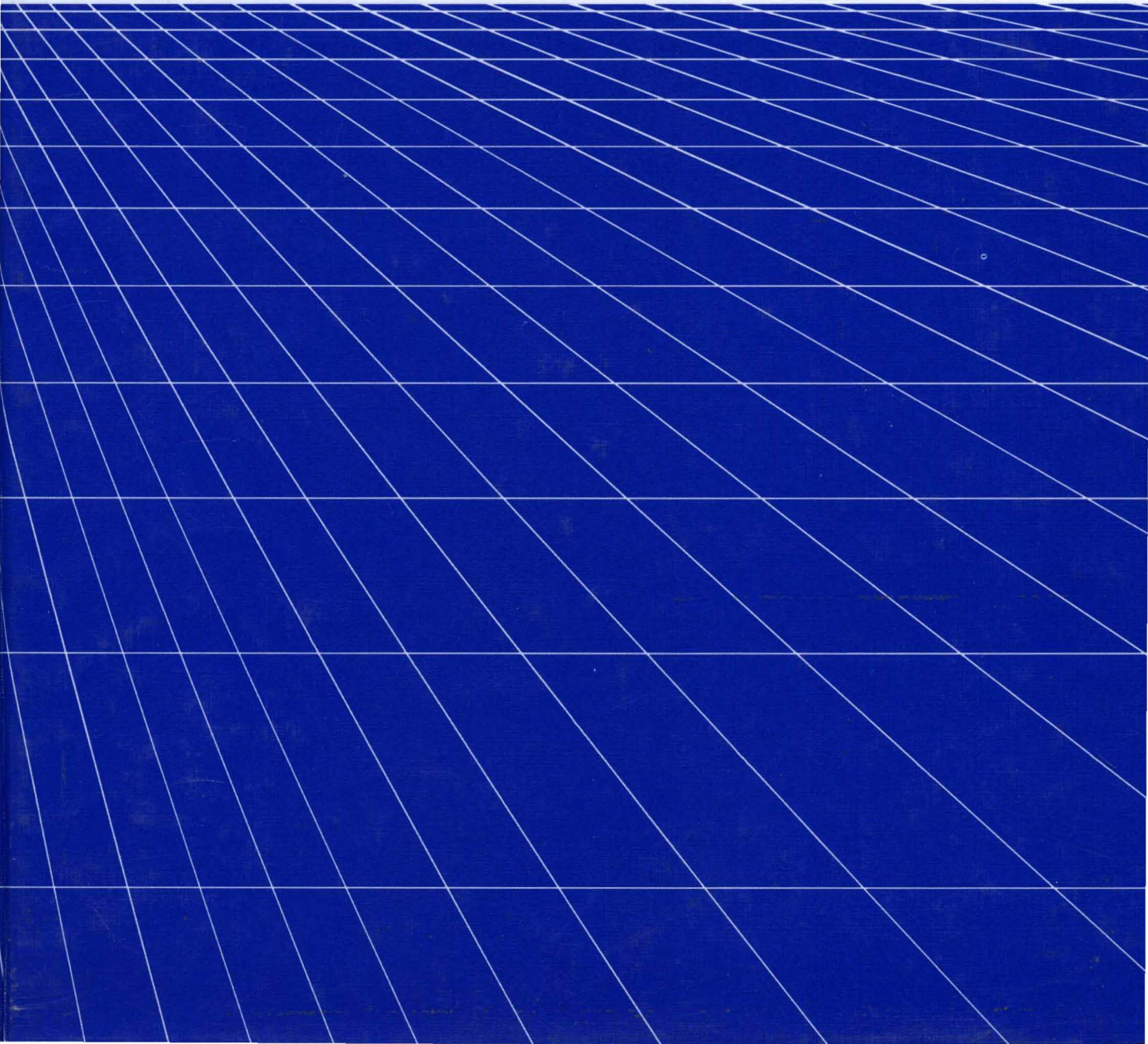
Digital Microsystems™

HINET MASTER
VOLUME 2
NETWORK MAINTENANCE GUIDE



Digital Microsystems DSD™

HINET MASTERS
VOLUME 2
NETWORK MAINTENANCE
GUIDE

Version 1.2

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5.0 DATA STORAGE

1.0 INTRODUCTION

This volume of the HiNet Masters manuals covers HiNet Utilities, the CP/M Operating System, Network Maintenance, Data Storage, and Network Diagnostics. Volume 1 covered setting up the Master and the Network in a simplified manner. Now, Volume 2 will cover the details of these procedures that you, the Network Administrator, will have to know to maintain the Network.

