DAVONG

Multi-OS™/ Davong MultiLink™

IBM® PC and
IBM® XT
128K Minimum

Davong MultiLink
File Server Station
192K Minimum

Utilities Manual

A0384-03-200041

D A V O N G

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Preface

Multi-OS™ from Davong Systems, Inc. lets your hard disk drive and IBM or XT computer work in tandem to produce extremely fast and reliable high-capacity data storage.

In essence, Multi-OS is a refined *disk driver* that allows your hard disk drive to communicate (i.e., transfer data) with your IBM PC or PC XT. In practical use, Multi-OS is a hard disk management system that puts you in control of the storage space on your hard disk.

This manual will show you how to use Multi-OS effectively. It describes the HDMGR (Hard Disk ManaGeR) utility program and Boot Options that will let you best manage and protect the storage space on your hard disk drive.

Before you can proceed with this manual, make sure your hard disk drive is installed and your Multi-OS utilities copied to your hard disk. If you have not performed these tasks, do so before you continue.

You can use the utilities described in this manual with all operating systems supported by Davong Systems. The options described here also work with the Davong MultiLink™ local area network. In addition, if you are using DOS, you can remove Chapter 4 "Using the Multi-OS Utilities With DOS" from your *Multi-OS Installation Manual* and insert it into this manual as Chapter 4.

If you installed Multi-OS with QINSTMOS and are using your Master Quick Boot Diskette, you will probably have no need of this manual.

Chapter 1 defines terms used in this manual, explains menus, and briefly describes the conventions used in this manual.

Chapter 2 describes the tasks you can perform with the HDMGR program. This chapter is arranged by tasks, not alphabetically.

Chapter 3 shows how to change your Boot Options. It describes how you can save these changes so you can boot from a floppy disk (i.e., your Master Boot Diskette) or from your hard disk drive itself. The *Multi-OS Installation Manual* contains two additional Boot Options in Sections 5 and 6. You can move them to Chapter 3 of this manual after you have finished your installation.

The table of contents includes a Chapter 4. This chapter is in the DOS version of the *Multi-OS Installation Manual*. For your convenience, you can transfer it to this manual.

Appendix A explains the editing keys you use with Multi-OS.

Appendix B explains how to optimize storage space on your hard disk.

Appendix C lists the error messages you might receive while using Multi-OS. Each message is defined and explained.

You will also find a Glossary of terms as well as an Index to this manual.

Certain conventions are used in this manual. The <**Enter**> key on the IBM keyboard is represented as ◄┘. Other control keys are placed within brackets—for instance, <**Ctrl**>. These keys are represented as keycaps (simulations of the actual key) in Appendix A. In sections where you are asked to make keyboard entries, sample entries are printed in boldface type; e.g. **MYVOL.** Screen entries are presented in text as This typeface.

In general, Multi-OS does not differentiate between upper- and lower-case letters; however, any entries you type when using the HDMGR and Boot Options screens are displayed in boldface, upper-case characters.

The chart on the next page shows which chapters you will need to read for some of the more common tasks. Read it carefully—you may fall into more than one category.

Reader	Chapters					
	1	**2**	**3**	**A**	**B**	**C**
If you are unfamiliar with hard disk volumes	✔	✔	✔		✔	
If you want to create and name your own volumes	✔	✔	✔		✔	
If you need to delete your volumes and start over	✔	✔	✔		✔	
If you want to change your user name	✔		✔			
If you want to change your boot password	✔		✔			
If you need to transfer volumes or files between systems	✔	✔	✔			
If you forget your password		✔	✔			
If you need to expand or shrink a volume	✔	✔	✔			
If you used QINSTMOS to install your hard disk and want to change your disk space allocation	✔		✔		✔	
If you need to troubleshoot your system						✔

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Before
You Begin

The task of managing huge quantities of data can be an overwhelming one.

Floppy diskettes are convenient if you only have four or five, but frustrating when you waste valuable time searching for the one floppy out of 50 that you need right now. And after you find it, you lose even more time because you must insert and load the contents of the diskette into the computer each time you want to use it.

A hard disk system eliminates these problems. All your data is in one place. A 10-megabyte hard disk system, for example, can store the equivalent of 64 single-sided floppy diskettes. And, your information is available to you within milliseconds.

Because hard disk systems can hold vast quantities of data, you need "tools" to manage them effectively. Davong Multi-OS software provides these tools via the HDMGR (an acronym for Hard Disk ManaGeR) program and Boot Options described in this manual.

This chapter explains the basic concepts you need to know to use the HDMGR program and Boot Options. This chapter defines terms, concepts, and keys you need to use the options detailed in this manual.

The HDMGR program and Boot Options are universal programs; although your disk drive must have been installed under Multi-OS, versions of these two programs run under the IBM® DOS, CP/M-86™, Concurrent CP/M-86™, or the UCSD p-System® operating systems. This means you don't have to use Multi-OS to run the HDMGR program although two of the options (Mounted Volumes and Resources) will not function unless you are using Multi-OS.

New Terms

Even though this manual contains a glossary of terms, there are words and phrases you need to understand before you begin using the Multi-OS utility programs.

Volumes

A volume is a contiguous area of storage space on a hard disk drive. You use a hard disk volume the same way you do floppy diskettes—to store information. The Multi-OS software allows you to create several kinds of volumes:

■   A *data* volume contains text files, data files, or programs just like a floppy diskette.

■   An *import/export* volume is a temporary volume used to move files from one operating system to another; e.g., IBM DOS to CP/M.

■   A *pipe* volume is used to send and receive information to another program or workstation (especially useful in the Davong MultiLink™ network).

Each volume must have a unique name. When you use the HDMGR options (described in Chapter 2) to create your own volumes, you must follow certain rules.

1. The name can be up to 16 characters; for example, DOS1, ROOT, MYDISK, 14CECIL, SAGGITAL CREST.

2. You cannot use characters that don't print on the screen; for instance, keys that you press in conjunction with the <**Ctrl**> key.

3. You cannot use commas, hyphens, back slashes, colons, and semi-colons in the volume name.

4. You cannot use the greater-than (>), less-than (<), or equals symbols, or the vertical line (¦).

5. You cannot use the characters \1 through \4. (\1 through \4 are used exclusively for default drive designations.)

Directories

A *directory* is a special volume that points to the disk locations of volumes under its jurisdiction. You can think of it as an index to other volumes. When you initialized your disk drive and named it ROOT (or a name of your choice), you created a *master directory*. You can divide this directory into subdirectory volumes that point to other subdirectories or other volumes. Generally, volumes in a subdirectory contain similar types of data. Note that these are *volume* directories and subdirectories, *not* DOS 2.x file directories and subdirectories. Figure 1-1 illustrates an example disk structure with the master directory represented as the "president" of the company. Other subdirectories and volumes "report" to the master directory. This is called a *hierarchical* structure.

Figure 1-1. Hierarchical Volume Structure

© Copyright Davong Systems, Inc. 1983, 1984
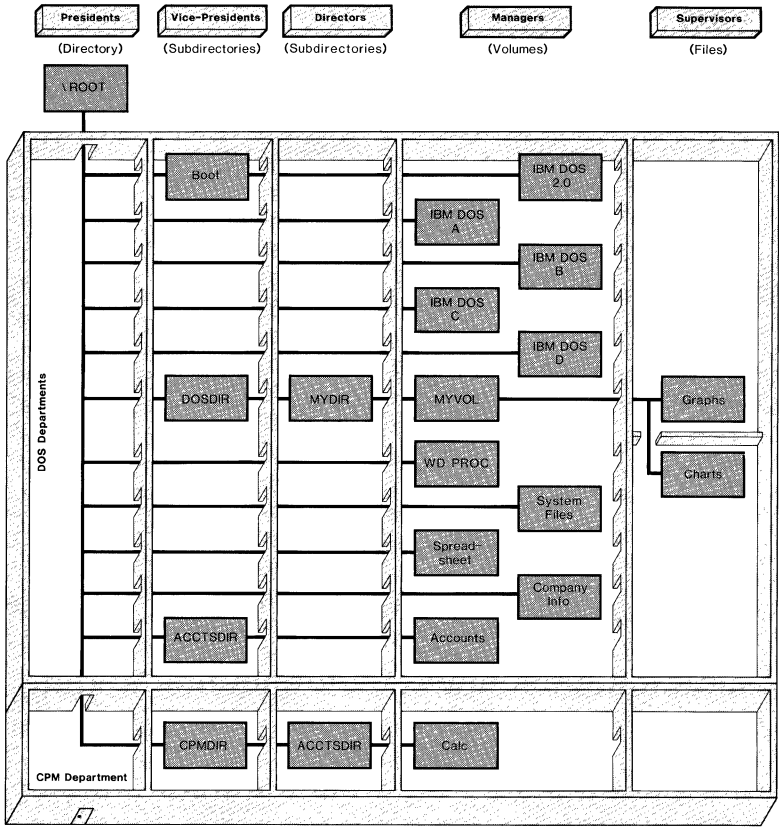
Pathnames

Because all volumes are linked to the master directory in this hierarchy, you must have some way to specify the particular volume you want.

You create a *pathname* for a volume when you create the volume. For instance, in Figure 1-1, there is a volume labeled MYVOL. Notice that before you can get to MYVOL's "office," you must start with \ROOT (the master directory), which in turn points you to DOSDIR, which in turn points you to MYDIR. It is MYDIR that points you to MYVOL. You could type the entire pathname each time you want to use the HDMGR utility program options. In this case, you would type \ROOT\DOSDIR\MYDIR\MYVOL. You must separate each name with a backslash. However, there is an easier way.

Working Directory

A *working directory* gives you direct access to volumes on your hard disk in a particular directory. Instead of typing the entire pathname when you want to use HDMGR or Boot Options, you can type the directory and subdirectory name(s) on the line labeled Working directory. You don't have to do so, but it saves typing time. Most of the time, your working directory will probably contain only the name of the master directory.

You can change the working directory at any time while working in the HDMGR program. Use the up arrow key to move the cursor to the working directory line. Press <**Ctrl**> and <**End**> together to delete the contents of the line. Then, simply type in the complete pathname (pre-ceded by a backslash (\)) to the new directory you want to access.

Once you type a pathname on the Working directory line, it remains your default pathname until you change it or exit the utility program. You can always override the working directory by typing the entire pathname when prompted to enter a volume name. Whenever you enter HDMGR, your working directory is initialized to the default disk drive number (\1).

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If your computer is attached to a slave hard disk or the Davong MultiLink network, you can also use this working directory feature to use the storage space on another hard disk.

Suppose, for instance, that you need to set up some accounting volumes on Joe's hard disk (named \JOE1) on your Davong MultiLink network. (You must, of course, have the proper "security" clearance to use another hard disk drive.) You can set up your own subdirectory on his disk, and create the volumes you want; for instance,

```
\JOE1\SECRETARY1\1Q84PAY
```

- Data Volume
- Subdirectory
- Master directory
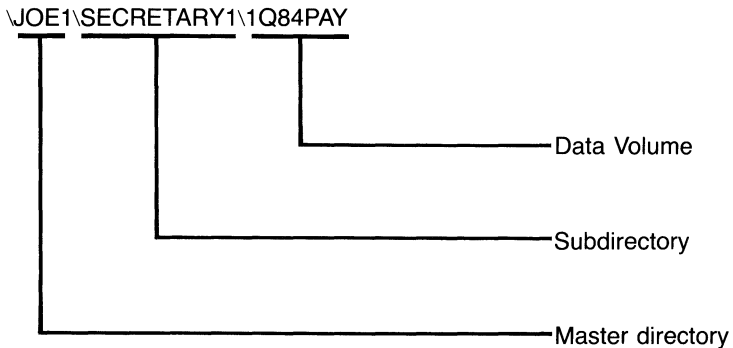
You can type the master directory and subdirectory names on the line labeled Working directory and create the volumes you want.

Mount and Dismount

After creating a volume, you have allotted space for it on the hard disk, but your operating system does not know about it yet. You must still activate, or *mount*, it before you can use it. This task serves the same purpose as inserting a floppy diskette into a floppy drive. The mount process assigns the volume to a drive-label location where it can be addressed by your computer.

You can mount as many as six volumes, including floppy drives, at any one time. Volumes can be mounted using either the Assign command in Boot Options or the Mount command (if you are using DOS 2.x).

System Security

If you have sensitive information on your disk drive that you do not want others to change—or sometimes even read—you can assign security to the directories and volumes. Security is comprised of *passwords* and *access rights* that you assign to your access groups. You decide whether a volume should be open to the *public* in which case you place no security on the volume. However, you may want only specified people to be able to have access to the volume. Then you must assign either *group* or *private* security.

Passwords are secret codes that you create and choose to give to other people. You have two types of passwords: *group* and *private*. You create the password and define the type of access you want associated with the password. These are called *access rights*. You can specify four types of access rights: Read-Write access, Read-Only access, Write-Only access, and No Access. The following table defines these accesses.

Table 1-1. Access Rights

Access right	Definition
Read-Write	(specified as RW) means that those who have a password with this access can do anything to your drive or volume. This includes the right to delete files or an entire volume on a hard disk.
Read-Only	(specified as R) means that a person can look at the drive or volume but cannot change anything on it. This permits running programs, typing or printing data files, transferring files to another volume, or simply reading the file or drive directory. It is often a good idea to allow Read-Only access to sensitive data volumes such as chronfiles, blue prints, archived reference data, or program volumes.
Write-Only	(specfied as W) means that a person can create, change, or delete volumes, but cannot read any file. This is useful for pipe volumes (for example, a mailbox).
No access	(specified as blank) means that you can prevent unauthorized persons from even looking into your directory or files in your volume.

Some HDMGR options require you to have certain access rights or passwords to use them. Be sure you understand what you need before you assign protection.

1. To List the volumes in a directory, you must have read access to the directory.

2. To Create a volume, you must have write access to the directory under which the volume is to be created.

3. To Delete a volume, you must have write access to both the volume and the directory (or drive) containing that volume.

4. To Alter a volume, you must have the private password to that volume. The private password allows all types of access.

Multi-OS lets you add passwords and access rights to several levels of the hard disk hierarchy. You can protect the boot process (see Chapter 3, Section 3), a subdirectory, or data volumes.

The more bizarre your passwords, the less likely they are to be deciphered. We make the following suggestions for you to consider when you start thinking about passwords.

