 256K bytes of this memory area are unused. To make use of this memory, the most recent versions of MS-DOS allow you to use it for device drivers and memory resident programs.

Support for the upper memory area is provided by the special HIMEM.SYS file provided by CTOS/Vpc. HIMEM.SYS is placed in the DOS CONFIG.SYS file as follows:

```
Device=C:\VPC\HIMEM.SYS
```

The HIMEM.SYS line must be placed before the PEMM.EXE line and before any other lines that make use of the upper memory area, such as *DeviceHigh* or *LoadDeviceHigh* lines.

Obtaining and Using Upper Memory Blocks

If your DOS CONFIG.SYS file has the HIMEM.SYS line, support is automatically enabled for the upper memory blocks. To use this area of memory, you must load device drivers using the *DeviceHigh* line in the DOS CONFIG.SYS file. To load programs, use the *LoadDeviceHigh* line. See your MS-DOS documentation for information on *DeviceHigh* and *LoadHigh*.

EMS Memory

EMS memory, also called expanded memory, is memory outside of conventional memory and is used for data storage, not for running executable programs. Windows and Windows-based applications, for example, don't use EMS memory. EMS memory was an early attempt to overcome the 640K byte limitation of conventional memory.

You don't need to specify any EMS memory unless your applications require it or recommend it. (You specify the amount of EMS memory in the CTOS *Pc.sys* file and in the DOS CONFIG.SYS file.)

EMS Memory is Provided by CTOS/Vpc's PEMM Program

Under CTOS/Vpc, EMS memory is provided by a program called PEMM.EXE, which makes a specified portion of CTOS/Vpc memory function as EMS memory. (It is largely compliant with the EMS 4.0 specification.) PEMM.EXE is placed in the DOS CONFIG.SYS file with the following options:

```
Device=[PATH]PEMM.EXE sSIZE [/v32]
```

A typical example of what you would enter is as follows:

```
Device=C:\VPC\PEMM.EXE s16
```

PATH is the full file specification for PEMM.EXE. For example, because PEMM.EXE is installed by default in the *C:\VPC* directory, *PATH* should normally be *C:\VPC*. If you don't specify *PATH*, only the current directory and directories in your AUTOEXEC.BAT file's *PATH* statement will be searched for PEMM.EXE.

SIZE is the number of 16K byte pages of EMS memory. You get *SIZE* by dividing the amount of EMS memory you want by 16. For example, to get 256K bytes of EMS memory, replace *sSIZE* with *s16* (256/16 = 16).

The optional /v32 parameter forces PEMM.EXE to operate compliantly with EMS specification 3.2. You should use this optional parameter only if you have an older application designed for EMS 3.2 and that doesn't work properly under the 4.0 specification.

Obtaining EMS Memory

To make EMS memory available in a CTOS/Vpc session you must modify the *ExpandedMemory* line in the *Pc.sys* file (you can specify any amount from 16K bytes to 32768K bytes) and include a PEMM.EXE line in the DOS CONFIG.SYS file.

For example, to specify 256K bytes of EMS memory, change the ExpandedMemory line in the *Pc.sys* file to:

```
:ExpandedMemory:256K
```

Then, add the following line to your DOS CONFIG.SYS file:

```
C:\VPC\PEMM.EXE s16
```

Note: *PEMM.EXE is a program distributed with CTOS/Vpc; it is not a DOS program and is not documented in MS-DOS manuals.*

XMS Memory

XMS memory, also called extended memory, is memory above 1024K bytes that can be used to run MS-DOS and some PC applications. Under CTOS/Vpc, you must specify 64K bytes of XMS memory in order to use Windows and Windows-based applications; for better performance, you should specify an *additional* 256K bytes to 512K bytes to be used as a SmartDrive cache. (See Section 9, "Disk Caching.")

XMS Memory and the High Memory Area

The first 64K bytes of XMS memory is called the high memory area; the default MS-DOS installation loads MS-DOS into this area of memory, in order to free up more memory in the 640K byte area of conventional memory.

XMS Memory Support Is Provided By CTOS/Vpc's HIMEM.SYS

XMS memory support is provided by the special HIMEM.SYS file provided with CTOS/Vpc. You include HIMEM.SYS in the DOS CONFIG.SYS file as follows:

```
Device=C:\VPC\HIMEM.SYS
```

The HIMEM.SYS line must be placed before the PEMM.EXE line and before the *DeviceHigh*, *LoadDeviceHigh*, or *DOS=HIGH* lines.

Obtaining XMS Memory

To make XMS memory available in a CTOS/Vpc session, you must modify the *ExtendedMemory* line in the *Pc.sys* file (you can specify any amount from 1K bytes to 16384K bytes) and include a HIMEM.SYS line in the DOS CONFIG.SYS file.

For example, to specify 512K bytes of XMS memory, change the *ExtendedMemory* line in the *Pc.sys* file to:

```
:ExtendedMemory:512K
```

(The value you supply here is rounded upward to the nearest multiple of 64.)

Then, add the following line to your DOS CONFIG.SYS file:

```
C:\VPC\HIMEM.SYS
```

Note: *HIMEM.SYS replaces the HIMEM.SYS that is shipped with MS-DOS. Do not use the DOS version of HIMEM.SYS.*

DPMI Memory

The DOS Protected Mode Interface (DPMI) specification was developed to enable applications to run in protected-mode and escape the former real-mode constraints of having to run in the lower 1M byte of memory. Many new applications, such as Windows, use DPMI memory.

DPMI memory is supported by CTOS/Vpc-supplied program called DPMIHOST.EXE. (DPMIHOST.EXE is not a DOS program and is not documented in the MS-DOS documentation.)

Obtaining DPMI Memory

To make DPMI memory available for a CTOS/Vpc session you must use the command **dpmihost**, normally in the AUTOEXEC.BAT file. (Changes to *Pc.sys* or CONFIG.SYS are not required.)