While the prospect of learning all of this may seem overwhelming, the information presented here is for reference; you do not have to remember all of it. Here is how this volume is divided after this introductory chapter:

Section 2 -- HiNet Utilities

Covers everyday utilities such as ASSIGN, DIRNET, WHO and FILECOPY, as well as the principles behind sharing and owning partitions, partition security, logging on and off the Network, and creating and using RAM Disks. This is the most important chapter for Users to understand. All DMS workstation manuals contain this section.

Section 3 -- The CP/M Operating System

Covers CP/M commands and special procedures for handling files on the Network.

Section 4 -- Network Maintenance

Provides information for the Network Administrator on 5HDHELP, ALLOC, NETALLOC, USERS, PASSWORD (PW) and MACHINE.

Section 5 -- Data Storage

Explains the use of Floppy Disks, Disk Drives and associated utilities (for example, FORMAT, FORMAT5, SYSGEN, MINICOPY, HARDBACK, 5HDBACK).

Section 6 -- Diagnostics

Details the use of 5HDHELP, Network Error Messages, and Diagnostics. This section should be referred to when talking to DMS Customer Service about special problems.

Section 7 -- Customizing

Descibes using the DMS CUSTOMIZ utility for manipulating the keyboard layout, loading alternate character sets and programming the function keys.

Section 8 -- Index

LOCAL AREA NETWORKS

Unlike most other microcomputers, a DMS HiNet Master can be used as either a 'stand-alone' unit, a Network workstation with local storage or the Master Station of a Local Area Network. A stand-alone "personal computer" can

be used by only one person at a time. While this is usually sufficient for those who work by themselves, people who work with other people need to interact and share information. Sharing computer resources is the function of the HiNet Local Area Network.

In a Local Area Network (or 'LAN') each separate workstation is a full-fledged microcomputer dedicated to serving the person (or persons) using it. In addition, all the stations are wired together into an interconnected system that allows everyone to communicate with each other as well as share resources such as Hard Disk storage, applications programs, and printers.

In each HiNet Network, one DMS-3/501 or DMS-3/4 is used as a Master Station which monitors and controls the entire system. Linked to the Master Station are from one to sixty-three workstations which can be used for whatever applications are desired (word processing, accounting, planning, graphics, etc.).

While both the Master Station and the various workstations are full computers with their own Central Processing Units (CPU), they are usually used for different purposes. The workstations are used for word and data processing applications, while the Master Computer is reserved for controlling the Network.

It is, of course, possible to run applications programs on the Master Station at the same time it is operating the Network, but it will perform these jobs more slowly than a workstation because it must also handle disk accesses for the various workstations.

1.1 NETWORK ADMINISTRATOR

Every HiNet Network should have someone responsible for coordinating all aspects of the Network, taking charge of the Master Station, and supervising Network maintenance and operation. This Network Administrator should be familiar with all the workings of HiNet, ensure that workstation operators understand how to use their stations, see that proper backup disks are regularly made, maintain the User and Allocation tables, and be responsible for password security.

1.2 OPERATIONS CHECKLIST

A HiNet Network requires a minimum of routine upkeep and maintenance. The only hardware maintenance required is regular cleaning of all workstation and Master Computer fan filters. The only software/data upkeep necessary is regular tape or Floppy Disk backup of Hard Disk partitions and system tables. The System Operator should ensure that the following tasks are performed regularly.

PARTITION BACKUP

If feasible, all partitions should be backed up daily using the appropriate utility (see Section 5.5). If this is too time-consuming, some partitions should be backed up daily on a cycle that results in each partition being backed up at least once per week. Partitions that have frequent changes of content should be backed up more often than partitions that contain only rarely altered data (utilities and applications programs, for example). The Network must be "down" while backups are being made. Therefore, a special time of the day or week should be set aside for this purpose; all Users should know that they cannot access the Network at that time.

PARTITION ZERO BACKUP

In addition to backing up regular partitions, the Network Administrator should copy the Users, Configuration, Allocation, Password and System Directory Tables to a Floppy Disk at least once a week or every time the tables are changed. This is very important because, should something happen to the Hard Disks, exact reproduction of these tables from your memory is difficult if not impossible. If the re-entered tables do not exactly match the old Tables then data cannot be accessed in the partitions.

Use 5HDBACK, READ0 and CARTBACK to copy the tables and software that are stored on Partition Zero. See section 5.