Table 1-2. Creative Passwords

Password	Comment
HEN13RY	You can combine letters and numbers.
#$.ZYX	You can use symbols.
1 UPL 565	You can break up your password.
DUCK PHETHERS	You can use intentionally misspelled words.
LEC PHD	You can use abbreviations.

Figure 1-2. Adding Security for Protection

You can password protect . . .

your diskette,

To change default password . . .

Change boot options?
Y then . . .

N

Change user name/password

Multi–OS
Installation/Boot
Diskette

or your . . .

Subdirectory

Hard disk unit

Volume

ROOT

Multi–OS
Utilities
Diskette

HDMGR

A

Alter . . .

New group password . . .
New private password . . .
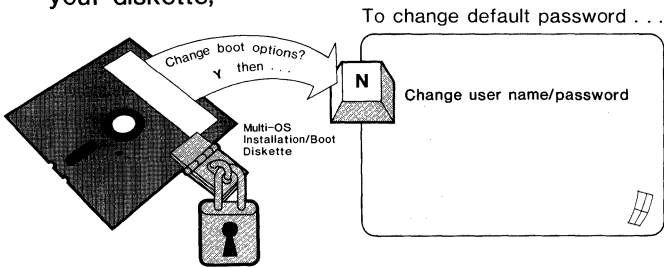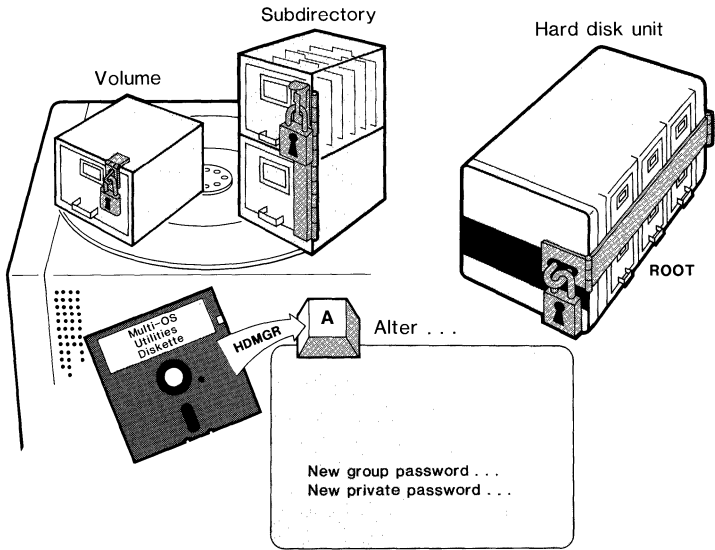
Passwords can be a maximum of 16 characters. When assigning passwords, you cannot use certain characters. These include control characters you press in conjunction with the <**Ctrl**> key, or the greater-than (>), less-than (<), and equals symbols, the vertical line (¦), or the backslash (\).

When you are thinking about passwords, be sure to select one that *you will remember.* If you forget your password, you will not be able to access your directory or volume. In fact, if you forget the password protecting the boot process, you will be locked out of your system. Then, you will have to use your original Davong Installation Diskette to reboot your system.

You can assign passwords using the Alter, Create, Export, and Transfer options in the HDMGR program. All of these options are described in Chapter 2. You may use the Name/Password option in the Boot Options menu to password protect your boot diskette or hard disk boot volume (see Chapter 3).

After you have password-protected a volume, you must type the password (preceded by a colon) after the volume name when you want to access it; e.g., \JOE1\SECRETARY1:READ ONLY\1Q84PAY:HEN13RY.

Default Passwords

A default password is one that the program will auto-matically assign unless you specify another. It is often convenient to assign the same passwords to virtually all of your volumes—especially if you have a pathname that contains more than two directories. Default passwords can be a useful "bridge." Using default passwords saves time and reduces the number of entry times that unauthorized individuals can see your passwords. It also cuts down on the number of passwords you have to remember.

Section

2

How to Use the HDMGR Menu

The Hard Disk Manager program is presented in menu form. You can make a choice by typing a single letter.

You can view the HDMGR menu and use the HDMGR options with either Multi-OS or your DOS, CP/M-86, etc., operating system booted into your computer. You do not need to be using Multi-OS.

You can find the HDMGR program on the Multi-OS Utilities Backup (#1) diskette you created during the installation process. They are also on the Multi-OS Utilities Diskette that came with your original Davong Systems purchase. (You should never use the original installation diskette as a working copy. If your Multi-OS Utilities Backup (#1) diskette is corrupted or lost, you should use the appropriate disk-copy feature to create a new one; then use the new copy as your working diskette.)

If you have copied the HDMGR programs to your hard disk as instructed in your *Multi-OS Installation Manual*, you can just type **hdmgr** and press ◄─┘ to view the HDMGR menu.

If you did not follow the standard installation procedure and elected to allocate your own volumes (or if you booted from your DOS, CP/M-86, etc., system diskette) you must insert your Multi-OS Utilities Backup Diskette (#1) into the left floppy drive of your computer, then type **hdmgr** and press ◄─┘ to view the HDMGR menu.

Note:

If you are using Multi-OS with the p-System, you must type **xhdmgr** (for eXecute HDMGR) and press ◄┘.

Figure 1-3 matches the HDMGR menu you see on your screen.

Figure 1-3. HDMGR Menu


```
Enter Command (? for Help):
----------------------------------------

                    HDMGR OPTIONS MENU

     A - Alter volume parameters
     C - Create a volume
     D - Delete a volume
     E - Export file
     I - Import file
     K - Krunch gaps
     L - List volumes on hard disk
     M - Mounted volumes display
     P - Set default passwords
     Q - Quit
     R - Resources
     S - Show protection
     T - Transfer a volume

Use the arrow keys on the numeric keypad to move the cursor.
<BackSpace>  erase the character just typed (left of cursor).
<Del>        erase the character under the cursor.
<Ctrl><End>  erase all characters to the end of the field.
```

As Figure 1-3 shows, the menu includes a short definition of the task you can accomplish with each HDMGR command. The top line contains a prompt asking you to enter a command letter. Select the task you want and type the comand letter to its left on the HDMGR menu. You do not have to press ◄┘ to select an HDMGR task.
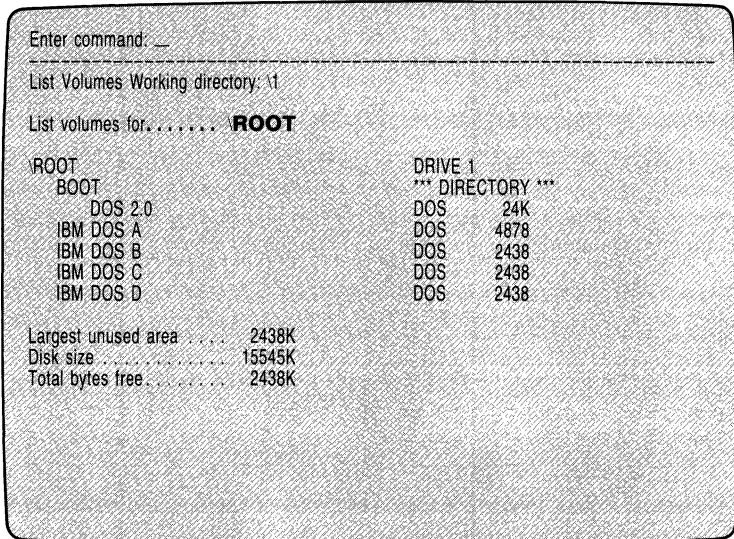
For example, type **L**. The program immediately displays the List Volumes screen. Type the name of your master directory, \ROOT, on the line labeled List Volumes for... Press ◄─┘.

You can also list the volumes in a specific subdirectory by typing the name of the subdirectory of the List Volumes for... prompt line.

To use these options effectively, you need to understand how volumes and files are organized on a hard disk, and how to get to them. If you are unfamiliar with volume organization, be sure to read Appendix B.

In the Multi-OS installation example, we chose to have four volumes: IBM DOS A, IBM DOS B, IBM DOS C, IBM DOS D for DOS 2.0. These volumes are listed on the screen with their sizes on Figure 1-4.

Figure 1-4. Example of a List Volumes Screen

```
Enter command: _
List Volumes Working directory: \1
List volumes for. . . . . . . \ROOT

\ROOT                          DRIVE 1
    BOOT                       *** DIRECTORY ***
        DOS 2.0                DOS      24K
    IBM DOS A                  DOS      4878
    IBM DOS B                  DOS      2438
    IBM DOS C                  DOS      2438
    IBM DOS D                  DOS      2438

Largest unused area  . . . .   2438K
Disk size . . . . . . . . . . . 15545K
Total bytes free. . . . . . . .  2438K
```

The area at the bottom of the List screen gives you the disk statistics—that is, the disk size in kilobytes, the largest unused area of space, and how much total storage space is left on the disk.

Note:

If the largest unused area number is smaller than the total bytes free area number, it means you have "empty" space between volumes. Because these gaps are usually small ones, they waste valuable storage area. You should use the Krunch-gaps command (see Chapter 2) to consolidate the remaining volumes on your hard disk. Remember to back up your files to floppy disk, tape, or another hard disk before using the Krunch-gaps option. This will protect them in the unlikely event of a problem occurring during this operation.

The List option is especially valuable when you want to create a new volume. Using List is the only way you can find out how much hard disk space is not already allocated to volumes. The List screen gives you this figure in two ways: the total number of bytes free and the largest unused area. These numbers may differ significantly if you have deleted several volumes and not consolidated the scattered spaces.

Getting On-Screen Help

If you forget the meaning of a word or phrase or become confused while using the HDMGR program, press the **?** key when the cursor is on the Enter command line to produce on-screen Help information. Read the screens carefully— they define terms you will see frequently. When you finish reading the first Help screen, press ◄┘ (or any other key) to display the rest of the Help information. When you have read this information, press <**Esc**> to return to the HDMGR menu.

Moving the Cursor Around

You use special keys to move the cursor around the
HDMGR screen so you can enter information. Each screen
lists the keys that will execute or abort a task. Read
Appendix A for a complete explanation of these keys. To
execute a command, press <**End**> (at any line) or ◀┘
(after an entry on the last line). When you have entered the
correct information, the messages Enter Command (? for
Help) and Command complete (flashing) appear on the
screen at the top and bottom lines, respectively. The rest of
the screen remains unchanged. You can then enter another
command letter or press <**Esc**> to return to the HDMGR
menu.

Leaving the HDMGR Program

Type **Q** to exit the HDMGR program. You can leave the
HDMGR program from its menu or whenever the cursor
appears on the Enter command line. The operating system
prompt appears immediately on your screen after you
leave the HDMGR program.

To return to the HDMGR utility program after exiting,
you must type **hdmgr** (or **xhdmgr** if you are using UCSD
Pascal) and press ◀┘ again.

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Section

3

Using the Boot Options Menu

Before you can use the Boot Options menu, you must reboot your system. If you used QINSTMOS to install your hard disk drive, you cannot use the Boot Options with your Master Quick Boot Diskette. However, you can use these Boot Options with your copy of the Master Boot Diskette (#3) even though you have installed your software with QINSTMOS.

You can reboot by press pressing <**Ctrl**><**Alt**><**Del**> simultaneously, or you can turn your computer off, then on again. This latter method is time consuming because your computer completely reinitializes itself before rebooting Multi-OS. If you have a hard disk boot volume, you do not need to insert your Master Boot Diskette; otherwise, you must insert it before you reboot.

If you followed the INSTMOS installation program, the first time you reboot you will see a screen prompting you to Enter your name. Do so and press ◀─┘. You will then see a prompt asking if you want to Change boot options? The Multi-OS screen display looks°like Figure 1-5.

> ***Note:***
> If you have already changed these options to your satisfaction—or whenever you boot up and do not want to make any changes—type **N** and press ◀─┘.

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Figure 1-5. First Screen After Booting Multi-OS

Davong Systems, Inc. Multi-OS(tm) Hard Disk System

Enter your name: **YOUR NAME**
Change boot options? (Y/N): _
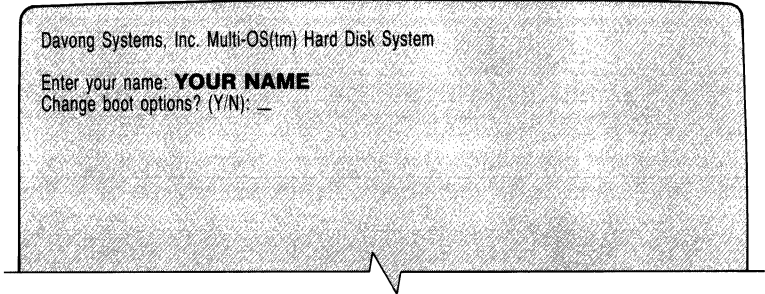
Type **Y** and press ◄─┘ to see the Boot Options menu. This menu looks like Figure 1-6.

Figure 1-6. Boot Options Menu

Enter command letter: _

                          Boot Options Menu

Valid commands are:
  A–Assign hard disk volumes and diskette drives
  M–Change memory size allocations
  N–Change user name/password
  P–Patch parameters

  Q–Quit boot option entry and boot system

  T–Set/Clear turnkey boot
  W–Write current configuration boot volume

  Item entry conventions
  Use the arrow keys on the numeric keypad to move the cursor

  <BackSpace>   erase the character just typed (left of cursor)
  <Del>   erase the character under the cursor
  <Ctrl><End>   erase all characters from cursor to end of the field

The top part of the screen displays the commands you can enter. Type the first letter of the command you want. You do not need to press ◄─┘ after you type a Boot Options command letter.

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The bottom part of the screen displays the keys you use to move the cursor or edit your typed responses. The last line of the screen is reserved for error messages. When you make a mistake, or the program can't do what you request, a message will flash on this line. It will continue to flash until you type another key. Refer to Appendix C for a list of error messages and how to correct them.

You must use the Write command to save the changes you make with the Boot Options. The Write command lets you save these changes to either your Master Boot Diskette or a boot configuration volume on your hard disk drive. See Chapter 4 of your *Multi-OS Installation manual* for explanations of the Write and Turnkey Boot Options.

Leaving the Boot Options Menu

To leave the Boot Options menu, type **Q**. When you do, your system will complete the boot process.

Note:

If you are using the p-System, you will also be prompted to insert a Bootable p-System diskette and press any key to continue. You should insert your DSIWORK: diskette to complete the boot process.

If you are using DOS or CP/M-86, you will see your mount table showing your volume allocations. (If you are using Concurrent CP/M or p-System, this table will not appear.) Any changes you made to the boot options will be shown on the screen. You will then see your operating system prompt.