How CTOS/Vpc Allocates Memory

CTOS/Vpc allocates memory as follows:

1. First, about 1.5M bytes of the available memory are reserved for the CTOS/Vpc program and the first 1M byte of DOS memory.
2. Second, any EMS memory specified in the *Pc.sys* file is reserved.
3. Finally, any remaining memory, up to 16M bytes, is treated as a memory pool which can be used as XMS and/or DPMI memory.

    a. If you want to use XMS memory, you specify how much memory from this pool you want to use as XMS memory in the *Pc.sys* file.

    b. You don't need to specify DPMI memory. Any memory from the memory pool that is not used as XMS memory is used as DPMI memory.

    To display the amount of DPMI memory available during a CTOS/Vpc session, press **ACTION+M** and select Display Configuration.

Appendix A
Status Codes

Table A-1 lists and describes CTOS status codes for CTOS/Vpc.

Table A-1. CTOS/Vpc Status Codes

Status Code	Description
15800	An inconsistent state was discovered in the CTOS/Vpc software.
15801	A fatal error, such as an illegal opcode, occurred in the PC software. This may be due to an error in the PC program or an error in CTOS/Vpc. Occasionally, CTOS/Vpc displays an error subcode before exiting to display this status code.
15802	Reserved.
15803	An invalid color value was specified in the PC configuration file. Color values are between 0 and 63.
15804	Too many colors are specified in the PC configuration file. A color monitor can display a maximum of eight colors.
15805	Hardware and/or system software required to run CTOS/Vpc is not present on this workstation.
15806	Reserved.
15807	Access to a physical DOS partition on the disk drive is not supported on this platform. You must have a CTOS EISA/ISA workstation in order to make use of this feature.
15808	An error has been encountered while trying to access a physical DOS partition on the disk drive. The operating system is unable to obtain consistent disk geometry information for the disk drive.
15809	DriveC and DriveD have been assigned to the same physical device. Make the necessary changes to your CTOS/Vpc configuration file (*[Sys]<Sys>UserNamePC.sys*) and restart Vpc.

Appendix B
The Pc.sys Configuration File

Introduction

This appendix describes the options that are available for the *Pc.sys* configuration file. The information presented here is nearly the same information provided in Sections 1 through 10; it is repeated here for your convenience. This appendix provides information on the following topics:

- About *Pc.sys*
- Format of *Pc.sys*
- Floppy drive and pseudovolume options
- Hard drive and pseudovolume or native DOS partition options
- Printer configuration options
- Communications options
- Video options
- Keyboard options
- Memory options
- Suppressing the pop-up menu
- Cluster performance options

About the Pc.sys File

The *Pc.sys* file is a configuration file that CTOS/Vpc reads to map CTOS devices to MS-DOS device names and to further customize your MS-DOS environment. The *Pc.sys* file normally has the *UserName* prefix, for example, *UserNamePc.sys*, where *UserName* is your SignOn user name under CTOS.

When you start CTOS/Vpc, it searches for a configuration file that matches the name you signed on with. For example, if you are currently signed on as *Margarita*, CTOS/Vpc searches for a configuration file named *[Sys]<Sys>MargaritaPc.sys*. To specify a different user name, you can override the default by entering a configuration file name in the Executive command form.

In most cases, you must modify the *pc.sys* file before using CTOS/Vpc.

The Format of the Pc.sys File

The PC configuration file is written in the following format:

:Keyword:Value

where

:Keyword:	is the name of a configuration option, keywords and the placement of colons must not be changed.
Value	is the configurable parameter you define.

The Default Pc.sys File

The default *Pc.sys* file is shown in Example B-1.

Example B-1. Default Pc.sys File

```
:DriveA:[F0]
:DriveB:
:DriveC:[YourDrive] or Yourpsv.psv
:DriveCReadOnly?:No
:DriveD:
:DriveDReadOnly?:
:LPT1:[lpt]
:COM1:[comm]b
:GraphicsAdapter:vga
:ExtendedMemory:64K
```

Editing the Pc.sys File

The *Pc.sys* file is an ASCII file that you edit using the CTOS **Editor** command. To make changes to existing values, simply delete the existing value and add the new one. To add a new keyword and value, type the keyword exactly as shown below, followed by the desired value.

The new values are implemented when you restart CTOS/Vpc.

Note: *If a keyword, such as* :DriveA:, *appears more than once in the* Pc.sys *file, only the first occurence of the keyword is recognized and used.*

Floppy Drive and Hard Drive Options

Several options are available to help you configure floppy drives and hard drives. These options assign MS-DOS drive names to CTOS drives, assign passwords, make pseudovolumes read-only, and enable you to create dynamically expandable pseudovolumes. The options are listed below.

:DriveA:

Default: *[F0]*

Example: *:DriveA:[F0]*

This parameter maps a CTOS floppy drive to an MS-DOS drive name. You then use the MS-DOS drive name to access that drive when you are using CTOS/Vpc. You can specify a floppy drive on your local workstation only. (You can't specify a floppy drive on the server.)

On a diskless workstation, leave this parameter blank; you cannot access a floppy drive on the server with CTOS/Vpc.

:DriveB:

Default: No drive

Example: *:DriveB:[F1]*

You can specify a second floppy drive as MS-DOS drive B only if you have already specified another CTOS floppy drive as drive A.

:DriveAPassword:

Default: *[F0]*

Example: *:DriveAPassword:[F0]*

This parameter specifies a password for the floppy drive.

:DriveBPassword:

Default: none

Example: *:DriveBPassword:[F1]*

This parameter specifies a password for the floppy drive.

Hard Drive, Pseudovolume, and Native DOS Partition Options

:DriveC:

Default: Whatever pseudovolume, native DOS partition, or DOS hard disk you specified during the installation of CTOS/Vpc.

Example for a pseudovolume: *:DriveC:[Sys]<Sys>Your.psv*

Example for a native DOS partition: *:DriveC:[D0]*

This parameter maps a pseudovolume or a native DOS partition to an MS-DOS drive name. Specify the pseudovolume or native DOS partition that you want to be used as drive C. You may specify a pseudovolume located on the server or anywhere on the network that is accessible from your workstation. (You may specify a native DOS partition on the server or on the network only if the server or the target network node is an EISA/ISA workstation.)

Drive C must be a bootable volume unless you plan to boot from a floppy disk.

:DriveCReadOnly?:

Default: No

Example: *:DriveCReadOnly?:Yes*

To allow read-only access to the pseudovolume mapped to drive C, specify **Yes**.