SAFE STRORAGE OF BACKUP DISKS

Once a week Floppy Disks containing back-ups of everything on the Network should be removed from your premises and stored in a safe place.

FAN FILTERS

Fan filters on all workstations and Master Computers should be thoroughly cleaned on a regular basis (see Volume 1, Section 1.6) at least once a month in typical office environments, more often in dusty environments. **Cleaning the fan filters is extremely important.** Dirty fan filters will severely degrade the station's cooling ability which may lead to over-heating and possible damage to circuits and chips.

FLOPPY DISK DRIVE HEAD CLEANING

Floppy Disk drives that are extensively used should have their read/write heads cleaned with a special head-cleaning diskette. Head-cleaning kits are sold in computer supply stores; follow the directions carefully.

2.0 HINET UTILITIES

2.1 INTRODUCTION

This chapter provides basic information that is necessary for operating DMS workstations on the HiNet Local Area Network (LAN). It will not attempt to cover all aspects of the system. Additional information about specific utilities is available throughout this manual.

The HiNet Network supports four different operating systems: HIDOS, CP/M-80, CP/M-86 and MS-DOS. The operating system that you wish to run depends upon your pre-assigned User Name and the capabilities of your workstation. Your assigned partitions must be formatted for either CP/M or MS-DOS. You cannot have files from both operating systems in one partition or be assigned to both types of partitions at the same time.

2.2 BEFORE STARTING

If you are new to the HiNet Network ask the person in charge of your Network for the following:

- Your user name (and password, if any).

- The name (and password, if any) of the partition you will use for saving your work.

- The file name(s) and partition name(s) where the application program(s) you will be using are stored.

- The user's manual(s) for the application program(s) that you will be using.

This manual will assume that the programs you will be using are located on the SYSTEM partition which is assigned to your drive A.

2.3 THE CURSOR

When you turn on a DMS workstation and get the Login message, you will see a solid block of light after **NAME:**. This is the cursor. The cursor marks the place on the screen (and, of course, in your text or numerical table) where your next operation or keystroke will be entered. In this case it marks the place where the first letter of your User Name will be entered.

As you type characters on the keyboard, the cursor moves to the right and shows where the next character will be entered. In a sense, the cursor is like the tip of a pen placed against paper; your next mark will be made wherever it is located. Just as you can lift a pen up off the paper and put it down anywhere else you want, it is possible to shift the cursor around

the screen, or through the pages of your text, with commands from the keyboard.

These commands (usually called Cursor Commands) vary according to the kind of program you are using. They will be explained in the appropriate parts of this manual, or in the user's manuals supplied with your applications programs.

2.4 LOGGING ON

While using the HiNet Network, the programs you use and the work you produce are stored on the HiNet Master Hard Disk. These programs and data files are available to you at any Network station where you log on. You may log on at any station by turning on the power or, if the power is already on, by 'Resetting' the station. On the workstation's screen you will see the words:

```
Joining HiNet...
Login please:
Network User Name=>
```

You then type in the User Name you have been given, followed by a Carriage Return. If you make a mistake while typing in your User Name hit **RETURN** twice and you will be returned to **NAME:** so you can start over.

After you enter your name and press RETURN, the station will respond with **PASSWORD:**.

```
Joining HiNet...
Login please:
Network User Name=> PAT
Password=>
```

If you have a password, you must now type it in followed by RETURN. The letters of your password will not appear on the screen as you type them.

If you make a mistake while typing your password, simply hit RETURN to restart the login process. If no password is required with your User Name you may hit RETURN to complete the login process.

If you have correctly logged onto a DMS workstation, the screen will show an **A>** (or possibly some other letter) after the login message.

A User Name is linked to a particular operating system (HIDOS, CP/M-86, or MS-DOS). If you try to log in to a workstation with a User Name that is linked to an operating system that the workstation cannot handle, your login request will be denied. See section 2.11.4 for a list of workstations and their compatible operating systems.

2.4.1 MS-DOS DATE AND TIME

Whenever you log in to a 16-bit workstation under MS-DOS, the current Network date and time (entered from the Master) are displayed on the screen. After the date, you are requested to enter a new date and then a new time. Hitting RETURN twice will keep the date and time the same. You can change the Network's date and time settings only from the Master, not from a workstation. Two RETURNS in the Login Command in your User Table entry will bypass this MS-DOS feature. If there is an AUTOEXEC.BAT file in the partition assigned to the A drive, the date and time requests will not appear at all.