Now that you understand what a volume is and what types of security are available to you, you can go to Chapter 2 and use the examples to help understand the HDMGR program and Boot Options.

Chapter

2

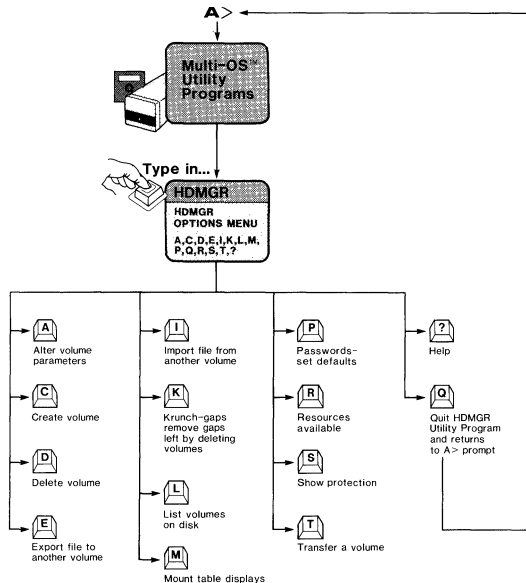# Managing Your Hard Disk

The HDMGR (Hard Disk ManaGeR) program is a "housekeeping" utility that can help you make the most efficient use of the storage space on your hard disk drive.

Figure 2-1 illustrates these commands in flowchart form.

Figure 2-1. HDMGR Program Options

This chapter describes the commands in the HDMGR utility program in the context of the tasks you can perform with them.

Section 1

How to Create a Volume

You must perform two distinct steps before you can use a
new volume: 1) create the volume for the hard disk, and 2)
mount a data volume on the system. You can create sub-
directories, data volumes and pipe volumes. This section
shows you how to create, name, and add volume security
with the Create option in HDMGR. You will find instructions
for mounting the volumes you create in Chapter 3 or
(Assign in Boot Options) or Chapter 4 (Mount command for
DOS 2.x).

   This section presents step-by-step procedures for
creating one sample volume. (Your *Multi-OS Installation
Manual* summarized these steps to help you create one
hard disk volume).

   Select **C** from the HDMGR menu. You will see a
screen that resembles Figure 2-2.

Figure 2-2. Create Volume Screen

```
Command: Create
-------------------------------------------------------------------
Create Volume
    Use this command to add a new volume to the current working directory. You must enter
the following options for each new volume you want to create.

Working directory: \1

Volume name . . . . . . . . . . . . . . . . . . . . .
Volume length in 1K units . . . . . . . . . . .  360
Number of directory entries . . . . . . . . . .  112
Group password . . . . . . . . . . . . . . . . .  XXXXXXXXXXXXXX
Private password . . . . . . . . . . . . . . . .  XXXXXXXXXXXXXX
Public access . . . . . . . . . . . . . . . . . .  RW
Group access . . . . . . . . . . . . . . . . . .  RW
Private access . . . . . . . . . . . . . . . . .  RW



Press <End> when all necessary information has been entered.
Press <Esc> to abort the screen and return to HDMGR Options Menu.
```

Some of the entries on this screen have default answers. If you want a volume the same size as a double-sided floppy diskette, you would not change the volume length default answer.

Figure 2-3. Creating a New Volume
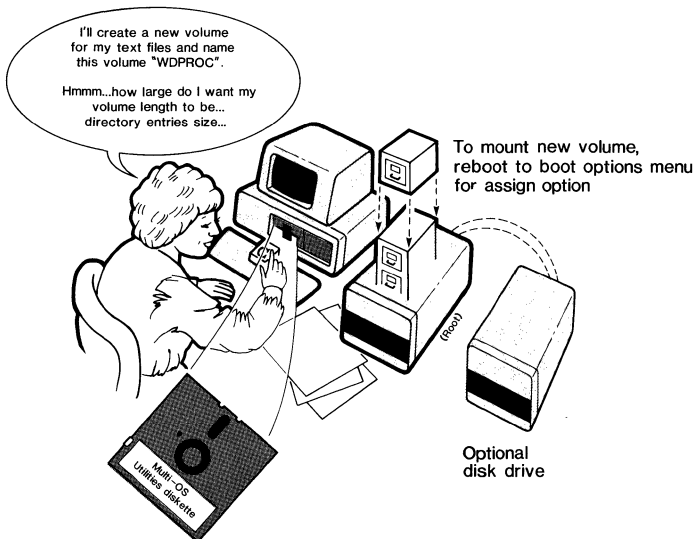
In Figure 2-3, Dana needs disk storage space for her text files. To make it easy to remember its name for future reference, Dana decides to name her new volume **WD PROC**, (for word processing). She decides she wants her new volume to take 3000K of space on her hard disk. She also wants to be able to put up to 512 files in this volume. She must also decide if she wants to place security on this volume.

Dana can create up to 625 volumes on her drive. The size of her volumes is limited only by the size of her drive and the amount (in kilobytes) of "free" space.

This process is outlined in a step-by-example on the following pages.

When the Create screen appears, the cursor is on the line labeled Volume name. The default working directory is \1. If Dana wanted to add this volume to another disk drive (like a slave drive), she could change her working directory or type the complete pathname on the Volume name line. To create her volume, she uses the following steps.

1.   Types **WD PROC** on this line.

2.   Presses ◄┘ to move the cursor to the line labeled Volume length in 1K units. (1K equals 1024 bytes.)

3.   Types **3000** (3 megabytes) and press ◄┘.

4.   Types **512** and press ◄┘.

> ***Note:***
> If you do not want to password protect your volume, you can bypass the following and continue at the following subsection, "Adding Subdirectories".

Adding Security to a Volume

Dana wants to add security to her WD PROC volume to keep unauthorized people from changing the information she has written to the hard disk. She must assign passwords and access rights. She therefore goes through the following steps.

1. Types **STRUNK & WHITE** on the line labeled Group password and presses ◀┘. Notes that it disappears as soon as she presses ◀┘.

2. Types **JEYRE BRONTE** to establish her private password. It too disappears as soon as she presses the ◀┘ key.

3. Presses the <**Space**> bar key twice to change the public access from RW to no access. Presses ◀┘. (Typically, you would not allow public access to your volumes.)

4. Types **R**, presses <**Del**>, and presses ◀┘. (If she did not want to allow any group access, she would press <**Del**> twice.)

5. Does not change the line labeled Private access.

6. Presses <**End**> to execute the command. She can now enter another command letter or press <**Esc**> to return to the HDMGR menu.

WARNING:

You must set *both* group and private passwords to protect a volume. If you password-protect your volume, you must have read-write on either public, group, or private access (usually private). Otherwise, you will not be able to gain access to your volume.

Dana now has a data volume for her word processing files that only she, with her password of JEYRE BRONTE, can change. She may choose to give the group password to Donna, Darren, or Doug (her group) so they can read her files and see what she is doing. However, each would have to copy her files to their volumes before they could make any changes.

Creating Volumes in Subdirectories

In the last example, Dana created a data volume that "reported" directly to the drive named ROOT, also known as the master disk directory. She can also create directories that report to the master disk directory.

To create a volume in a directory other than the master directory, Dana creates a name for her directory when she creates the volume name. Use the following example to create a volume ACCOUNTS in a subdirectory ACCTSDIR.

1. Press **C** from the HDMGR Menu.

2. Type **ACCTSDIR\ACCOUNTS** for Volume name and press ◂┘.

3. Type **2000** for the Volume length and press ◂┘.

4. Type **2048** for the Number of entries and press ◂┘.

5. Type **350 SLC** as the Group password and press ◂┘.

6. Type **SILVER CLOUD** as the Private password and press ◂┘.

7. Press <**Space**> bar twice to erase the RW access. Press ◂┘.

8. Type **R**, then press <**Space**> bar. Press ◂┘.

9. Do not change the line labeled Private access.

10. Press <**End**>.

The passwords you entered are the same for the volume and the subdirectory.

To demonstrate the other options in the HDMGR program, we will also simulate creating three more volumes: COMPANY INFO, SPREADSHEET, and SYSTEM FILES.

Volume name	COMPANY INFO	SREADSHEET	SYSTEM FILES
Volume length	1000	1500	1000
Number of entries	512	1024	1024
Group password	632 RWT	IM OK	PROGRAMS DOS
Private password	OK YR	632 RWT	CHICKEN LIPS
Public access			R
Group access	R	R	R
Private access	RW	RW	RW

Notice that the group password for COMPANY INFO and the private password for SPREADSHEET are the same. This means that a person who knows the password 632 RWT can read and write to any files in the SPREADSHEET volume, but can only read the files in the COMPANY INFO volume.

Although you have created your volumes and they are on the disk, the computer does not know about them until you mount them. Use either the Mount command (see Chapter 4 from the *Multi-OS Installation Manual*), or reboot and use the Assign command in Boot Options.

Creating Pipe Volumes

To make a pipe volume that acts as a message center, you would need to add a P after the accesses. For instance, to create a read-only pipe volume, you would make the accesses RP. For read and write pipes, make the accesses RWP. Pipe volumes are usually used in a local area network. If you have a Davong MultiLink network, you can read more about pipes in the *MultiLink User's Manual*.

2-7

How to Make Changes to an Already Created Volume

To change the name or security currently assigned to a volume, use the Alter command from the HDMGR menu. You must supply the volume's private password (if any) to use this command. If you don't, you will see a Need private password for rename message flashing at the bottom of the screen.

Renaming a Volume With New Security

Changing the name of a volume is simple task. Suppose, for example, you want to change the name of the existing volume ACCOUNTS, which is on the disk \1 named \ROOT in subdirectory ACCTSDIR, to OLD ACCOUNTS.

1. Type **A** to select Alter.

2. Type **ACCTSDIR\ACCOUNTS:SILVER CLOUD** and press ◀┘. The Alter screen will display the same name on the New volume name line.

3. Type **OLD ACCOUNTS** over the existing name and press ◀┘.

4. Type **PAST DUE** as the Group password and press ◀┘.

5. Type **OVER 90** as the Private password and press ◀┘.

6.   Press <**Del**> twice to erase the public RW access. Press ◄⎦.

7.   Type **R** and <**Del**> once to establish read-only group access.

8.   Press <**End**> when you've finished making changes. Look at Figure 2-4 to see these changes.

Figure 2-4. Alter Volume Screen

```
Command: Alter
------------------------------------------------------------------------------
Alter volume parameters
    This command lets you change the name of a hard disk volume. Enter the current name
of the volume to be changed in the field labeled source volume path. Use the cursor keys or
the ◄⎦ key to move to the next field.

Working directory: \1

Source volume path  . . . .   ACCTSDIR\ACCOUNTS:SILVER CLOUD
New volume name  . . . . .    OLD ACCOUNTS
New group password  . . .     PAST DUE
New private password  . . .   OVER 90
New public access  . . . . .
New group access  . . . . .   R
New private access . . . . .  RW




Press <End> when all necessary information has been entered.
Press <Esc> to abort the screen and return to HDMGR Options Menu.
```

You can also use this option to change the security of an existing volume. You would use this if your original password(s) fell into the "wrong" hands. This could happen if you create batch files that have your passwords in them. The next time you begin a session, activate the volume with the new password using the Assign command in the Boot Options menu.

2-9

> **Note:**
>
> When you have a subdirectory with a volume, changing passwords for the volume does *not* affect the passwords for the subdirectory.

Renaming and Protecting a Hard Disk

If you have several computers with hard disks, it is likely that two or more may have the same name (i.e., ROOT, the default name specified in the standard Multi-OS installation procedure). If these systems operate independently, this is OK.

But before you can link these hard disks into the Davong MultiLink network, you must give each its own unique name. (One of the hard disks on Davong MultiLink should remain named ROOT.)

You can use the Alter option in HDMGR to rename a hard disk and/or place security on a hard disk before you put it on your network.

1.   Type **A** to select Alter from the HDMGR menu.

2.   Type a backslash (\), then old name (i.e., **ROOT**) on the Source volume path line. If you had a password for your drive, you must precede it with a colon before you enter it. Press ◄┘.

3.   Type the new name (e.g., **MASTER**) right over the old one. Do not type the backslash! Use the <**Del**> key if the new name is shorter than the old one.

> **Note:**
>
> If you do not want to use passwords, press <**End**> to execute the command.

4. Type **TERTLE TONGUES** (or a password of your choice) and press ◄─┘.

5. Type **MY 2DISK** (or a password of your choice) and press ◄─┘.

6. Assign access rights as none for public, R for group, and RW for private.

7. Press <**End**> to execute the command.

8. Reboot your system by pressing <**Ctrl**><**Alt**><**Del**>.

9. Type **Y** and press ◄─┘ when prompted to Change boot options?.

10. Type **A** to select Assign.

11. Use the down arrow key to move the cursor to Default group password.

12. Type **TERTLE TONGUES** and press <**End**>.

13. Press **Q** to leave Boot Options.

You can also add security to your ROOT drive using the same steps. However, you do not have to rename it. Then, you can control who accesses your drive. However, you must have the password listed in the one of the default password fields in Boot Options Assign. Otherwise, your system will not boot your operating system.

Section

3

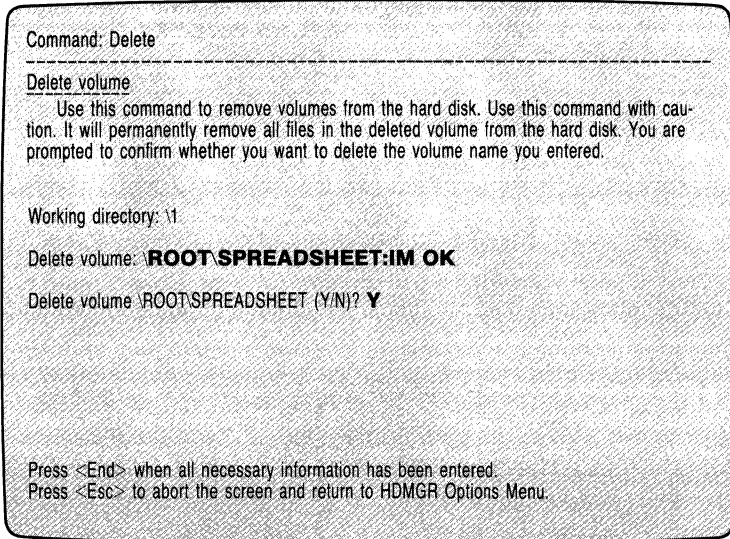# How to Remove a Volume from Your Disk

When all the files in a volume become obsolete, that entire volume is simply "taking up space." You may use the Delete option to remove the volume from your disk so you can use the area for current information.