:DriveCPassword:

Default: none

Example: *:DriveCPassword:Kristi*

This parameter specifies a password for the hard drive. If passwording is used on a CTOS hard disk that has either a pseudovolume as drive C or a native DOS partition as drive C, the password must be in effect before you start CTOS/Vpc. You can supply the password with the *DriveCPassword* parameter, or you can supply the password when signing on to the workstation, or you can supply the password using the **Path** command from the CTOS Executive.

However, *if* drive C is a DOS hard disk with no CTOS partition, you *must* use the *DriveCPassword* parameter. The password in this case must be the device password, which is the same as the device name, for example *D1*.

:DriveD:

Default: None

Example for a pseudovolume: *:DriveD:[Sys]<Sys>YourSecond.psv*

Example for a native DOS partition: *:DriveD:[D1]*

This parameter maps a pseudovolume to an MS-DOS drive name. Specify the pseudovolume that you want to be used as drive D. You may specify a pseudovolume located on the server or anywhere on the network that is accessible from your workstation. (You may specify a native DOS partition on the server or on the network if the server or target node is an EISA/ISA workstation.)

:DriveDReadOnly?:

Default: No

Example: *:DriveDReadOnly?:Yes*

To allow read-only access to the pseudovolume mapped to drive D, specify **Yes**.

:DriveDPassword:

Default: none

Example: *:DriveDPassword:FreshFish*

This parameter specifies a password for the hard drive. If passwording is used on a CTOS hard disk that has either a pseudovolume as drive D or a native DOS partition as drive D, the password must be in effect before you start CTOS/Vpc. You can supply the password with the *DriveDPassword* parameter, or you can supply the password when signing on to the workstation, or you can supply the password using the **Path** command from the CTOS Executive.

However, *if* drive D is a DOS hard disk with no CTOS partition, you *must* use the *DriveDPassword* parameter. The password in this case must be the device password, which is the same as the device name, for example *D1*.

:CreateLargePSV?:

Default: Yes

Example: *:CreateLargePsv?:Yes*

This parameter allows you to create a dynamically expandable pseudovolume (a pseudovolume that expands automatically whenever you need more space for MS-DOS files).

To create a pseudovolume that can expand up to 127M bytes, specify **:CreateLargePsv?:Yes**.

To create a pseudovolume that can expand up to 30M bytes, specify **:CreateLargePsv?:No**.

Printer Configuration Options

Several printer options are available to help you specify a printer, flush print buffers automatically (for spooled printing), and insert a form feed after each print job.

:LPT1:

Default: *[Lpt]*

Example: *:LPT1:[lpt]*

Note: *If you use a parallel port security key (dongle), the :LPT1: line must be set as follows:* :LPT1:[lpt].

This parameter lets you specify a printer for your CTOS/Vpc session. (Any printer you specify *must* be supported by MS-DOS or by your PC application.)

If you want to print directly to a printer connected to the parallel port on your workstation, *bypassing the CTOS Generic Print System*, specify *[Lpt].* which is the default.

If you want to use a GPS printer attached to your workstation, to your server workstation or to a networked server, specify a GPS printer name as follows:

:LPT1: [OldFaithful]

To find out what GPS printers are available to you, use the CTOS **Print Manager** command. (See the *CTOS Generic Print System Administration Guide* for information about setting up GPS printers.)

Specify *[Nul]* if you do not want to define a printer.

:AutomaticPrintFlush?:

Default: Yes

Example: *:AutomaticPrintFlush?:Yes*

By default, CTOS/Vpc flushes the print buffer during spooled printing if data is not sent to the printer within a 20 second interval. To suppress automatic flushing of the print buffer, specify **No**.

:AddFormFeed?:

Default: No

Example: *:AddFormFeed?:Yes*

To add a form feed to the end of each print job, specify **Yes**.

Communications Options

Communications options are available that allow you to specify which CTOS communications channels are used for DOS COM1 or COM2, and to specify the flow control protocol.

:COM1:

Default: *[Comm]B*

Example: *:COM1:[Comm]B*

This parameter maps a CTOS serial communications device to an MS-DOS communications device name. Specify an asynchronous communications channel on your workstation to be recognized by MS-DOS as COM1.

Valid CTOS communications channel device names are *[Comm]A* and *[Comm]B* for the channels on workstation processors, and *[Comm]1A* to *[Comm]1D* on port expander modules. On SuperGen Series 5000 workstations, valid device names are *[Comm]A* to *[Comm]C*.

If you do not want to attach a communications device, leave the value blank or specify *[Nul]*.

Note: *Do not specify a printer or queue name in this field.*

:COM2:

Default: *[Nul]*

Example: *:COM2:[Comm]A*

Do not specify a printer or queue name in this field.

Note: *If you use a second serial port, the total throughput through the two ports will be slightly less than if you used only one port, due to the overhead associated with port management.*

:ReadyBusy:

Default: None

Example: *:ReadyBusy:CTS*

This parameter defines device-ready and device-busy signals of communications devices attached to COM1. Specify *Xon/Xoff*, *CTS*, or *None*.

In *Xon/Xoff* mode, Xoff (13h) and Xon (11h) represent busy and ready respectively. Xon/Xoff mode should not be used if the data being transmitted contains Xoff and Xon characters. In *CTS* (clear to send) mode, the RS-232 signal *CTS* is dropped to indicate busy and is raised to indicate ready.

:ReadyBusy2:

Default: None

Example: *:ReadyBusy2:CTS*

This parameter defines device-ready and device-busy signals of devices attached to COM2. Specify *Xon/Xoff*, *CTS*, or *None*.

Video Options

You can configure CTOS/Vpc for EGA or VGA displays. You can also use the older MDA (monochrome, text only) type display.

:GraphicsAdapter:

Default: None

Example: *:GraphicsAdapter:VGA*

This parameter defines the video mode of CTOS/Vpc. Depending on its video controller and monitor, your workstation may be capable of EGA or VGA graphics. (See the *CTOS/Vpc Product Family Software Release Announcement* for detailed information about the graphics capabilities of specific video controller models.) Specify *EGA*, or *VGA*, as shown in the following example:

:GraphicsAdapter:VGA

To support MDA mode either on an older character-map monitor or on EGA or VGA monitors, specify *MONO*.