2.5 THE PROMPT

The **A>** that you see is called a 'Command Prompt'; it means that the computer is finished with what you last told it to do and is waiting for your next command. This particular form of prompt indicates that you are in CP/M or MS-DOS (see section 3.0 or section 4.0). The use of the letter **A** shows that you are currently accessing Drive A and thus it is sometimes called the "A Prompt". If you were accessing one of the other three drives you would see a "B Prompt" (**B>**) for Drive B, or some other letter for some other drive. (See section 2.9, Drives.) Application programs usually have their own forms of prompts such as **:** or **OK.**

2.6 USING COMPUTER COMMANDS

CAPITALS VS. LOWER CASE

After the prompt, type in your commands, whatever they might be. In most instances it will make no difference whether you type the command in CAPITAL LETTERS or lower case, and we will use both in this manual. Occasionally, however, some program may recognize only capitals, or lower case letters, so if a command fails to work, it is a good idea to try typing it in the other case.

SPACES

Watch out for spaces when entering commands. In most cases you must pay close attention to the placing of spaces between the parts of a command. For example, **B> dir D:** will give you a directory of the files on drive D, but **B> dirD:** will give you the response **DIRD:?.**

CARRIAGE RETURNS

When you have typed in a command you must end it with a carriage return (**RETURN**) to tell the computer to execute your command.

----------NOTE----------
Some computer manuals assume that you know this and do not specify when the RETURN command is to be used in their command descriptions.

2.6.1 CANCELING AND CORRECTING COMMANDS

A command line may be corrected and/or canceled before you press the RETURN key. The BACKSPACE key will erase the last character in the line each time the key is pressed.

If you make a mistake or decide not to carry out a command when you have almost finished entering it, you can cancel the entire command by entering a CTRL X. In CP/M this will erase the line all the way back to the A> prompt. In MS-DOS the end of the command will be marked with a \ and the cursor will move to the next line down so that you may reenter the command.

If you have made a mistake in a particularly complex command line in CP/M, you have the option of preserving the command line with the mistake on the screen and starting over from scratch again. Entering a CTRL U will place a # sign marker at the end of the command line and move the cursor to the first column in the next row down. This way you have the old command to refer to while reentering the command correctly.

2.7 THE TYPE AHEAD BUFFER

You will notice that it often takes a moment for the screen to respond to the commands you have entered into the computer. Because DMS workstations are equipped with a 'Type Ahead Buffer' it is not necessary for you to wait for the screen to catch up before going on to your next command. Since the computer will remember

what you have typed, and will carry out your commands in sequence, you can type in commands or text faster than the screen responds to them. However, some commands, such as CP/M's DIR and TYPE, will abort if you enter additional characters or RETURNS while the command is being processed.

2.8 LOGGING OFF THE NETWORK

Normally it is not necessary for you to log off the Network formally. Simply turning your workstation off or resetting it will result in the Network Master automatically logging you out. Sometimes, however, if the Network is very busy, it can take several minutes to log out officially. If your present partition assignments are owned for writing only by you, no one else will be able to write to your assigned partitions until the Master logs you off the Network.

To immediately log yourself off the Network, use the LOGOUT command. Entering LOGOUT <CR> (or A:LOGOUT <CR>) will Release write ownership for any partitions you are assigned to and log you off the Network.

It is particularly important to use LOGOUT if you plan to turn off one workstation and go work on another one. If the Master has not logged you off the first workstation by the time you log in to the second station, you will not be able to write to your assigned partitions (if they are set to be OWNED by you). If this happens you will have to get the System

Administrator to clear your write protection with the NETALLOC program. (See Section 2.11.5 for more information on owning partitions.)

2.9 FILES AND PARTITIONS, OVERVIEW

This section will provide a general overview of files, partitions, and drives. It is intended for those new to the HiNet system who may be unfamiliar with these terms. Additional information on files will be found in section 2.10 and detailed information on how partitions are used with HiNet will be found in section 2.11.

FILES

All computer work is stored in files. Almost everything you do with your workstation will in some way concern files--taking information out of a file, putting information in, using one file to process another, and so forth. Like a paper file, a computer file can range in size from very long to very short and contain almost any kind of information. There are two general types of computer files--data files and program files.