To erase a volume from your hard disk, select **D** (for Delete) from the HDMGR menu.

In the following example, you will delete the SPREADSHEET volume.

1.   Type **\ROOT\SPREADSHEET:632 RWT** and press ◀◂┘. Your screen should look like Figure 2-5.

2.   The screen prompts you to confirm whether or not you want to delete this volume.

3.   Type **Y** and press ◀◂┘ to execute the command.

Figure 2-5. Delete Volume Screen Example

```
Command: Delete
_____
Delete volume
    Use this command to remove volumes from the hard disk. Use this command with cau-
tion. It will permanently remove all files in the deleted volume from the hard disk. You are
prompted to confirm whether you want to delete the volume name you entered.


Working directory: \1

Delete volume: \ROOT\SPREADSHEET:IM OK

Delete volume \ROOT\SPREADSHEET (Y/N)? Y




Press <End> when all necessary information has been entered.
Press <Esc> to abort the screen and return to HDMGR Options Menu.
```

    The Delete option will not let you delete any
subdirectory that still contains volumes. To delete a
subdirectory, you must first delete all the volumes in it. You
must have write access to the subdirectory you want to
delete and to its master directory. Then use the Delete
option to delete the subdirectory.

    If you have backed up your files on floppy diskette or
a tape cartridge, you can use the Krunch-gaps command to
consolidate the remaining volumes on your hard disk (see
Section 4).

How to Remove Empty Gaps from Your Disk

Deleting volumes from your hard disk often leaves gaps of unused space on the disk. Selecting the Krunch-gaps command lets you consolidate these unused areas into one large contiguous area suitable for creating more volumes.

You must have the user (private) password for the drive (if one exists) to use this option. This is required because you could lose a volume if the power fails during the Krunch-gaps operation.

WARNING:

Before you use the Krunch-gaps option, back up **_all_** of your volumes (from every operating system on your hard disk) to floppy diskettes, tape cartridges, or a second hard disk. You should never interrupt this procedure before it is completed—you risk losing an entire volume if you do. Even a power failure will cause the loss of an entire volume.

---

1. Type the name of the disk and its password; e.g., **\ROOT:PASS WORD** and press ◄─┘.

2. Type **Y** when you see the Continue? prompt message. Press ◄─┘.

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When you execute this command, the numbers of volumes and blocks within the current volume that remain to be moved are displayed in the upper right corner of the screen. Krunch will execute very quickly (on the order of 1/10ths of a second) if there are no gaps to remove. If there are gaps on your disk, Krunch-gaps may take several minutes to complete.

How to Set Default Passwords

If you plan to assign the same passwords to most of your volumes, you should use the P - Set default passwords option. One use for this option is to set the default passwords, then use the Alter option to enter volume names you want to password-protect. It is also useful if you have several directory and subdirectory names in a pathname. Rather than entering the same password after each, you can use the default passwords as a "bridge." Then, you don't have to type the passwords each time.

This command tells HDMGR to assign your passwords for you when you are running HDMGR. The passwords you enter in the Set default password screen are assigned automatically to any volume or subdirectory as you alter, create, export, or transfer it.

By taking advantage of this option, you reduce the chance that your passwords will be seen each time you perform a HDMGR task. You also reduce the possibility of mistyping a password, especially if it is an unusual one. If necessary, you can always override these default passwords by typing a different password after a volume name.

Figure 2-6 illustrates an example of setting default passwords. Just type the respective group and private passwords you want, then press ◄─┘ or <**End**> to execute the command. These default passwords remain in effect until you quit the HDMGR program.

Figure 2-6. Example of Setting Default Passwords

```
Command: Passwords
-------------------------------------------------------------------

Set default passwords
    You can use default passwords instead of or in addition to passwords you embed in a
pathname. This can save keystrokes and reduce the chance of typing errors.

Group password . . . . . . . . . . . . . . . . . .    632 RWT
Private password . . . . . . . . . . . . . . . . .    IM OK




Press <End> when all necessary information has been entered.
Press <Esc> to abort the screen and return to HDMGR Options Menu.
```
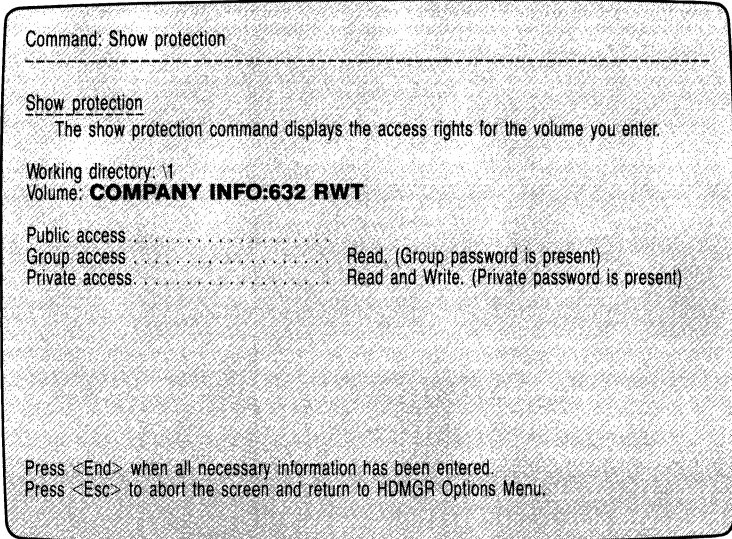
2-17

How to Display a Volume's Protection

To display the protection status for a volume, select **S** from the HDMGR menu. You must have read access to the volume to use this option. If your password does not allow you to read, you will see a flashing message at the bottom of the screen.

The screen lists the status of all three access types and whether a password has been assigned to the volume. Use this option when you can not remember whether you have assigned protection to a volume. This option will not display the password itself—it only shows whether there is one. After entering the volume name and password (if present), press **◄┘** or <**End**>. See Figure 2-7.

Figure 2-7. Example of Show-Protection Screen

Command: Show protection

Show protection
    The show protection command displays the access rights for the volume you enter.

Working directory: \1
Volume: **COMPANY INFO:632 RWT**

Public access . . . .
Group access . . . .   Read. (Group password is present)
Private access. . . . .   Read and Write. (Private password is present)

Press <End> when all necessary information has been entered.
Press <Esc> to abort the screen and return to HDMGR Options Menu.

Section

7

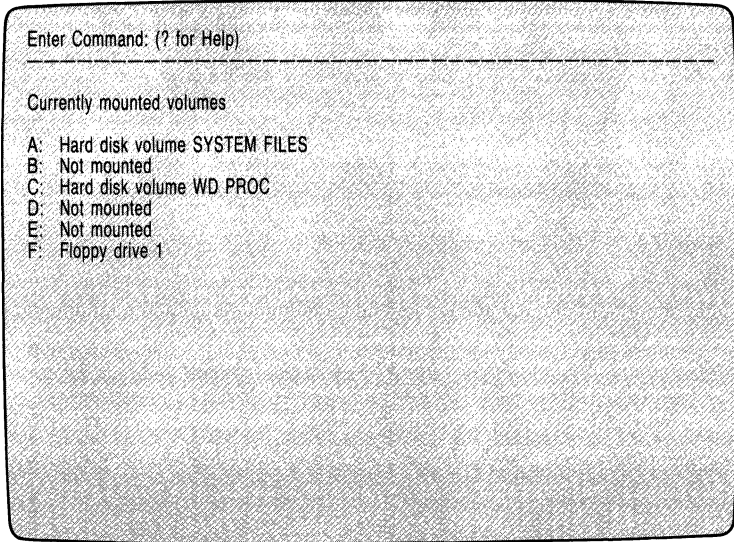# How to Check Your Currently Mounted Volumes

Almost everyone using a hard disk occassionally forgets which volumes they have activated for use. The Mounted Volumes option in HDMGR displays the current mount table showing the drive-label locations of the volumes available for use.

This option is especially convenient if you are not using DOS 2.x and you can't recall which volumes you have mounted. You can use it without having to exit the HDMGR program to see the volumes you have activated. This can be particularly helpful when you are moving or copying files from one volume to another and want to make sure a particular volume is mounted.

Select **M** from the HDMGR menu to display the volumes you have mounted. Figure 2-8 shows a sample mounted volumes list.

Figure 2-8. Example of Mounted Volumes List

```
Enter Command: (? for Help)
_____

Currently mounted volumes

A:  Hard disk volume SYSTEM FILES
B:  Not mounted
C:  Hard disk volume WD PROC
D:  Not mounted
E:  Not mounted
F:  Floppy drive 1
```

This screen also reflects the changes you make using the Mount command (with DOS 2.x) to activate volumes.

Section

8

How to Move a File Between Operating Systems

When you have more than one operating system supported under Multi-OS on your hard disk, it is often necessary to combine information from two of them. For example, you may need to combine data from a spreadsheet program running under CP/M with text in a word processing program running under DOS.

Multi-OS lets you move these files in a two-step process. You first *export* the file you need from its host operating system to an export volume, then *import* the export volume into the destination operating system.

Creating an Export Volume

To begin this process, you must first boot the source operating system—the one containing the file you want to move—into your computer. Drive-label A: must be a volume under the operating system from which you want to export the file. Also, you must make sure that you have mounted the volume in which the "export file" is currently located. Use the following steps to create an export volume.

1.   Insert the correct Master Boot Diskette for the operating system under which the file is located.

2.   Reboot your computer using <**Ctrl**><**Alt**><**Del**>.

3.   Type **N** when prompted Change boot options?. Press ◄┘.

4.   Type **hdmgr** (or **xhdmgr** for p-System) and
     press ◄⊃.

5.   Type **E**.

     Figure 2-9 displays an example of entering a file to be
exported. Notice that the file must be mounted to a drive
label. After you have typed the name and confirmed
whether it is a text file, the screen displays the Export
volume name. (A text file is simply one that you can read
on the screen in contrast to a binary file that usually
makes no sense when you display it.) You can assign the
passwords and access rights to this export volume.

Figure 2-9. Creating An Export Volume

```
Command: Export
-------------------------------------------------------------------------
Export Volume
      This command is used to transfer files between different operating systems, and to help
make backup copies of large files.
      To copy a file from one system to another, you must Export the file from the original
system, and then Import it to a file under the destination system.

Working directory: \1

File to export . . . . . . . . . . . . . . . . . .   C:INVOICE
Text File? (Y/N). . . . . . . . . . . . . . . . .   Y
Export volume name. . . . . . . . . . . . . .   EXPORT\C__INVOICE
Group password . . . . . . . . . . . . . . . . .   XXXXXXXXXXXXX
Private password. . . . . . . . . . . . . . . . .   XXXXXXXXXXXXX
Public access . . . . . . . . . . . . . . . . . . .   RW
Group access . . . . . . . . . . . . . . . . . . .   RW
Private access. . . . . . . . . . . . . . . . . . .   RW


Press <End> when all necessary information has been entered.
Press <Esc> to abort the screen and return to HDMGR Options Menu.
```

When you have made the final entry, press ◀─┘ or <**End**> to execute the command.

> **Note:**
> To move a file between the UCSD p-System and the other operating systems supported by Multi-OS, you must reboot as usual to change from one operating system to another. In other words, you must first reboot with the source Master Boot Diskette and execute the Export command. Then, to perform the Import process, you must reboot using the destination operating system Master Boot Diskette.

Importing the Export Volume

To move the exported file into another operating system, you must reboot your system with the Master Boot Diskette of the destination operating system.

> **Note:**
> You should not try to mount an export volume. The operating system does not recognize it and will display an error message.

When you have rebooted, call up the HDMGR menu. Then select **I**.

Type the name of the file to be moved; e.g.,
C:INVOICE and press ◄─┘. This copies the file from the
export volume \1\EXPORT\C___INVOICE into an import
volume. Figure 2-10 displays an example of an import
volume name; e.g., EXPORT\C INVOICE. Press ◄─┘ to
accept that name.

Figure 2-10. Example of Importing A File

```
Command: Import
------------------------------------------------------------------
Import file
     Use this command to read a file you transferred out of another system using an export
volume command and bring it into a new operating system.



Working directory: \1

Import filename ....................  C:INVOICE
Import volume name..............  EXPORT\C INVOICE

Delete volume after import (Y/N)? Y




Press <End> when all necessary information has been entered.
Press <Esc> to abort the screen and return to HDMGR Options Menu.
```

Usually, you will have no further use for the Export
volume after the file in it has been copied. The Import
option screen lets you delete it easily—just press ◄─┘ in
response to the Delete volume after import (Y/N)?
prompt.

You can also export from and import files to a floppy
diskette if it is assigned to a drive label.

How to Transfer a Volume into Another Volume

Whereas the Import/Export options move files, the Transfer option lets you move entire volumes around. You can use this option to move a volume from a master to a slave drive, or from one disk to another on the Davong MultiLink™ network. The Transfer option is a convenient way to to make a backup copy of a volume.

The Transfer option performs all the tasks necessary to create a destination volume automatically for you. It lets you assign the new volume a name and security. Type **T**.

Figure 2-11 shows an example of transferring a volume from a master drive (\1) to a slave drive (\2). Use the following steps to create this new volume.

1. Use the up arrow key on the numeric keypad to move the cursor to the Working directory line. Type the name of the drive you are transferring from (with password) followed by the name of the directory (**\ROOT\ACCTDIR:SILVER CLOUD**), with password, you want transferred.

2. Type the names of the drive and the directory from which you are transferring with passwords; for example **\ROOT\ACCTDIR:SILVER CLOUD**. Press ◄─┘.

3. Type the name of the volume with its password, if any, (**ACCOUNTS:SILVER CLOUD**) you want to transfer and press ◄─┘.

Managing Your Hard Disk

4.   Type the destination volume pathname, including the drive name (in this case, **MINE**) and the name of the new volume (**CALC**). In this case, we're also adding a subdirectory (**ACCOUNTS BAK**) to the pathname.