Keyboard Options

Keyboard options are available to help you customize keyboard performance. Normally, however, you don't need to use or change these options.

:KeyboardNationalizationFile:

Normally, you should not specify anything in this parameter because CTOS/Vpc automatically determines which keyboard is being used.

This parameter is available for the benefit of CTOS/Vpc users who have customized their keyboard tables. If you have a previously nationalized or otherwise customized keyboard table, you can include it here.

:KeyboardTimeToRepeat:

Default: 2

Example: *:KeyboardTimeToRepeat:2*

This parameter defines the delay time from when a key is depressed until when the repeating starts. Specify a number between 1 and 3, as shown below:

Value	Approximate delay until repeating starts
1	.2 seconds
2	.4 seconds
3	.7 seconds

:KeyboardRepeatFrequency:

Default: 2

Example: *:KeyboardRepeatFrequency:2*

This parameter defines the repeat rate when a key is continuously depressed. Specify a number between 0 and 3, as shown below:

Value	Approximate frequency of repetition
0	1 character/second
1	10 characters/second
2	20 characters/second
3	30 characters/second

Memory Options

Memory options are available to enable you to use EMS or XMS memory in a CTOS/Vpc session.

:ExpandedMemory:

Default: None

Example: *:ExpandedMemory:256K*

This parameter defines the number of K bytes of EMS memory on a 386 or later processor to allocate exclusively for EMS.

Specify a number from **16K** to **32768K** bytes.

:ExtendedMemory:

Default: None

Example: *:ExtendedMemory:256K*

This parameter defines the number of K bytes of XMS memory to allocate for CTOS/Vpc. CTOS/Vpc supports the Extended Memory Specification (XMS) standard, including the Upper Memory Blocks.

Specify a number from **1K** to **16384K** bytes. The value you supply is rounded upward to the next multiple of 64K bytes. Values over 16384K bytes are rounded down to 16384K.

Suppressing the Pop-Up Menu

CTOS/Vpc provides a pop-up menu that you can display by pressing **ACTION+M**. The menu allows you to examine your current configuration and lets you change printers and communications devices.

If you want to disable this feature, add the following to the *Pc.sys* file:

:SuppressAction-M?:Yes

The default is No.

Cluster and System Performance Options

These options enable you to assign a higher or lower priority to the CTOS/Vpc session and to enable you to make more efficient use of the CD-ROM drive or other CTOS cluster resources.

:PcPriority:

Default: 129

Example: *:PcPriority:129*

To increase or decrease the priority of a CTOS/Vpc process, specify a decimal number between 129 and 176, where 129 is the highest priority and 176 the lowest.

In some cases, it is necessary to raise this value so that low priority processes, such as GPS device drivers, can execute simultaneously with CTOS/Vpc. For more information, see the *CTOS System Administration Guide*.

:TerminateCTOSResources:

Default: No

Example: *:TerminateCTOSResources:Yes*

This parameter specifies whether to release CTOS resources, for example, when you have used the CD-ROM service. If you specify *Yes*, the resources are released when CTOS/Vpc is rebooted by pressing **ALT+CTL+DEL**. It is recommended that you specify *Yes* for this parameter any time an MS-DOS program uses LANce/pc or ClusterShare services to access remote resources.

:SleepOnIdle:

Default: Some

Example: *:SleepOnIdle:Some*

This parameter specifies whether to allow CTOS/Vpc to sleep if DOS or Windows is idle, freeing up system resources for other CTOS applications. During the sleep intervals, DOS and Windows applications continue to operate while CTOS/Vpc allows the other CTOS applications to execute.

The following values are available:

None	This disables all idle-detection and sleeping. This option maximizes the responsiveness of CTOS/Vpc--at the expense of other CTOS applications of the same or lower priority.
Some	The default mode of operation. Occasional sleeping will occur only if DOS or Windows is idle.
More	CTOS/Vpc will sleep when DOS or Windows is idle and occasionally even when they are not idle. This setting will decrease CTOS/Vpc responsiveness.
Most	CTOS/Vpc will sleep when DOS or Windows is idle and frequently even when they are not idle. This setting will decrease CTOS/Vpc responsiveness noticeably, and is used only when you need to give other CTOS applications more CPU time.

Appendix C
Troubleshooting

Introduction

This section provides general troubleshooting information related to CTOS/Vpc. It provides information on the following:

- Problems starting CTOS/Vpc
- Application-related problems
- Drive access problems
- Performance problems
- Windows-related problems
- Problems starting multiple CTOS/Vpc sessions
- Communications-related problems

Each of these topics is described below.

Problems Starting CTOS/Vpc

Your attempt to start CTOS may result in the following error message:

```
Cannot open configuration file, status code = 203
Configuration file: [Sys]<Sys>UserPc.sys
No such file (Error 203)
```

This message is displayed when CTOS/Vpc cannot find the correct *pc.sys* file. When you start CTOS/Vpc, it searches for a configuration file that matches the name you signed on with. For example, if you are currently signed on as *Nikki*, CTOS/Vpc searches for a configuration file named *[Sys]<Sys>Nikkipc.sys*. If you want to specify a different *pc.sys* file, you must override the default by entering a configuration file name in the Executive command form or by specifying the correct *pc.sys* file in the Context Manager configuration file.

Application-Related Problems

If you have problems starting or running an application, check the application documentation to make sure you set up the application properly.

If the application is set up properly, check the *CTOS/Vpc Product Family Software Release Announcement* to determine whether any restrictions or limitations apply to the application.

Drive Access Problems

If you cannot access drive C or D, or if the drive C or D you can access is not the drive you expected to access, check your *pc.sys* file to make sure you assigned the correct pseudovolume or DOS partition to drive C or D.

If you cannot write to drive C or D, check your *pc.sys* file; the drive may have been made read-only (write-protected). To change the drive's read-only status, change the appropriate line in the *pc.sys* file.

If you made drive C or D read-only, some applications on the drive may fail to run because they need to write to the drive on which they are placed. You can get around this by installing the application on a drive that is not read-only, or by having the application write to drive that is not read-only (if the application allows you to do this).