Program files (often called 'Applications Programs') tell the computer how to carry out your instructions. Programs are the tools you and the computer work with. Word processing programs are used to write documents and letters, accounting programs keep books, data

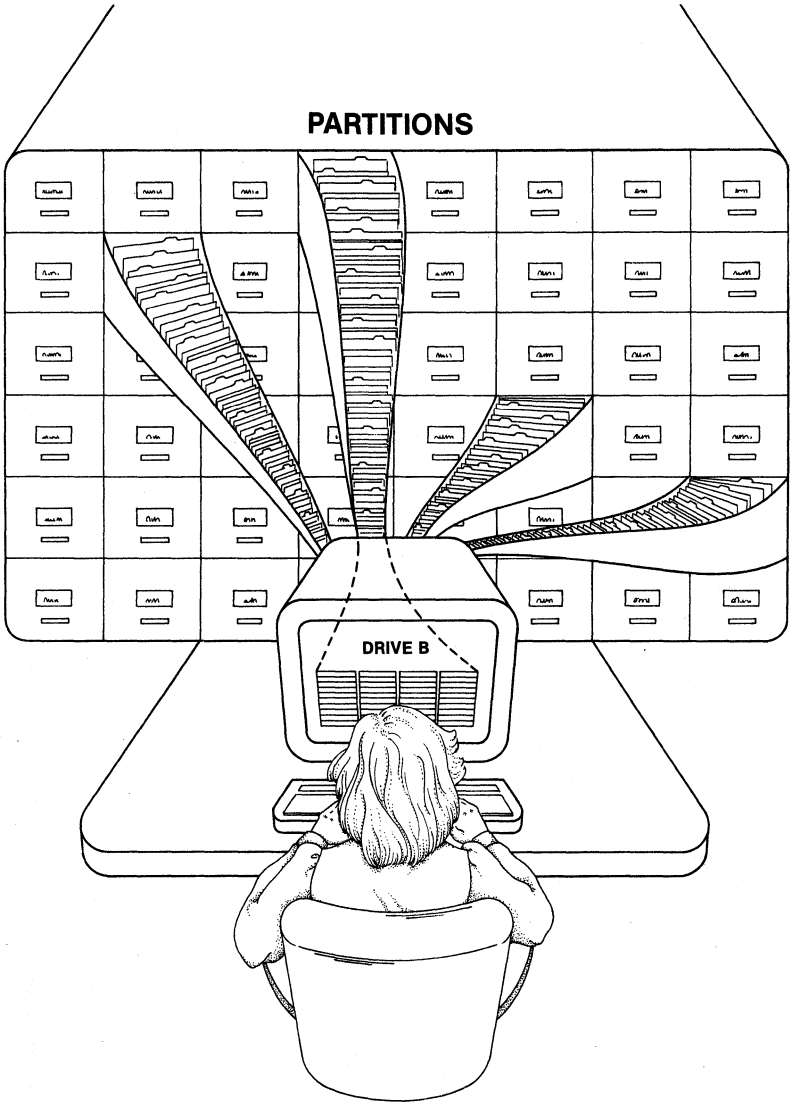
base management programs analyze data, and so on. Applications programs such as these are usually purchased or custom-written by professional programmers.

Data files are created by your use of applications programs. They are the files that contain your work. The individual memos and manuscripts written with a word processing program are stored as data files, as are the ledgers created and maintained by an accounting program, or the mailing lists maintained by a data base management program.

PARTITIONS

Your workstation is connected to a Master Computer that uses Hard Disk Storage to store information for everyone on the Network. This Hard Disk Storage is divided into Partitions that contain files. You can think of Hard Disk Storage as a very large filing cabinet with many drawers. Each partition is like a separate file drawer that can contain many files.

Partitions may be assigned to specific people, to departments, or to general functions. For example, a partition named 'ACCOUNTS' might be used by many people and contain accounting programs, ledgers, customer files, and tax records (all in separate files). A second partition labeled 'MELVIN' might be used by one person to keep his personal work, while a third named 'SYSTEM' could be used to store various programs that everyone on the Network shares.


PARTITIONS
DRIVE B

When you tell the computer to save some work that you have done on your workstation, it is placed in a file. You have to name the file and the partition where the file is kept. If you change the contents of a file and order the computer to save it, the old version will be erased and replaced by the new version. Some applications programs will rename the original file and save it as a backup file.

DRIVES

Inside a DMS 8-bit workstation are four connections--eight in 16-bit workstations--each of which you can link to one of the partitions on the Hard Disk. In computer terminology these links are called 'Drives' or 'Logical Devices', and they are labeled 'A', 'B', 'C' and 'D' for 8-bit stations, 'A' through 'H' for 16-bit stations. These drive letters are what appear on your screen as the prompt (A>, B> etc.).