5.   Add security to the new volume (see Figure 2-11).

6.   Press <**End**> to complete the command.

Figure 2-11. Example of a Volume Transfer

```
Command: Transfer
--------------------------------------------------------------------
Volume transfer
    Use this command to copy an existing volume to a new volume. You normally use this
command to make backup(s) of an existing volume.

Working directory: \ROOT\ACCTDIR:SILVER CLOUD


Source volume . . . . . . . . . . . . . . . . .   ACCOUNTS:SILVER CLOUD
Destination volume. . . . . . . . . . . . . . .   \MINE\ACCOUNTS BAK\CALC
Destination group password. . . . . . . . . .   OURS TOO
Destination private password. . . . . . . . .   MINE TOO
Destination Public access . . . . . . . . . . .
Destination Group access . . . . . . . . . . .   R
Destination Private access  . . . . . . . . . .   RW



Press <End> when all necessary information has been entered.
Press <Esc> to abort the screen and return to HDMGR Options Menu.
```

Notice that you must have write access to the directory into which the volume is to be created. Because ACCTS BAK did not exist before you created CALC, this new volume (CALC) and its subdirectory (ACCTS BAK) have identical passwords. Neither allows public access.

This command creates the volume CALC for you and makes it the same size as the ACCOUNTS volume. Had the CALC volume already existed on drive \MINE, the program would ask whether you wanted to delete the existing CALC volume. If you have the correct password, you will be allowed to do so; otherwise, you will not.

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Section

10

How to Display Your Available Resources

When you want to see which peripheral devices—hard disk drives, printers, etc.—you have at your command, select **R** from the HDMGR menu. Since each hard disk drive must be named when Multi-OS is installed on it, the screen will display the names of the drives available to you. If you have only your hard disk attached, the screen displays the name of your disk and the type of resource it is. In Figure 2-12, there are two drives: ROOT (the master) and MINE (the slave).

Figure 2-12. Example of Available Resources

Enter Command (? for Help):
Resources
Use this command to find the name(s) and/or type(s) of resources available to you.

ROOT	Hard disk
MINE	Hard disk
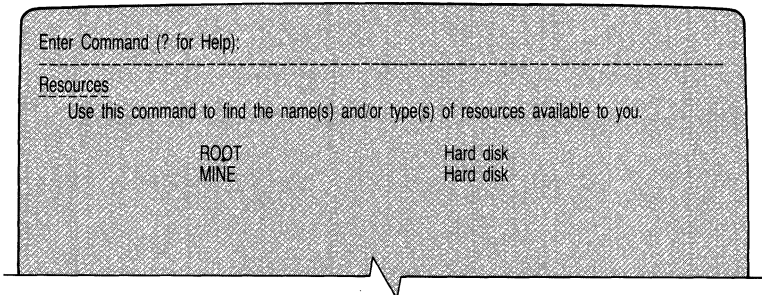
If your computer is linked into the Davong MultiLink network, this command becomes more valuable since it can display those resources that are active on the network and ready for your use.

Using the Resources Command
with Davong MultiLink

When your computer is part of the Davong MultiLink network, the resources-available screen looks a little different. When you select **R** from the HDMGR menu, you will see a screen showing the resources that are currently active in the network.

The first entry on the screen, No. (for number), is the node number to which your network board switches are set when you link up to the network. The Unit Name is the name you specified (or accepted) as the drive name; e.g., ROOT; and the User Name is the name you gave as your User Name on the Change Name and Password screen in Boot Options.

Figure 2-13 illustrates a sample screen of the information given for a network.

Figure 2-13. Names and Locations of
Active Server Workstations

```
Enter Command (? for Help):

Resources
    Use this command to find the name(s) and/or type(s) of resources available to you.

No.   Unit Name       Resource     Computer   Op. System    User Name
 1    JAY1            Hard Disk    IBM PC     IBM DOS 2.0   JAY'S MLINK
 2                                 IBM PC     IBM DOS 2.0   BRUCE MLINK
 3    TIM1            Hard Disk    IBM PC     CONCURRENT    TIM
14    JACK1           Hard Disk    IBM PC     CPM-86        JACK
33    ROOT            Hard Disk    IBM PC     CPM-86        JAY*
                      Clock
      brandx          Printer
      MINE            Hard Disk                             JAY
34    SECOND DRIVE    Hard Disk    IBM PC     IBM DOS 2.0   SHARED PC
47    BRUCE1          Hard Disk    IBM PC     IBM DOS 2.0   NORBERT
50                                 IBM PC     IBM DOS 2.1   ACCOUNTING
```

This screen describes each active workstation and the resources attached to each. Notice that the station requesting the information (your station) is marked with an asterisk after the user name so you can identify it easily. When the list of active workstations is too long to fit on one screen, you can see the succeeding screens by pressing ◄┘ or any key.

This screen describes each active workstation and the resources attached to each. Notice that the station requesting the information (your station) is marked with an asterisk after the user name so you can identify it easily. When the list of active workstations is too long to fit on one screen, you can see the succeeding screens by pressing ◄┘ or any key.

How to Change a Volume's Size

Even when you plan ahead and create volumes that you think will fit your needs, you may often find it necessary to change the size of a volume.

A volume for a large data base may fill up quicker than expected and need to be expanded. Another with seldom-used word processing files on it may be larger than necessary, wasting disk storage space. When this happens, use the instructions in this section to expand or shrink volumes.

Back up (on floppy disks, tape, or a second hard disk) the volume you plan to enlarge or shrink. Back up the volume as a set of files; *not* as a volume. If you back it up as a volume, the volume will be restored to the same size as before. Now back up *all* your remaining hard disk volumes.

The procedures used to expand and shrink volumes are similar. They vary only when you have limited free space on your hard disk. In either case, you must first create a new volume of the size you want. You then assign the new volume to a drive location and copy the files from the old volume to it. Last, you delete the original volume and (optionally) rename the new volume. You can give it the same name as the original one, if you choose.

Use the List option in HDMGR to see if you have enough disk space to create the new volume. (Largest unused area) If so, the procedure is straightforward. If there is not enough space on the disk, however, you must use the Krunch-gaps and Delete options in HDMGR to rearrange you disk's layout, "creating" the necessary free space.

Before beginning, use the List option to see how much "free" space you have on your hard disk.

> **Note:**
> If you are using DOS 2.x, use the Mount command rather than rebooting when you are instructed to assign a volume to a drive label in the following procedures.

When There Is Enough Free Space

If there is enough unused, contiguous free space to create a volume of the size you want, follow these steps.

1. Use Create in HDMGR to define a name (for example, **SALARY INFO**) and size (in kilobytes) for the new volume.

2. Reboot and use the Assign boot option to activate the new volume. (If you are using DOS 2.x, use the Mount command to activate the new volume.) Do not dismount the "old" volume (for this example, we'll call it WAGE INFO).

3. Use your copy program to copy the files from WAGE INFO to the SALARY INFO volume. Do *not* use the Transfer option in HDMGR to copy these files—you will only succeed in creating a volume of exactly the same size as the old one if you do.

4. Use the Delete option in HDMGR to delete WAGE INFO.

Optional Steps

5. Use the Alter option in HDMGR to rename the new volume (i.e., change it from SALARY INFO to WAGE INFO). This saves you the trouble of remembering a new volume name.

6. Back up your hard disk to floppy disks, to tape, or to another hard disk.

7. Use the Krunch-gaps option in HDMGR to remove the empty space created when you deleted the original volume.

When You Need More Free Space

Use the List option in HDMGR to check the amount of free space on your disk. If the new volume must be larger than the largest unused area space on your disk, follow these steps.

1. Use the Krunch-gaps option in HDMGR to remove empty space between existing volumes.

2. Use the List option to see if this created enough contiguous free space on the hard disk for the new volume. If this created enough space, go on to the next step; if not, use Delete to remove another volume from your hard disk and use Krunch-gaps again.

3. Create the new volume (i.e., SALARY INFO). Reboot your system (or, if you are using DOS 2.x, use the Mount command). Then, assign SALARY INFO to a drive location (do not dismount WAGE INFO).

4. Copy the files from the old volume (i.e., WAGE INFO) to the new volume (SALARY INFO).

5. Use Delete in HDMGR to remove WAGE INFO from your hard disk. *Make sure you have backed up the files on this volume before you delete it.*

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Optional Steps

6. Use the Alter option in HDMGR to rename the new volume (i.e., change SALARY INFO to WAGE INFO). This saves you the trouble of remembering a new name.

7. Back up your hard disk.

8. Use the Krunch-gaps option in HDMGR to remove the empty gaps created when you deleted WAGE INFO.

3

Customizing the Boot Options Process

████████████████████████████████████

Each time you load Multi-OS into your computer, you can give it a set of "boot" instructions that tell the computer what you want. These instructions, called the Boot Options, can be stored on either a floppy disk (your Master Boot Diskette) or a special volume on the hard disk itself.

In the *Multi-OS Installation Manual*, you were told how to use Boot Options to create a boot from hard disk volume. However, if you have a Davong internal disk drive, you cannot boot from hard disk unless you are connected to the Davong MultiLink network. Chapter 3 of that manual also gave you the instructions for creating a Turnkey volume so that your hard disk boot volume would appear just like your Master Boot Diskette. Davong internal disk drive owners must be connected to the Davong MultiLink network before they can use the Turnkey option.

You can also use the Boot Options program to:

■   specify or change the operating system you want (if you have installed more than one on your hard disk),

■   assign hard disk volumes and diskette drives to drive labels, and the Boot Options working directory,

■   change the size of your user memory, or

■   provide system security by password-protecting the boot process.

If you are an applications programmer, you can also use the Boot Options to

■   change your hard disk's data "seek" method, and

■   turn on or off a network clock (if you are on the Davong MultiLink network).

Any time you make changes to the Boot Options screens, you can use the Write command to save your changes to your *boot configuration volume*. Simply select **W** for Write and type either the name of your hard disk boot volume (usually your User name) or your floppy drive.

After saving these changes, your system will boot the configuration you selected. This configuration remains until you return to the Boot Options program and change it.

The Boot Options also let you create two other volumes used during the boot process. The Patch and Turnkey options create volumes that give you even greater control over the boot process, particularly if your computer is attached to the Davong MultiLink network.

On the first screen after booting your system, you will see a prompt message, Change boot options? (Y/N). Type **Y** (for yes). (If you have "frozen" your Boot Options, however, you may not see this prompt. You can insert your Master Boot Diskette Backup (#2) if you need to change your Boot Options.)

Activating Volumes with the Assign Option

The Assign Boot Option lets you alter the Mount Table you see each time you boot up.

Type **A** (for Assign hard disk volumes).

Your volume assignments depend on the operating system you are using with Multi-OS. The default assignments depend upon the Davong-provided volume allocations you accepted (if any) during the standard installation process.

Figure 3-1 shows sample mount default tables for various operating systems.

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Figure 3-1. Sample Mount Tables

DOS		CP/M-86		Con. CP/M-86	
Drive		Drive		Drive	
Label		Label		Label	
A	IBM DOS A	A	CPM A	A	:F1
B	IBM DOS B	B	CPM B	B	:F2
C	IBM DOS C	C	CPM B	C	CPM
D	IBM DOS D	D	CPM D	D	CPM
E	:F1	E		E	
F	:F2	F	:F1	F	

p-System		QINSTMOS (with DOS)	
Drive		Drive	
Label		Label	
A	:F1	A	:F1
B	:F2	B	:F2
C	PASCAL A	C	IBM DOS C
D	PASCAL B	D	
E	PASCAL C	E	
F	PASCAL D	F	

> **Note:**
> You can see the QINSTMOS mount table only if
> you use the Master Boot Diskette (#3) and
> configure it the same way.

The Assign Boot Option screen also contains two lines that deal with default passwords. You can enter default passwords to work with these volumes in Boot Options without re-entering your password each time. These passwords remain in effect during the boot process. Default passwords and their use are described in Chapters 1 and 2.

The remaining lines explain the keys you use to leave the Assign screen after making changes or without making changes.

Using Assign To Activate Volumes

Assigning a volume is simply the same as inserting a floppy diskette into a floppy disk drive.

In the following example, we will assign three sample volumes created in Chapter 2, Section 1 to the following drive labels: SYSTEM FILES to drive-label A; SPREADSHEET to drive-label B:, and COMPANY INFO to drive-label C:. You will also assign :F1 (the left floppy drive) to drive-label F:. If you have already created your own non-standard volumes and now want to mount them, type the names of your new volumes instead of the examples given here.

> **Note:**
> If you try to assign a non-existent volume, you will see the error message, Volume not found. Your next keystroke will cause the error message to disappear. You can now type the correct volume name.

1. Type **A** at the Boot Options menu. The cursor should be on the A: drive-label line when the Assign screen appears.

2. Type **SYSTEM FILES:CHICKEN LIPS** and press ◄┘. The cursor should now be opposite drive-label B:.

3. Type **SPREADSHEET** and press ◄┘. The cursor should now be opposite drive-label C:.

4. Type **COMPANY INFO:OK YR** and press ◄┘. The cursor should now be opposite drive-label D:.

5. Type <**Ctrl**> and <**End**> to remove any volume name from the line, because we are not assigning anything to drive label D:.

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6. Press ◀◄┘. The cursor should now be opposite drive-label E:.

7. Press ◀◄┘ again.

8. Type **:F1** and press ◀◄┘.

9. Type **632 RWT** as the default group password. Press ◀◄┘.

10. Type **IM OK** as the default owner password. Press ◀◄┘.

Figure 3-2 shows how your assign screen should read after reallocating the volumes. In reality, each password disappears from the screen as soon as you press ◀◄┘.

Figure 3-2. Reallocated Volume Names

Command: Assign

Assign hard disk volumes, diskette drives, and default passwords.
     During volume assignments, use :F1, F2, F3, and :F4 for floppy drives 1-4.

Working Directory: \1

Drive Label
     A   SYSTEM FILES:CHICKEN LIPS
     B   SPREADSHEET
     C   COMPANY INFO:OK YR
     D
     E
     F   :F1

Enter default group access password   632 RWT
Enter default owner access password   IM OK

Press <End> when all necessary information has been entered.
Press <Esc> to abort the screen and return to Boot Options Menu.

Press <**End**> to save this configuration. To write this change to your boot configuration volume, type W. If you are using a Master Boot Diskette, type :F1 as your User configuration volume name. If not, type your user name. Then press <**End**>.

Assigning Floppy Diskette Volumes

Your operating system may require that the floppy drive be assigned to a specific drive label. If there are several PCs with hard disks at your location, it may be convenient to assign all floppy disk drives to the same drive label. All floppy drives in single-drive systems could be mounted on drive-label F:; the floppy drives on double-drive systems could be mounted to the E: and F: drive-labels. This makes it less confusing to copy data to and from floppy diskettes.