If you are using a drive that does not contain a CTOS partition, you must specify the device name of the drive as the password. For example, if drive *[D1]* is a DOS drive used as drive C, you must enter the following line in pc.sys:

```
:DriveCPassword:D1
```

Performance Problems

An application can fail to run or fail to perform satisfactorily due to a number of reasons:

- Insufficient memory
- A printing setup that is not optimized
- Failure to use disk caching (all applications)
- Failure to use SmartDrive caching (to improve floppy drive performance)
- Wrong baud rates used (in communications applications)

Insufficient Memory

If an application fails to start, the problem may be due to insufficient memory. Determine the type (EMS, XMS, or DPMI) and quantity of memory that is required. Normally the application documentation will tell you this.

If you need more EMS memory, or more XMS memory, modify the *pc.sys* file and the DOS CONFIG.SYS file as described in Section 10.

Non-Optimized Printing

If you are having trouble printing to a particular printer, or your print jobs are taking too long, make sure your *pc.sys* file is set up properly to use either CTOS GPS print services and printers (if that is what you want) or DOS printing. (See Section 5.) DOS printing is fastest, but CTOS GPS provides more extended features and access to more printers.

Failure to Use Disk Caching

All applications can benefit from disk caching. Some applications really need a disk cache to run well. If your application is running slowly, try using a disk cache (see Section 9).

Failure to Use SmartDrive

Floppy drive performance can be very slow even on native PC environments. Using SmartDrive to cache floppy drives can speed up performance dramatically (see Section 9).

Wrong Baud Rates

Communications applications can operate too slowly if you have the baud rate set too high or too low. If the baud rate is set too high, you get more errors and retransmissions, resulting in slower actual data transfers. Or, if the rate is too low, there are fewer errors but the data transfer still takes longer than it needs to. See Section 7 for information about baud rates.

Windows-Related Problems

If you use Windows, you can experience several problems caused by insufficient workstation memory, insufficient Context Manager partition space, noninstallation of the mouse driver, or noninstallation of the DPMIHOST command. The symptoms of these problems are:

- During installation, Windows "hangs," forcing you to abort the installation
- Windows won't start
  - VGA initialization error message displayed
  - Error message W031V011E displayed
  - Windows won't start in enhanced mode
  - Windows won't start in standard mode
- Windows applications won't start

Each of these symptoms and remedies for them is described below.

Windows "Hangs" During Installation

If Windows "hangs," or freezes during the Windows installation process, forcing you to reboot, check the following:

- If you used the Unisys mouse driver for Windows, make sure the CMOUSE driver from the CTOS/Vpc DOS files diskette is installed in the CONFIG.SYS or the AUTOEXEC.BAT file. It must be installed before you install Windows.
- If you used a non Unisys mouse driver, make sure the corresponding DOS driver for the mouse has been installed in the CONFIG.SYS or the AUTOEXEC.BAT file.
- Does the CTOS/Vpc session have at least 512K bytes of DPMI memory available? If you don't have 512K bytes of DPMI memory, the installation will fail.

  You can check the amount of DPMI memory by pressing **ACTION-M** and then selecting Display Current Configuration. If you don't have enough DPMI memory, you may have to decrease the amount of XMS or EMS memory you specified in the CTOS *pc.sys* file.
- If you are using Context Manager, you may need to increase the size of the Context Manager partition. The Context Manager partition should be at least 3M bytes.
- If Windows attempts to start, but nothing happens, make sure the *:GraphicsAdapter:* line in *pc.sys* is set for VGA.

Windows Won't Start (VGA Initialization Error)

You might encounter the following errors when you start Windows.

VGA Initialization Error Message is Displayed

You may see the following VGA initialization after Windows fails to start:

```
An error occurred while trying to initialize the VGA adapter
```

Check the *:GraphicsAdapter:* line in the *pc.sys* file. You must specify *VGA* or *EGA*: if you specify *none* or *mono*, Windows will not start.

Error Message W031V011E is Displayed

You may see the following error message after Windows fails to start:

```
W031V011E
```

Make sure you installed the CTOS/Vpc DOS files diskette as described in Section 2. Make sure the following line is entered in your AUTOEXEC.BAT file:

```
C:\VPC\DPMIHOST.EXE
```

If this line is not entered in the AUTOEXEC.BAT file, enter it now and reboot MS-DOS.

Windows Won't Run in Enhanced Mode

You may see the following error message after Windows fails to start:

```
Cannot run Windows in 386 enhanced mode with the currently
installed protected-mode software.  Quit the protected-mode
software and try again.
```

CTOS/Vpc does not support Windows in enhanced mode. You must force Windows to run in standard mode by starting Windows with the following command:

```
Win /s
```

Windows Won't Run in Standard Mode

You may see the following error message after Windows fails to start:

```
Cannot start Windows in Standard Mode.  Make sure you are not
running other protected-mode software, or try starting Windows
in 386 enhanced mode by typing win /3.
```

This message is displayed if you install a Windows version other than the CTOS/Vpc version supplied by Unisys. You must install and use the CTOS/Vpc version of Windows that is supplied by Unisys.

Windows Applications Won't Start

If a Windows application attempts to start, but fails and displays an insufficient memory message,

- Check workstation or Context Manager partition memory. Recommended amounts are provided in the *CTOS / Vpc Product Family Software Release Announcement.*
- Check the amount of memory that is available for your Windows application. To do this, highlight the Help menu in the Windows Program Manager, and choose "About Program Manager" to display the amount of memory currently available to Windows.
- See the *CTOS / Vpc Product Family Software Release Announcement* to determine whether any restrictions or limitations apply to the application.

Problems Starting Multiple CTOS/Vpc Sessions

If you are running multiple instances (sessions) of CTOS/Vpc on your workstation, you may see the following error message after one of the CTOS/Vpc sessions fails to start:

```
Pseudovolume: [Sys]<Sys>User.psv
Unable to open DriveC, status code = 220
Press any key to exit.
```

(DriveD may be mentioned instead of DriveC.) This message is displayed when you try to start a CTOS/Vpc session using a pseudovolume that is already being used by another session. Unless you want to make that pseudovolume read-only, you must reconfigure your *pc.sys* file to use a different pseudovolume.