You can also use this option to change the current working directory. For instance, Figure 3-2 shows that \1 is the current working directory. (See Chapter 1 for a definition of working directory.) If you need to change this, type the name of the new working directory. Otherwise, you must precede each volume name with the directory in which it is located.

Changing the Size of Your User Memory Space

You may have noticed that the red busy light on your hard disk goes on occasionally after you update data/text files or programs. If you are unfamiliar with hard disks, this probably surprised you the first time it happened. After all, you had not requested a "read " or a "write" to the hard disk.

Your computer and disk drive were in fact exchanging data. This was the disk cache (pronounced cash) in operation. A disk cache is a means of speeding up the transfer of data between your hard disk and your computer.

The disk cache is a portion of your computer's random-access memory (RAM) used by Multi-OS as temporary storage area. The cache acts as a buffer between your hard disk and another portion of your computer's RAM that is called the user memory. The user memory is the section of RAM in which your computer language, operating system, and program files—for example, word-processing or spreadsheet programs—are placed when you load them into your computer.

Your computer uses the cache each time it transfers data to or from your hard disk and user memory. See Figure 3-3.

Figure 3-3. Representation of How
a Disk Cache Works
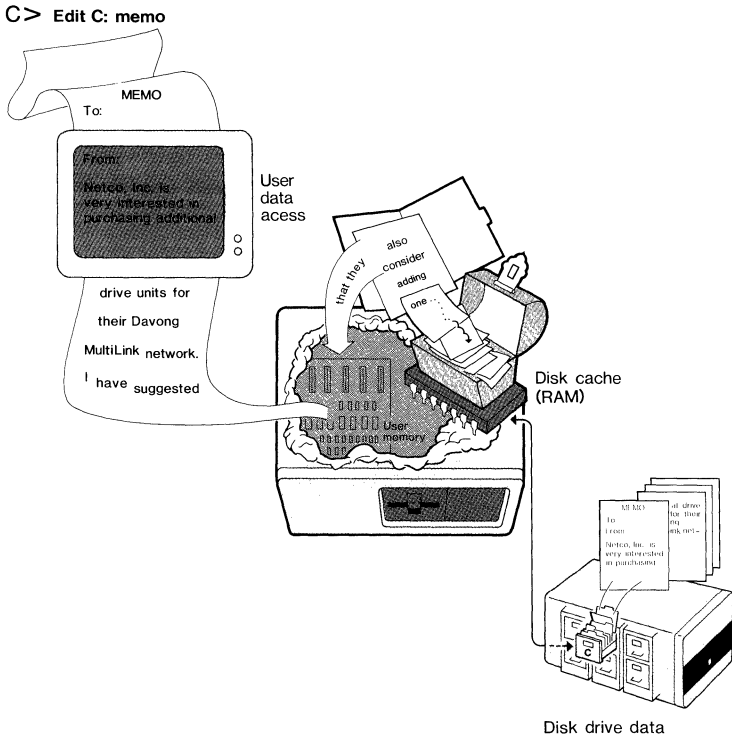
When you first transfer data from your hard disk into
your computer, as much data as your computer's RAM will
hold is read into the cache and your user memory. If the
data file is extremely long, only a portion of it is actually
transferred from the disk to the cache in your computer.

Thereafter, when information is requested, the cache
is searched first. If the data requested is found, no actual
disk read is made. The data is moved to your user memory
area for your program's use. If the data is not found, the
requested data is transferred to the cache.

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Whenever you make an actual write (save) request to the disk, the data is first copied into the cache. Then it is written to the hard disk (as a background task), so you can work on something else. For every write, a request is queued and sent to the hard disk. Therefore, every write goes almost immediately to the hard disk. Your program can continue to operate while the mechanical hard disk seeks to the correct storage area for your data.

The Change Memory Size Allocations Boot Option lets you change the amount of your computer's memory space dedicated for your user memory and, thus, your disk cache.

To change the size of your user memory, you must be within the Boot Options program; if you are not, you must reboot and specify that you want to change your boot options.

The screen should display the Boot Options menu.

To change your user memory space, type **M**.

You will see a screen similar to Figure 3-4. The default amount of memory varies with the amount of RAM in your computer.

Figure 3-4. Memory Size Allocation Screen

```
Command: Memory
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
Change memory size allocation
    Use this command to control the disk I/O performance by selecting an appropriate size
for your user memory space.

NOTE: The total memory of the system is divided between the disk cache space and the
user memory space. The user memory space should be at least 90K bytes. All excess
memory will automatically be assigned to the disk cache memory.

User memory space (in K bytes) . . . . . . . . . . . . . . . . . . .    109




Press <End> when all necessary information has been entered.
Press <Esc> to abort the screen and return to Boot Options Menu.
```

Decide how much memory you want allocated to your user memory area. It must be enough to accommodate your operating system plus the largest program you expect to run on your computer. You can simply type the new figure over the existing number. When you have entered the amount of user memory space you want, press <**End**> or ◂⏎. The program returns you to the Boot Options menu.

Your operating system "thinks" that this is the size of the computer memory and will run any program that will operate with this much "real" memory. The remaining memory in your PC will be used by Multi-OS (and disk cache).

If you do not leave enough memory to run Multi-OS, you will get a Fatal Multi-OS Error/Not Enough Memory message. If this happens, simply reboot, return to this boot option, and *decrease* the amount of user memory. This increases the memory available for Multi-OS.

Use the Write Boot Options Changes option to save this change to your Master Boot Diskette or to your hard disk boot (configuration) volume.

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Section

3

Changing Your Name and Boot Password

When you first loaded Multi-OS into your system, you were prompted to enter your name. The Change user name/ password option lets you personalize the boot process so that you can avoid typing your name at the start of each session. You can also use this option to assign password protection to your boot process. When you have finished your changes, use the Write Boot Options changes option to save your changes to your Master Boot Diskette or to your hard disk boot (configuration) volume.

Type **N** from the Boot Options menu. You should see a screen similar to Figure 3-5.

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Figure 3- 5. Name/Password Change Screen

```
Command: Name/Password
------------------------------------------------------------------------
Change user name/password
    Use this command to set your name and password.

If you answer 'N' to 'Allow boot option change,' the system will not allow you to make any
more changes to this boot diskette and no questions will be asked during the boot-up pro-
cedure.

Operating system  . . . . . . . . . . . . . . . . . . .  DOS Vx.x

Allow user name change (Y/N)?  . . . . . . . . . . .  Y
Allow boot option change (Y/N)?  . . . . . . . . . .  Y

Enter default user name  . . . . . . . . . . . . . .  _
Enter password  . . . . . . . . . . . . . . . . . . .  XXXXXXXXXXXXXXXX




Press <End> when all necessary information has been entered.
Press <Esc> to abort the screen and return to Boot Options Menu
```

You can use this option to "freeze" your name so that the screen simply states your name each time you reboot your system.

You must first make your name the default user name. Type the name you want to appear when you boot up the system; e.g., Jay, Jack, Sue, DOS. (If you press <**End**> after entering your name, you would be asked to confirm your name—for instance, Is your name Jay? (Y/N):—each time you reboot your system.)

Next, use the up arrow key to move the cursor to the Allow user name change (Y/N)? line. Type **N** and press ◄┘. Now you will not be asked to confirm your name at the start of each session. The screen will simply state, User name is: Jay. (If you create a Turnkey volume, you are still asked to enter your name each time you boot so you can boot with your configuration.)

If you do not wish to password protect the boot process, press <**End**> to return to the Boot Options menu.

If you do wish to password protect the boot process, press ◄┘ twice to move to the Enter password line.

Password Protecting the Boot Process

Anyone with a Master Boot Diskette can use your system if you do not password protect the boot process. And if they can boot your system up, then they can find your volume passwords using the Assign Boot Option. This gives them virtually unlimited access to the valuable information you have stored on your system.

If you are not continuing from the previous section, type **N** from the Boot Options menu.

When you see the Change user name/password screen, use the down arrow key to move the cursor to the Enter password line.

Type a password you will *remember*! If you forget your password, you must use the original Davong Multi-OS Boot Diskette you received with your purchase, and respecify your Boot Options.

For more information about passwords, see Chapter 1.

Press <**End**> to return to the Boot Options menu.

Changing Your Operating System

If you are booting Multi-OS from a floppy (e.g., a Master Boot Diskette), you can use the Change Name/Password and Assign boot options to switch from one operating system to another using just one Master Boot Diskette.

Note:

You cannot use this feature to move between the p-System and the other operating systems supported by Multi-OS. To switch from the p-System to DOS, or from CP/M-86 to the p-System, for example, you must reboot your system as usual (i.e., switch boot floppies if you are booting from them).

For example, you may generally run a word
processing program that operates under DOS 2.0 on your
hard disk. While composing a letter, however, you may
need to see sales totals in a spreadsheet program that runs
under CP/M, which is also on your hard disk. But you
cannot locate the CP/M Master Boot Diskette.

You must be in the Boot Options Menu to begin. If
you are not, then reboot your system by pressing
<**Ctrl**><**Alt**><**Del**> simultaneously.

1. Type **Y** and press ◄┘ when prompted Change boot
    options?.

2. Press **N** (to select the Change User Name/Password
    option).

3. Use the up arrow to move to the line labeled
    Operating system. . . IBM DOS 2.0. Type the name
    of the second operating system (i.e., CP/M). This must
    match a Boot volume on your hard disk or network.

4. Press <**End**>.

5. Type **A** to move to the Assign screen.

6. Type in the names of your CP/M volumes at the
    appropriate drive labels. Make sure you assign a CP/M
    volume to A:. If you do not, the program cannot do
    anything and simply hangs.

7. Press <**End**> to return to the Boot Options menu.

8. Press **Q** to leave Boot Option. Do *not* use the Write
    Boot Option to write these changes to your boot
    floppy.

9. Type **N** when prompted Update boot data?.

As you can see, you are given a "second chance" to
update your Boot Options changes when you do not use
the Write option.

> **Note:**
> If you booted from your hard disk, you can
> switch operating systems easily, too. Simply
> reboot your system (press <**Ctrl**><**Alt**><**Del**>
> simultaneously). Then, when prompted, type in
> the user name you usually enter when loading
> the second operating system.

The changes you made will be for this session only.
The next time you boot with this floppy, your usual
operating system volumes will be mounted.

Section

4

Changing Your Disk's Parameters

The Patch Boot Option is used primarily for special Davong MultiLink configurations. Only qualified, experienced programmers should read beyond this point. If you are not, skip this section.

If you are an experienced programmer, you can use this command to change the disk write scheduling algorithm, the memory location of the Multi-OS or MultiLink code, or the network clock enable/disable setting. You can use the Patch command to alter your hard disk drive's data seek method from optimal to sequential.

To use the Patch command, you must be at the Boot Options menu. Then type **P.**

The information selected with the Patch command is placed in a volume of its own. This volume can be located on a floppy disk or created on your hard disk drive.

To create a Patch volume on the hard disk, type a name (for example, **FRED1**) and press ◄─┘ on the Patch volume name line. To put the patch information on a floppy disk, type **:F1** on that line and press ◄─┘.

If you are using Multi-OS with software that does not allow the optimal data-seek method, type **Y** over the N on the Enable sequental disk I/O (Y/N)? line.

The screen you see resembles Figure 3-6.

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Figure 3-6. Patch Parameters Screen


```
Command: Patch _
------------------------------------------------------------
    WARNING: Do not use this command unless you are an experienced programmer. If you
are not, press <Esc> to leave this screen.

    Use the Patch command to change the disk seek method from optimal (disk requests
grouped by cylinder) to sequential (disk requests grouped by occurrence); turn the network
clock on/off, or establish a new address for the server. Numeric fields are hexadecimal.

Working Directory: \ROOT\USERS

Patch volume name . . . . . . . . . . . .   F1
Enable sequential disk I/O (Y/N)? . . . . .  N
Enable network clock (Y/N)? . . . . . . . .  Y
Start of server's new address (Paragraph)  F0
Length of server (Paragraphs) . . . . . . . XXXX




Press <End> when all necessary information has been entered.
Press <Esc> to abort the screen and return to the Boot Options Menu.
```

The "server" program is the portion of MultiLink that enables your computer to communicate with other units on the network. The name "server" in this context refers to the interface program that enables your computer to access the hard disk or other resources on a Davong MultiLink network. You can move this program from its default address so that it does not conflict with special application program operation. The following examples show the results of moving the server program to a user-specified address for DOS and NCI p-System.

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Non–Contiguous
memory

Normal
address

6000:0h

User memory 2

20F0:0h

Server program

0:0h — User memory 1

7000:0h

Server program — 128K

5000:0h

Memory
not present — 64K

4000:0h

User memory 2
(all) — 256K

0:0h
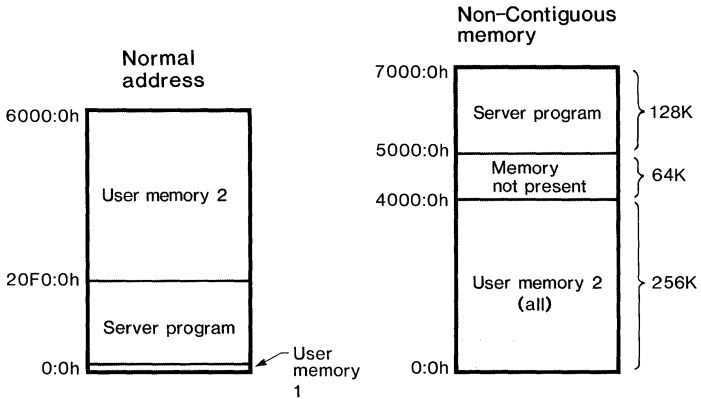
To change DOS to non-contiguous memory, you would
need to name the patch volume; e.g., **FRED1,** define the
Start of server's new address as **5000** (in hex), and the
Length of server as **2000** (hex). 2000 equates to 128K.

Press <**End**> to save the changes you made.

Therefter, when the prompt Enter user name
appears on your screen, you may specify a particular Patch
volume by appending the Patch volume name to the user
name, separating the two with a comma (i.e., Enter user
name: **FRED,FRED1** or **FRED,:F1**). Your system will then
operate within the parameters set forth in this volume.

Normal

5000:0h
User memory 2
4000:0h

Server program

2000:0h

User memory 1

0:0h

Support for
expanded
memory

5000:0h
User memory 2
4000:0h
Server program
3800:0h

User memory 1

0:0h
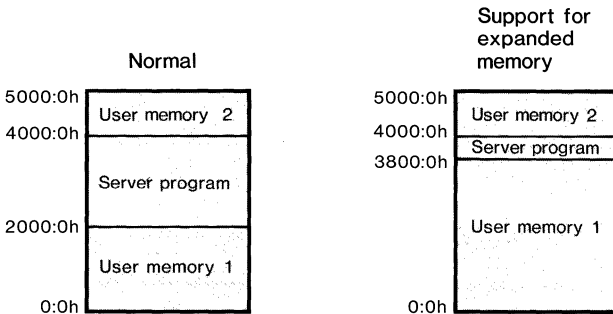
To change NCI p-System to support expanded
memory, you would need to name the patch volume; e.g.,
EXPANDNCI and define the Start of server's new
address as **3800** (in hex). You do not need to enter a
length as the server is still located between the two user
memory areas.

Press <**End**> to save the changes you made.

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Appendix

A

Editing Keys

Use the following keys to move the cursor around the screen when you are using the Multi-OS utility programs.

Table A-1. Cursor Keys

Key	Use
[Enter key]	This key (Enter) moves the cursor to the start of the next line (or field). If the cursor is on the last line of the screen page, this key executes the command screen.
[2↓ key]	This key moves the cursor to the next line. If the cursor is on the last line on the screen page when you press this key, you will hear a beep.
[8↑ key]	This key moves the cursor to the previous line. If the cursor is on the first line on the screen page when you press this key, you will hear a beep.
[6→ key]	This key moves the cursor one character to the right. You will hear a beep if you press this key and there are no characters to the right.
[4← key]	This key moves the cursor one character to the left. You will hear a beep if you press this key and there are no characters to the left.

Special Keys

Use these keys to edit your entries and to leave the current screen page.

Table A-2. Special Editing Keys

Key	Use
Esc	This key aborts a command or action. When you press this key, the screen returns a prompt or displays a menu.
Del	The Delete key deletes the character under the cursor. Any characters to the right of the cursor move one space to the left.
←	The Backspace key deletes the character to the left of the cursor. You will hear a beep if there are no characters to the left when you press this key.
Ins	The Insert key inserts a blank character at the cursor. Any characters to the right of the cursor move one space to the right.
Ctrl + End	If you press these keys simultaneously, you will erase the character under the cursor and all of those to the right to the end of the line.
End	This key indicates that you are finished answering the questions on the screen. This immediately begins execution. You can also press this key to accept the default answers without moving the cursor down the screen.

Organizing
Your Hard Disk

There is no single ideal way to organize a hard disk drive. How you allocate the space on your hard disk depends on a number of factors—how you intend to use the space on your hard disk drive, the number of users, whether your hard disk will be on a network, etc.

There are, however, some general rules you should understand when you organize your hard disk. This appendix outlines optimum volume layout.

The number and size of the volumes you create can be as large as the available disk space, the size of your disk drive, and the operating system permit. You can use as many as six volumes at any one time. You should keep related files in volumes together. For instance, place all spreadsheet files that you update at the end of every month on the same volume and back up the entire volume once a month.

We also suggest that you keep all .COM and .EXE program files (for DOS) on a volume by themselves. You then need to back up this volume only when you add a new program, not each time you change a data file.

Only you can decide whether it is more advantageous to split up your disk into many small volumes or one or two large volumes. If you bought your hard disk to handle large data bases, you may find it more practical to create only one or two volumes on your hard disk.

For most applications, however, several smaller volumes are more practical. Creating several small volumes allows you to be more selective in protecting your data. And, if one volume becomes corrupted, the remainder of your storage space will still be intact. The backup process is also faster and uses fewer diskettes when you use small volumes.

Optimizing Disk Layout

When you create hard disk volumes, the HDMGR program places each volume in the first available space large enough to hold it. Data on the hard disk is not organized such that one entire side of a disk platter (hard disk) is accessed before the other side is. Hard disks transfer information on a track-by-track basis. A track on a hard disk can be likened to a record groove, except that one hard disk track is one continuous circle on a disk platter.

When a hard disk transfers data, it does so by reading from or writing to a vertical set of tracks called a *cylinder*. Only after a cylinder has been completely read or filled up with data do a hard disk's read-write heads move to another cylinder. In other words, if your hard disk has two disk heads, they take turns reading the disk. Each set of recording heads read as much data as it can without moving.

Figure B-1 illustrates how the heads seek information on the disk. Most of the disk's information retrieval time is spent in moving from one cylinder (i.e., vertical set of tracks) to another.

Figure B-1. Disk Seek Method
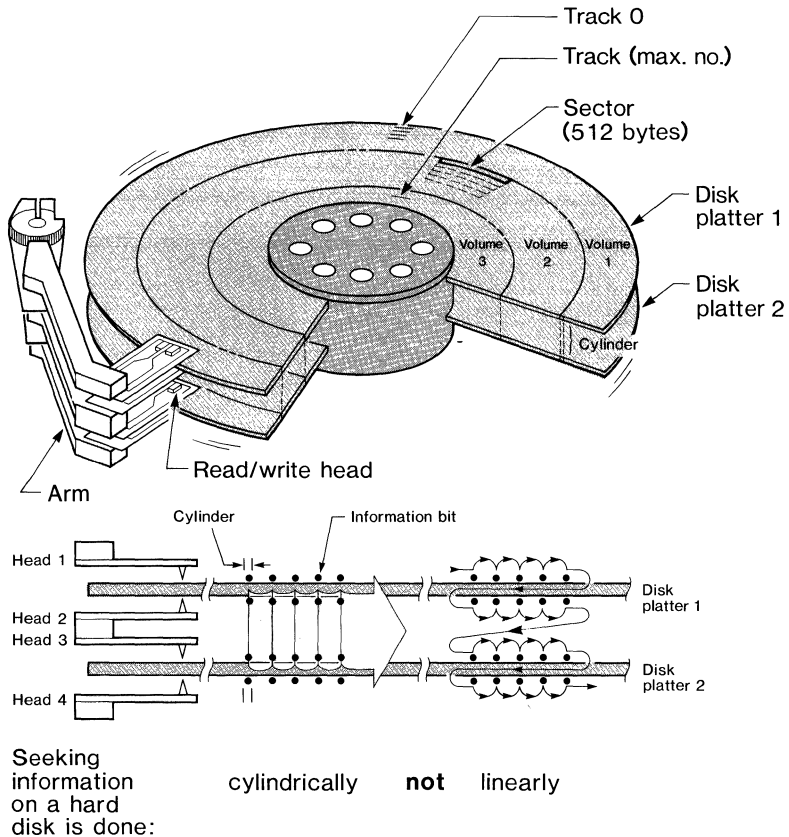
Because of this, you should arrange the volumes on your disk so that the heads spend as little time as possible seeking data. Typically, you use volumes in the same operating system at about the same time. Group these volumes together to greatly reduce the amount of time your disk spends in locating information.

In the following examples, volumes stored in two different operating systems are used to illustrate how to organize your hard disk. For these examples, pretend this hard disk is made up of one large DOS volume of 1500K bytes, 12 CP/M volumes totalling 3020K bytes, and a small DOS volume of 320K bytes.

　　　　B-3

Example of Bad Disk Organization

```
Large        ── 80
                cylinders
                DOS

             ── 220
                cylinders
Other           CPM
volumes

Small       ── 20
               cylinders
               DOS
```
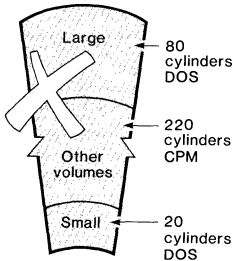
If you create the CP/M volumes after you create the large DOS volume, they will be placed immediately after the large DOS volume. If you then create a 320K DOS volume, it will follow the CP/M volumes. This means that when you use both DOS volumes, the disk heads spend a great deal of time skipping back and forth over the CP/M volumes to reach the two DOS volumes.

Example of Better Disk Organization

```
Large        ── 80
                cylinders
                DOS

Small        ── 20
                cylinders
                DOS

Other
volumes      ── 220
                cylinders
                CPM
```
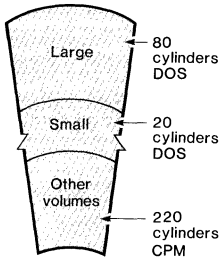
To reduce the amount of time your disk spends in seek, group all the volumes from the same operating system together (if possible) by creating them before you create volumes for a second operating system. Then the hard disk heads will not have to travel over the cylinders allocated to the CP/M volumes.

Example of Best Disk Organization

```
Small        ── 20
                cylinders
                DOS

Large        ── 80
                cylinders
                DOS

Other
volumes      ── 220
                cylinders
                CPM
```
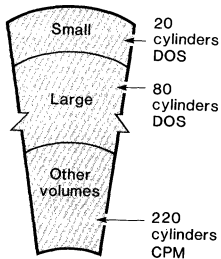
The best arrangement to reduce the search time on a single-drive hard disk system would be to place the small DOS volume first on the disk, followed by the large DOS volume, and then the CP/M volumes. This reduces the space between the start of the DOS volumes to only 20 cylinders rather than 80.

Example of a Two-Drive Disk Organization
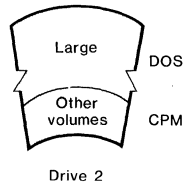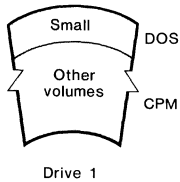
If two hard disk drives are connected to your computer system, you can achieve an even better arrangement by putting some volumes on each drive. This reduces the search time substantially because one set of heads on drive 1 is already placed on one volume (either DOS or CP/M), and one set of heads on drive 2 is already placed on one volume (either DOS or CP/M).

Keep the information in this chapter in mind when you turn to Chapters 2 and 3 to create and activate your own disk volumes. You will discover that the Create and Krunch-gaps options in the HDMGR menu are particularly useful tools in optimizing your hard disk drive's storage areas.

B-5

Error Messages

This appendix contains the error messages that may appear
on the screen during installation or during your use of the
Multi-OS and Davong MultiLink utility programs. Each
message is followed by an explanation and how to recover
from the error.

A DIRECTORY WAS EXPECTED, BUT NOT FOUND
The program expected to see a directory name but did not
find it in the pathname. You probably ended a pathname
with a data volume name. Enter a directory name.

ATTEMPT TO CREATE AN EXISTING VOLUME
You tried to create a volume with a pathname matching a
volume that already exists. Use the List command in
HDMGR to check the volume name. If you do not want the
existing volume, use the Delete command to remove it
from the hard disk.

BAD ACKNOWLEDGE WAS RECEIVED
A packet was not sent over the network, yet an acknowl-
edge was sent to a station. Check the cabling on all your
network connections.

BAD DELIMITER IN VOLUME PATHNAME
You used a character other than a back slash in front of
your pathname. Retype your volume pathname correctly.

BAD DRIVE NUMBER IN PATHNAME

You entered a drive number that you don't have. This probably was a typo. Enter a number from \1 to \4, or type the full drive name.

BAD STATUS FROM NMC CARD

The NMC card has failed. It should be replaced or repaired.

BAD UNIT NUMBER IN PATHNAME

This is the same message as BAD DRIVE NUMBER IN PATHNAME.

BOTH COPIES OF DIRECTORY ARE BAD

When the system tried to boot, it read the first copy of the master drive directory and found it bad. It then read the second copy and found that it was not readable either. This rates as a serious problem. You may have to reinitialize the system and restore your disk from your backup sets.

BOTH COPIES OF SPACEMAP ARE BAD

The Volume Allocations Tables on the hard disk have become corrupted and the system cannot locate any volumes. Turn off the drive and check your cable connections. You also need to reseat your network or disk interface card. Then reboot your system. If this error message is repeated, you will have to take your hard disk drive to your authorized dealer.

CANNOT DELETE NON-EMPTY DIRECTORY

The directory in the pathname you specified for deletion still contains other volumes. You can only delete empty directories. To delete the directory, you must first delete the volumes in it.

CANNOT DELETE ROOT VOLUME

You are not allowed to delete a root volume. You may use Alter to rename it, if you want.

CANNOT TRANSFER A DIRECTORY

You tried to use Transfer to move a directory. You can only transfer volumes that contain data.

DESTINATION NODE NOT PRESENT

A packet was sent to a station on the network that is not responding. The destination node may be turned off. If not, check your cable connections.

DISK I/O ERROR

Your computer could not "locate" your disk drive when it tried to read or write to it. You need to make sure the connections between your computer and disk controller board are secure. Retry the operation you were doing. If you get the same error, make sure your disk is turned on. You may need to reinstall your hard disk and restore your volumes from your backup sets.

DRIVE NOT FOUND

The drive name you entered in the pathname is not recognized by Multi-OS. Check to see if you spelled the drive name correctly. Use the Resources command in the HDMGR program to find the active drives.

DRIVE NOT READY

The disk drive you specified is not ready. If you specified a floppy disk, this may mean that you do not have a diskette inserted into the drive. If you specified a hard disk, it may mean that you didn't allow enough time for the drive to warm up. It could also mean that either your disk controller card or your drive has a problem.

DUPLICATE RESOURCES FOUND ON NETWORK

Two drives with the same name are on the network. You must rename one of them.

END OF PATHNAME IS A DIRECTORY

The pathname you entered specifies a directory, not a data volume as it should have been. Retype the pathname correctly, ending it with the name of a data volume.

END OF VOLUME

You have filled all the storage space in the volume specified and are out of room. To continue adding files to the volume, you should follow the instructions in Chapter 2, Section 11, to expand your volume.

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ERROR OPENING PIPE

You supplied a wrong password or pipe name, or the pipe volume no longer exists.

ILLEGAL COMMAND

The program cannot recognize the command you entered. Re-enter the command.

ILLEGAL DRIVE NUMBER

Utilities other than HDMGR will print this message if you use a number other than \1 through \4 to identify your drive. Retype your request.

ILLEGAL LOCK NAME

You have used either illegal characters or too many characters in your lock name.

ILLEGAL LOCK NAME OR RANGE

The lock name is not in the correct format, or you entered an end-of-range number that was smaller than the start of the range number.

LOCK ALREADY SET LOCK IS IN USE

Another station already has placed a lock on the file or record you are attempting to lock. Use <**Ctrl**><**Break**> to clear the message. Then use the Lock/l command to see who has set the lock.

LOCK IN USE BY STATION xx
ABORT,RETRY,IGNORE?