Communications Problems

You may encounter two similar communications problems; one regarding a failure to open, and the other regarding a failure to close a COM device.

Can't Open a COM Device

If you are running more than one CTOS/Vpc session, and you are using communications ports, you may encounter the following error message:

```
Unable to open COM device [comm]a, status code = 8401
Press <GO> to continue without this COM device or <FINISH> to
exit.
```

This message is displayed when more than one CTOS/Vpc session tries to use the same CTOS communications channel. The first CTOS/Vpc session has full control of a CTOS communications channel; no other subsequent CTOS/Vpc session can gain control, nor can any CTOS application gain control of that channel.

You should reconfigure the *pc.sys* file for each CTOS/Vpc session so that each session uses a different CTOS communications channel.

Can't Close a COM Device

If you are running more than one CTOS/Vpc session, and you are using communications ports, you may encounter the following error message:

```
Unable to close COM device [comm]a, status code = 206
Press <GO> to continue without this COM device or <FINISH> to
exit.
```

This message is displayed when more than one CTOS/Vpc session tries to use the same CTOS communications channel. The first CTOS/Vpc session has full control of a CTOS communications channel; no other subsequent CTOS/Vpc session can gain control, nor can any CTOS application gain control of that channel.

You should reconfigure the *pc.sys* file for each CTOS/Vpc session so that each session uses a different CTOS communications channel.

Appendix D
CTOS and PC Keyboard Key Mapping

The key layout on your CTOS workstation keyboard can differ substantially from a PC keyboard. Although the alphanumeric and function keys have essentially the same locations on both the PC and the CTOS keyboard, other special PC keys such as **SHIFT** or **CTRL** have different locations on a CTOS keyboard.

In addition, special PC keys may not be marked on the CTOS keyboard. For example, the **COPY** key is a CTOS-specific key, but under CTOS/Vpc can also function as the PC-specific **ALT** key, although the key may be marked only as **COPY** on the keyboard.

Keyboard Decals

To help you quickly identify the PC-specific keys on a CTOS I-bus style keyboard, CTOS/Vpc provides a set of decals containing the PC key names. You should attach each PC key decal to the corresponding workstation key, following the instructions provided with the decals. (CTOS workstation keys function in their usual manner when you are not using CTOS/Vpc.)

CTOS and PC Key Mapping Tables

For additional help in identifying PC-specific keys on the various CTOS keyboards, see Tables D-1 through D-5.

Table D-1. K1 Keyboard

Workstation Key	PC Key
COPY	ALT
MOVE	BREAK
CODE	CTRL
DELETE	DEL
SCROLL DOWN	END
RETURN	ENTER
CANCEL	ESC
SCROLL UP	HOME
OVERTYPE	INS
MARK	NUM LK
NEXT PAGE	PGDN
PREV PAGE	PGUP
1/2-1/4	* (asterisk on numeric keypad)
SHIFT-1/2-1/4	PRT SC (while in DOS)
CTRL--	PRT SC (while in Windows)
BOUND	SCROLL LK
GO	SYS REQ
NEXT	+

Table D-2. K2 Keyboard

Workstation Key	PC Key
COPY	ALT
DELETE CHAR	BREAK
CODE	CTRL
DELETE	DEL
SCROLL DOWN	END
RETURN	ENTER
CANCEL	ESC
SCROLL UP	HOME
OVERTYPE	INS
%	NUM LK
PAGE	PAUSE
NEXT PAGE	PGDN
PREV PAGE	PGUP
WORD	PRT SC
COL	SCROLL LK
LINE	SYS REQ
GO	SYS REQ
PARA	F11
SENT	F12
NEXT	ENTER (NUMERIC PAD)
DIVIDE KEY	/ (NUMERIC PAD)
X (NUMERIC PAD)	* (NUMERIC PAD)

Table D-3. K5 Keyboard

Workstation Key	PC Key
ALT	LEFT ALT
SYSTEM	RIGHT ALT
DELETE CHAR	BREAK
CODE	CTRL
SCROLL DOWN	END
RETURN	ENTER
CANCEL	ESC
SCROLL UP	HOME
OVERTYPE	INS
%	NUM LK
PAGE	PAUSE
NEXT PAGE	PGDN
PREV PAGE	PGUP
WORD	PRT SC
COL	SCROLL LK
LINE	SYS REQ
GO	SYS REQ
PARA	F11
SENT	F12
NEXT	ENTER (NUMERIC PAD)
DIVIDE	/ (NUMERIC PAD)
X (NUMERIC PAD)	* (NUMERIC PAD)

Table D-4. SuperGen I-bus Keyboard (SG-101-K)

Workstation Key	PC Key
ALT	LEFT ALT
SYSTEM	RIGHT ALT
DELETE CHAR	BREAK
CODE	CTRL
SCROLL PREV	END
RETURN	ENTER
CANCEL	ESC
SCROLL NEXT	HOME
OVERTYPE	INS
%	NUM LK
PAGE	PAUSE
PAGE NEXT	PGDN
PAGE PREV	PGUP
WORD	PRT SC
COL	SCROLL LK
LINE	SYS REQ
GO	SYS REQ
PARA	F11
SENT	F12
NEXT	ENTER (NUMERIC PAD)
DIVIDE	/ (NUMERIC PAD)
X (NUMERIC PAD)	* (NUMERIC PAD)

Table D-5. PC Style Superset Keyboard (SG-102-K)

Workstation Key	PC Key
CTOS LOCK + 5 (NUMERIC PAD)	SCROLL LOCK

CTOS Keyboard LED Indicators

On the K1, K2, K5, and SG-101-K keyboards, the LEDs on keys **F8**, **F9**, and **F10** are used to indicate the following PC functions:

F8 LED	NUM LOCK
F9 LED	CAPS LOCK
F10 LED	SCROLL LOCK

Superset Keyboard

The SG-102-K Superset keyboard toggles between PC mode and CTOS lock mode. If you press the CTOS **LOCK** key on the Superset keyboard, the keys on the numeric an auxiliary keypad function as the following CTOS keys:

PC Mode	CTOS Lock Mode
0	MARK
1	MOVE
2	SCRL NXT
3	COPY
6	NEXT
7	ACTION
8	SCRL PRV
9	FINISH
DEL	BOUND
ESC	CANCEL
CTRL	CODE
INSERT	OVERTYPE
PAGE UP	PG PREV
PAGE DOWN	PG NEXT
ENTER	GO
F1	HELP

Note that the **SCROLL LOCK** LED is on when the keyboard is in CTOS lock mode. (There is no LED for the PC **SCROLL LOCK** key, but the functionality is hidden on the numeric keypad when **NUMLOCK** is off.) To return the keyboard to PC mode, press the CTOS **LOCK** key again.

SG1000 Keyboard

There are seven LEDs on the SG1000, three of which are used to reflect the current state of the keyboard. The 4th LED indicates the state of numlock and the numeric keypad, and is explained in greater detail below. The 5th LED reflects the state of **CAPSLOCK**. The 6th LED is used to indicate CTOS mode status, also explained below.

The keyboard on the SG1000 has fewer keys than a standard PC keyboard. The missing keys are all available by using the function key **FN** in conjunction with those keys having a colored legend on their front edge. Two exceptions to this are **SYSRQ** and **SCRLLK**, which should be available as **FN+PRTSC** and **FN+HOME** respectively, according to the function key legends. They are both available using the **ALT** key instead of the function key, so **ALT+PRTSC** is **SYSRQ**, and **ALK+HOME** is **SCRLLK**. There are also two function key combinations that are unlabeled. The right **ALT** and right **CTRL** keys are available as **FN+ALT** and **FN+CTRL** even though there are no colored legends to indicate this functionality. Most of the other missing keys are those that make up the numeric keypad.

The numeric keypad is embedded in the main keyboard, and can be accessed in two ways. For temporary use, you can hold down the function key while using the numeric keys. For extended use, you can permanently enable the numeric keypad by pressing **FN+NUMLOCK**. While the numeric keypad is enabled, use of the function key allows access to the normal keyboard keys. Pressing **FN+NUMLOCK** again returns the keyboard to its normal state. The state of **NUMLOCK** affects the numeric keypad keys in the same manner as on a normal PC keyboard (ie. numeric values versus screen and cursor positioning).

The 4th LED is used to indicate both the state of **NUMLOCK** and the state of the embedded numeric keypad. When **NUMLOCK** is active the LED is on, and when the numeric keypad is enabled the LED blinks. This results in four possible LED states: Off; Mostly Off; Mostly On; and On. Mostly On means the LED is on but briefly blinks off every three seconds. Likewise, Mostly Off means the LED is off but briefly blinks on every three seconds. To illustrate the behavior of the keyboard in each of the four states, the result of pressing **J** is provided in parenthesis.

When the LED is Off, **NUMLOCK** is inactive and the numeric keypad is disabled (J). When the LED is Mostly Off, **NUMLOCK** is inactive and the numeric keypad is enabled (END). When the LED is Mostly On, **NUMLOCK** is active and the numeric keypad is disabled (J). And when the LED is On, **NUMLOCK** is active and the numeric keypad is enabled (1).

In addition to the embedded numeric keypad, there is an embedded keyboard mouse that is available if you have no other mouse or trackball attached to your system. As with the numeric keypad, the keyboard mouse can be accessed in two ways. For temporary use, you can hold down the function key while using the mouse keys. For extended use, you can permanently enable the keyboard mouse by pressing **FN+F10**. While the keyboard mouse is enabled, use of the function key allows access to the normal keyboard keys. Pressing **FN+F10** again returns the keyboard to its normal state. There is no indication as to whether or not the keyboard mouse is enabled.

There are certain CTOS keys that are necessary in order to interact with the CTOS environment, specifically **GO**, **ACTION**, **FINISH**, **SYSTEM**, and **HELP**. The first case, **GO**, is always available as **ALT+ENTER** or on the \| key while in CTOS mode. The rest are only available when the keyboard is in CTOS mode. CTOS mode is toggled using **FN+HOME**, which is labeled as **SCROLL LOCK**. **SCROLL LOCK** is available as **ALT+HOME** to any application needing that functionality, although there is no indication as to whether or not **SCROLL LOCK** is active. When in CTOS mode, home behaves as **ACTION**, end behaves as **FINISH**, **PRTSC** behaves as **SYSTEM**, **F1** behaves as **HELP**, and \| behaves as **GO**.

Index

A

AUTOEXEC.BAT configuration,
  for CDR ASSIGN, 8-8
  for CD-ROM, 8-6 through 8-7
  for multiple CD-ROM drives, 8-9

B

baud rates (*See* serial communications)

C

caching (*See* disk caching)
CDR ASSIGN entries, 8-8
  for CD-ROM on server, 8-9
  for multiple CD-ROM drives, 8-9
  for remote CD-ROM drive, 8-9
CD-ROM drives,
  CDDRIVER.EXE, 8-4
  CTOS/DOS interoperation, 8-1 through 8-3
  locating MSCDEX.EXE extension, 8-4
  locating drivers, 8-4
  setting up, 8-3
CDDRIVER.EXE, 8-4
COM1/COM2 (*See* serial communications)
CONFIG.SYS,
  configuring for CD-ROM, 8-6 through 8-8
configuration, 2-1, 2-13
  information sources, 2-13
    MS-DOS, 2-14
    Windows, 2-15
conventional memory, 10-5
CTOS CD-ROM service,
  installing, 8-5
  SysInit.jcl, 8-5 through 8-6
CTOS/DOS files, 6-1 through 6-14
CTOS GPS (*See* Generic Print System)
CTOS mouse service,
  installing, 4-2
  SysInit.jcl, 4-2 through 4-3
CTOS volume password,
  supplying for CTOS/Vpc, 3-7
CTOS/Vpc,
  compatibility with PCs, 1-5
  configuring, 2-13
    defined, 1-1
    general performance, 1-5
  installation environment, 2-1
  installing, 2-1 through 2-12
    multiple sessions won't start, C-7
    PC emulation supported by, 1-2
    tasks you can do with, 1-1
  using, 2-13
  won't start, C-1