This message appears if you are using Shared DOS on the Davong MultiLink network. You tried to set a lock on a lock spec that was already locked. It usually happens when two people are trying to access the same file on the same hard disk at the same time. If you are in a batch file, you can type <**Ctrl**><**Break**>. You can then display the lock list and see who has locked the file or volume you want to use. It is not wise to override this message.

LOCK NOT HELD BY YOUR STATION

You tried to clear a lock that was not set at your workstation. A lock must be cleared by the same workstation that set it. Or, you may have tried to clear a lock that did not exist.

LOCK TABLE IS FULL
RETRY (Y/N)?

The Lock program has room for only so many locks. Until you or another station clears a currently set lock, you cannot set any more. You can try again to set the lock as many times as you wish, or you can clear one of the locks you had set previously. If you are in a batch file, you can exit by pressing <**Ctrl**><**Break**>.

LOCK NAME IS NOT YOURS

You tried to release the lock placed on a file or record by another station.

MULTI-OS OR MULTILINK MUST BE INSTALLED
TO CREATE A HARD DISK BOOT VOLUME

You booted from an operating system diskette (i.e., IBM DOS or CP/M-86) rather than your Multi-OS or MultiLink boot floppy. Remove the operating system floppy from your left floppy drive. Insert your Multi-OS or MultiLink boot floppy in the left floppy drive and reboot (press <**Ctrl**><**Alt**><**Del**> simultaneously). Then retype the proper command to begin creating your hard disk boot volume.

MULTI-RECORD PIPE WRITE IN PROGRESS

The pipe is "locked" for any other access. Retry your request at a later time.

NAME OR PASSWORD TOO BIG

You used too many characters (more than 16) in your name or password.

NAME PARAMETER REQUIRED

You entered a pathname that contained two adjacent delimiters or that began with a null character.

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NEED PRIVATE PASSWORD FOR RENAME
To rename a volume, you must enter the private password.

NESTING LEVEL TOO DEEP
When you are trying to list the volumes on a drive, you will see this message if there are too many levels of subdirectories. Try listing from a specified subdirectory farther down the organization chart.

NETWORK CARD BUFFER RAM FAILURE
The network card in your computer is bad. See your Davong dealer.

NETWORK CARD POWER-ON FAILURE
The network card in your computer did not respond to a reset comand. See your Davong dealer. You may have to reseat your network card.

NETWORK IS DOWN
You station cannot "talk" to any other station on the network. This is probably a hardware problem. Check your network connections and your network card. You might have to reseat your network card.

NETWORK IS NOT INSTALLED
You probably booted up with your Multi-OS Master Boot Diskette (#3), or an operating system diskette such as DOS 2.0, instead of your MultiLink Master Boot Diskette (#6).

NETWORK TIMEOUT
The network is very busy, and the network file server is unable to respond to any more requests—for now. If it continues, you may have a hardware problem. See your Davong dealer.

NO ACCESS FOR READ
Either the password you entered does not give you read access to the volume, or you did not specify a password. Retype the password—you may have mistyped it the first time. Make sure you are entering the correct password for that volume.

NO ACCESS FOR WRITE

Either the password you entered does not give you write access, or you did not specify the password. Retype the password—you may have mistyped it the first time. Make sure you are entering the correct password for that volume.

NO NETWORK CARD IN SLOT

The Davong MultiLink program cannot access any file server on the network because you have no Network MultiFunction Card in your computer. Check with your local Davong dealer.

NO NEXT LOCK

You have reached the end of the lock list. If you need another lock, release some of the previous locks.

NO PIPE NAME SPECIFIED

When you used the Pipeout program, you did not type a pipe volume name.

NO WRITE ACCESS TO PARENT VOLUME

You cannot create/deleate a volume unless you have write access to its directory.

NON-DIRECTORY FOUND IN PATHNAME

One of the names in the pathname, other than the last one, identifies something other than a directory. The last name in the pathname must be a data volume.

NOT A SYSTEM DATA VOLUME

You cannot mount the operating system boot volume or a pipe volume.

NOT ENOUGH MEMORY

You need to adjust the parameters on your boot disk. Use M from the boot options menu to decrease your user memory space and increase the memory space allotted to Multi-OS. Refer to Chapter 3.

PACKET IS TOO BIG

The length of the network packet was larger than the legal maximum.

PIPE FULL

You cannot write any more requests to the pipe until a read action has transpired.

PIPE WRITE OUT OF SEQUENCE

This means that a packet was probably delayed during transmission.

READ/WRITE NOT ALLOWED ON DIRECTORIES

You cannot use a directory volume to read and write data to/from the hard disk.

RESOURCE NOT FOUND

The resource (drive or other peripheral) you are trying to find is not currently on the network or does not exist.

SYNTAX ERROR IN VOLUME PATHNAME

Check to see if you have entered the correct delimiters, or if the first parameter in the command is a null pathname. You may have entered more than 16 characters for a volume name or password, or used illegal characters. Remember that you cannot use <**Ctrl**> characters, commas, hyphens, back slashes, colons, semi-colons, or an equals symbol when naming volumes and assigning passwords.

TO INSTALL A HARD DISK BOOT VOLUME, YOU MUST BE RUNNING IBM DOS 2.X

You booted Multi-OS or MultiLink from the wrong operating system (i.e., Multi-OS or MultiLink support of DOS 1.1 or the UCSD p-System rather than IBM DOS 2.X). You must be using Multi-OS or MultiLink support of DOS 2.X to install a hard disk boot volume. Insert your IBM DOS 2.X Master Boot Diskette in the left floppy drive and reboot (press <**Ctrl**><**Alt**><**Del**> simultaneously) to continue. Then start the procedure to create a hard disk boot volume over again.

UNIT NOT FOUND

You cannot create a new volume because the drive name you specified cannot be located. If you are linked to a network, check to see if that station is turned on.

UNRECOGNIZED NETWORK RESPONSE

A response for which there was no outstanding request came over the network.

VOLUME NAME ALREADY EXISTS

You cannot give two volumes the same name. Your files would become disorganized.

VOLUME NOT FOUND

The program cannot find the volume name you specified. Check your spelling. Use the List command in HDMGR to verify its existence and spelling.

VOLUME IS NOT A DIRECTORY

You tried to use a volume name as a directory name (e.g., in creating a new volume).

VOLUME SIZE REQUESTED EXCEEDS SPACE AVAILABLE

You have run out of disk space. You should delete obsolete volumes, then use the Krunch option in HDMGR to create a contiguous block of space on the disk. See Chapter 3, Section 11.

Fatal Errors

There are several Multi-OS errors that are extremely serious. These are usually symptomatic of hardware problems. These errors display as Fatal Multi-OS Error followed one of the messages listed below.

CONSISTENCY CHECK — *read screen text*

If this occurs, make a note of the exact text and the conditions that lead to the error, and call your dealer. If you have a internal Davong disk drive, the screen may display this message when you turn off your hard disk's power supply before you turn off your computer. When you see this error in this context, it may be ignored.

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ERROR CREATING OUTPUT FILE

You may not have write access for the volume on which you were creating the file. You could also be out of disk space.

ERROR READING DATA FROM PIPE

Something affected the communication link between your station and the station from which you were receiving.

FLAW TABLE FULL

During mapping, the program found too many flawed areas on the disk. Check your specified drive size; it may be incorrect. Check the back of your external disk drive for the correct model number. If you have an internal Davong disk drive, you will have to remove the cover of your IBM PC and check the top of the drive for the correct model number. If you have entered the correct size, call your dealer and report this problem.

UNABLE TO READ SPACE MAP

The program attempted to read both space maps and could not read either one. This is a serious problem. You will have to reinstall and reformat the disk drive. Then you must restore your volumes from the backup sets you made. The other possibility is that there is a hardware problem.

UNABLE TO WRITE SPACE MAP COPY 1
UNABLE TO WRITE SPACE MAP COPY 2

These mean a probable hardware failure. Try to reinstall and reformat your hard disk. If this does not work, your drive may have to be repaired.

Glossary

access rights   the assigned rights that allow entry to a protected resource; e.g., diskette, directory, volume. You can have Read/Write, Read Only, Write Only, or No access to a protected resource.

activate   to make a volume available to an operating system (see *mount*).

background task   a low-priority task that the system can do when it is not doing more important tasks.

back up   the process of making a duplicate copy of data stored on a hard disk or floppy diskette; ensures against losing valuable data when a system failure (i.e., a "crash") occurs. Floppy diskettes and tape systems are popular ways to back up hard disk drives.

boot diskette   a floppy disk that contains information necessary to load an operating system into a computer.

boot up   to prepare the computer for use by loading the operating system into memory; may be from a ROM inside the computer or from external sources such as a floppy diskette or a hard disk.

boot configuration volume   a storage area on a hard disk that holds data used in the boot process; the data in the boot volume is loaded into the computer automatically when the computer and hard disk are turned on together. Also called a boot volume.

byte   a unit of information in the computer which is made up of a certain number of bits—usually the eight bits that represent a character in binary code.

contiguous   adjacent; as in consecutive, unbroken areas of space.

cylinder   a vertical set of tracks on multiple-disk platters which is the width of one track at any head position; refer to *track*.

data   information which represents facts, concepts, or instructions for use in a computer program; refer to *byte*.

default   the name or value assumed when no other is specified.

directory   a special type of volume that contains the pointers to other volumes.

disable   one of the two possible states of a switch on a computer processing unit (e.g., the disk controller) which prevent certain functions from occuring; contrast with *enable*.

disk cache   a section of a computer's random-access memory (RAM) circuits set aside to act as a temporary buffer (a storage area) between the computer and a hard disk drive; speeds up data transfer to/from a computer and hard disk.

disk driver   a program or set of programs that allow a hard disk drive to communicate with a computer.

disk platter   a flat, semi-rigid recording surface coated with magnetic material; resides inside the sealed portion of a hard disk drive.

drive designation   a name assigned to a hard disk drive so that is can be recognized.

drive label   the symbolic representation of a logical storage device.

enable   one of two possible states of a switch on a processing unit which allow certain types of functions to occur; contrast with *disable*.

export   to copy a file to a temporary volume so that it can be moved to a different operating system.

file   a collection of related text or data which is named and treated as a unit; may exist on a hard disk, floppies, tape, or in computer memory.

filename   the name used to store and retrieve a file.

floppy-sized volume   a storage area on a hard disk drive that holds the equivalent amount of data that can be placed on a standard floppy diskette—up to 360 kilobytes.

format   the process of initializing all tracks and media surfaces of a floppy or hard disk; refer to *sector*.

HDMGR   a Multi-OS utility program that allows you to manage your hard disk space.

hard disk drive   a high-capacity, random-access mass storage device that reads, writes, or erases data on non-removable magnetic disk platters; allows recording of information in small magnetized areas on disk platters; refer to *disk platter*.

hardware   the physical computer equipment consisting of electronic and mechanical devices; contrast with *software*.

head   a read/write recording mechanism attached to an arm inside the sealed portion of a drive unit; positioned above the disk surface by a motor.

interface   the hardware and software components that connect the units of a system and allow transfer of information; a shared boundary.

I/O (Input/Output)   the process of transmitting data into or out of storage media for processing.

K (Kilo)   a unit of measure for memory capacity; two to the tenth power (1024 in decimal).

landing zone   a circular area on the disk platter used to park read/write heads when the DSI PARK utility is executed; prevents the heads from touching data- storage areas on the hard disk.

M (Mega)   a unit of measure for memory capacity; two to the twentieth power (1,048,576 in decimal).

media surface   the flat recording surface of a disk platter; each platter provides two media surfaces; refer to *disk platter.*

mount   to activate a hard disk volume so that it is recognized by the operating system. The process is similar to inserting a floppy diskette into a floppy drive.

Multi-OS   a disk driver system from Davong Systems that allows you to transfer files between your computer, hard disk, and floppy disk drives. Separate versions of Multi-OS allow you to transfer and store files created with the IBM DOS, CP/M, Concurrent CP/M, and UCSD p-System operating systems.

operating system   the software system that controls a computer's resources and allows execution of computer programs.

password   a bizarre string of characters, not to exceed 16, that a user must supply before being allowed access to a given diskette, directory, or volume.

pathname   a series of directory names separated by backslashes that must be entered to reach a specified volume.

read   to obtain data from a storage device or data medium such as floppy diskette or hard disk drive.

sector   a segment of track on a hard disk recording surface; contains data stored in a continuous (or *serial*) stream of data bits; Davong drives use "soft" sectors (i.e., formatting gaps are required between sectors); refer to *format*.

seek   selective positioning of read/write heads over a disk platter; to search for information on the drive unit.

software   non-hardware components of a computer system; includes sets of programmed instructions and procedures which control the computer; contrast with *hardware*.

track   a ring on the surface of a disk which has a constant radius and width; an area where data is recorded.

volume   a fixed and contiguous area of a hard disk; the size of a volume is determined during disk formatting or by accessing the HDMGR Create command.

Winchester technology   a hard disk system with head assemblies which are continuously loaded, low in mass, and highly compliant; a storage technology featuring a totally sealed, contamination-free environment that allows read/write heads to fly a few microns above the disk platters.

working directory   the pathname for a volume or set of volumes that you are currently using.

write   to record data onto a storage media, such as hard disk or floppy diskette.

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What one thing could we do to improve this manual for you?

Name _____ Title _____

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May we contact you regarding your comments?
☐ Yes ☐ No

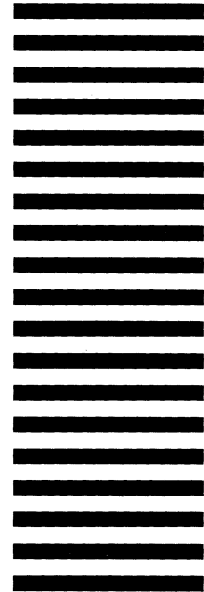Phone: (_____) _____ – _____ ext. _____

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Within the period of this warranty DSI shall be obligated to replace or repair this Product should it prove to be defective in material or workmanship. Repair parts and replacement products will either be reconditioned or new and all parts so exchanged or replaced will become the property of DSI.

Warranty service may be obtained by delivering the Product during the warranty period to an authorized DSI dealer. You may contact DSI at the address appearing below for the name of the authorized DSI service center closest to you. If this Product is returned for repair, it must be accompanied by proof of purchase indicating the date of purchase and dealer's name from whom it was purchased. All returns must be prepaid and insured by you and must be appropriately packaged for safe shipment since DSI will not accept responsibility for loss or damage in transit.

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