D

device password,
  when required, 3-6
  supplying for CTOS/Vpc, 3-6
disk caching
  described, 9-1
  types available under CTOS/Vpc, 9-2
  using CTOS caching, 9-2
  using SmartDrive, 9-3
  using to improve floppy drive performance, 9-3
  choosing the type of caching that's best for you, 9-4
  amount recommended, 9-5
DOS partition (*See* native DOS partition)
DOS hard disk,
  defined, 1-4
  accessing on a server workstation, 3-6
  accessing on a remote network node, 3-6
  configuring CTOS/Vpc for, 3-6
  making read-only, 3-8
DPMI, 10-3, 10-4, 10-8 through 10-9
drive letters (DOS) and CTOS/Vpc, 3-18
dynamically expandable pseudovolume (*See* pseudovolume)

E

EMS, 10-3, 10-4, 10-6 through 10-7
enhanced mode (*See* Windows)
expandable pseudovolume (*See* pseudovolume)

F

fixed-size pseudovolume (*See* pseudovolume)
floppy drives,
  configuring Pc.sys for, 3-3
  using with CTOS/Vpc, 3-1

G

Generic Print System,
  configuring Pc.sys for, 5-5
  using for DOS print jobs under CTOS/Vpc, 5-3
GPS (*See* Generic Print System)

H

hard drives
  accessing on a server workstation, 3-4 to 3-6
  accessing on remote network nodes, 3-4 to 3-6
  configuring Pc.sys for, 3-4
  preparing hard disk partitions, 2-3
  using DOS hard disks for, 3-6
  using native DOS partitions for, 3-5
  using pseudovolumes for, 3-4
  using with CTOS/Vpc, 3-1
HIMEM.SYS, 10-8

I

installation, CTOS/Vpc, 2-1 through 2-12
applications, 2-15
DOS files, 2-9 through 2-11
MS-DOS, 2-14
new, 2-7
preparing DOS partition, 2-3
preparing pseudovolume, 2-4
public installation, 2-11 through 2-12
updating, 2-5
Windows, 2-15

K

keyboards,
identifying PC keys on a CTOS-style keyboard, D-1 to D8

M

memmaker, using, 2-3, 2-14
memory, 10-1 through 10-9
allocation, 10-9
conventional, 10-5
DPMI, 10-3, 10-4, 10-8 through 10-9
EMS, 10-3, 10-4, 10-6 through 10-7
MS-DOS, 10-3
not enough, 10-2
reserving, 10-2
restricting, 10-2
supported MS-DOS types, 10-3, 10-4
upper memory area, 10-5 through 10-6
upper memory blocks, 10-5 through 10-6
XMS, 10-3, 10-4, 10-7 through 10-8
memory cache (*See* disk caching)
Microsoft Windows (*See* Windows)
modems supported, 7-2
mouse driver,
installation, 4-3 through 4-5
CTOS/Vpc, 4-4
other, 4-4
Windows, 4-5
mouse installation,
preliminary tasks, 4-1
connecting, 4-1
MS-DOS driver, 4-3
MSCDEX.EXE, 8-8
MSDOS Read command, 6-2 through 6-6
MSDOS Write command, 6-1, 6-2, 6-7 through 6-10
MSDOS Directory command, 6-1, 6-2, 6-11 through 6-14
MS-DOS,
configuring, 2-14
hard disk (*See* DOS hard disk)
installing, 2-14
memory available, 10-3
mouse driver, 4-3
supported memory types, 10-3
multiple CD-ROM drives, using, 8-9

N

native DOS partition
  accessing on a remote network node, 3-5
  accessing on a server workstation, 3-5
  configuring CTOS/Vpc for, 3-5
  creating a, 1-4, 2-3
  described, 1-4
  making read-only, 3-8
null modems,
  using, 7-2

P

partition, 2-2, , 2-3
passwords (*See* CTOS volume password; *See* also device password)
PEMM, 10-6
printers,
  support required, 5-1
printing from CTOS/Vpc,
  configuring the Pc.sys file for, 5-4 to 5-5
  options available, 5-3
  using CTOS print services, 5-3
  using CTOS spooler, 5-3, 5-5
  using DOS printing, 5-2
pseudovolumes,
  accessing on a server workstation, 3-4,
  accessing on a remote network node, 3-4
  and CTOS file system, 1-4
  configuring CTOS/Vpc for, 3-4
  creating, 3-9 to 3-13
  described, 1-4
  dynamically expandable, 3-9
  fixed-size, 3-9
  making read-only, 3-8
  maximum allowed per CTOS/Vpc session, 1-4
  maximum size, 3-14
  resizing, 3-14
  types of, 3-9

R

remote CD-ROM drive, 8-9
reserving memory, 10-2
restricting memory, 10-2
ROM BIOS,
  emulation of, 1-2
RTS/CTS (*See* serial communications)

S

serial communications,
  CTOS communications channels supported, 7-1
  maximum baud rates, 7-6
  using two communications channels, 7-1, 7-6
  configuring Pc.sys for, 7-2 to 7-5
  flow control using CTS/RTS, 7-5
  flow control using Xon/Xoff, 7-4, 7-5
  excessive errors/retransmissions, C-4
  can't close a COM device, C-8
  can't open a COM device, C-8
Size PSV command, using, 3-14 to 3-15
SmartDrive (*See* disk caching)

software virus,
  described, 1-8
  protecting against, 1-8
standard mode (*See* Windows)
status codes, A-1

T

Troubleshooting CTOS/Vpc, C-1 to C-8

U

upper memory area, 10-5 through 10-6
upper memory blocks, 10-5 through 10-6

V

video drivers, 1-9
virus (*See* software virus)

W

Windows
  enhanced mode, 1-8
  installing, 2-15
  installation problems, C-5
  mouse driver, 4-5
  standard mode, 1-8
  using, 2-15
  version required by CTOS/Vpc, 1-8
  WINSTALL.BAT, 2-15
  won't run in enhanced mode, C-6
  wont' run in standard mode, C-6
  won't start, C-5 to C-6
WINSTALL.BAT, 2-15
workstation memory,
  determining amount, 10-1
  used by programs, 10-1

X

XMS, 10-3, 10-4, 10-7 through 10-8
Xon/Xoff (*See* serial communications)