When a workstation is running under CP/M-80, there are four drives available that can be assigned to partitions. 16-bit workstations, running either CP/M-86 or MS-DOS, have eight drives available.

Using the ASSIGN command (see section 2.11.5) you can electronically connect each of your drives to one specific partition on the Hard Disk. In other words, your workstation can be linked to any four or eight partitions on the Master Hard Disk depending on your workstation type.

Assigning a partition (file drawer) to one of your drives gives you the power to open that partition and work with its contents. You can read material from the files stored in the partition, alter those files, erase them, create more files, rename old ones or copy them to other partitions.

----------NOTE----------
The label 'Drive' can be associated with any memory storage device (Hard Disk partition, Floppy Disk, etc.) depending on how you assign it. For example, your Network may contain some workstations equipped with Floppy Disk Drives (the DMS-3/F, DMS-3/501 or DMS-3). At those stations you can assign any of your logical drives to a Floppy Disk Drive or a Local Hard Disk partition instead of a partition on the Master's Hard Disk.

2.10 FILES

Programs and data are stored in files. Like a file drawer, each partition may contain many files. Once you are logged onto the system and accessing the proper partition, most of your work will concern the manipulation of files.

2.10.1 FILE NAMES

Every file, whether program or data, has a distinct name by which you and the computer know it. When you create a file through the use of a

program, you give it a name. Files can be renamed at any time.

File names follow a simple pattern--first an identifying name of 1 to 8 characters, then a period, and then a 'type' name of 1 to 3 characters which is used to identify what sort of file it is, for example, **SHOPPING.LST, CHAP-3.TXT, WHO.COM, LETTER.BAK** etc.

2.10.2 FILE TYPE IDENTIFIERS

The period and three-character file type identifier at the end of a file name are not mandatory; **XX, 2,** and **ADVERT** could all be used as file names if you wish. However, most people find it useful to identify files by their kind, both for their own information and because some operations (erasures, for example) can be performed on groups of files rather than one by one.

By common convention some type identifiers have standard meanings. For example: **.COM, .CMD, .BAS** and **.OVR** usually indicate a program. **.BAK** indicates a backup file (such as those created automatically by some word processing programs). **.TXT** usually stands for Text, **.DOC** for Document, **.LST** for List, and **.LTR** for letter.

2.10.3 FORBIDDEN CHARACTERS

You can name (or rename) a file anything you want as long as there are no more than 8 characters before the period, no more than three

after, and you do not use any of these forbidden characters, in CP/M: > < , ; : + ? *] [. TAB plus these in MS-DOS: " / \ | . (These characters are reserved for special CP/M and MS-DOS instructions. For example, the period is used as a file separator.)

To learn how to rename a file, see sections 3.4. and 3.6. To learn how to erase a file see section 3.5. To learn how to copy files from one partition to another see section 3.6.

----------NOTE----------
Make sure you do not give two different files the same name. Even if they reside in two different partitions, the chance of confusing them can lead to one or both files being destroyed. CP/M will not allow you to have the same filename twice in a partition. If you copy a file into another partition that has a file with an identical filename the file in the destination partition will be overwritten--effectively erasing it. (MS-DOS will allow two files with the same name to exist in the same partition but they must be in separate sub-directories.)

2.10.4 FILENAME WILDCARD SYMBOLS

When listing files for certain commands (ERASE, for example) you can identify a group of files by using the characters that their names have in common, plus the wildcard symbols * and ?, to stand for those characters that are

different. A question mark will stand for any single character, and an asterisk will stand for everything on one side of the period.

? stands for **ANY SINGLE CHARACTER.**

* stands for **EVERYTHING ON ONE SIDE OF THE PERIOD.**

For example, **FI??.DOC** would represent any file with **FI** as the first two letters of its name, any additional two letters, and **DOC** after the period (**FISH.DOC, FILM.DOC, FIRM.DOC,** etc.). ***.LST** would stand for any file of the type **.LST** (**SHOP.LST, MAILING.LST, POOBAH.LST,** R2D2**.LST,** etc.). Since * stands for everything to one side of the period, ***.*** would stand for every single file in a partition. FI*.DOC would stand for every file beginning with FI and ending in .DOC. However, the expression ***SEC.TXT,** represents every file that ends with TXT, not just those that have SEC in the filename. As soon as CP/M sees the * wildcard symbol, it ignores everything after it until the period. In a case like this you must use the ? symbols instead of *.

DIRECTORY

To see a directory of the files contained within the partition you are currently accessing (that is, the partition assigned to the drive you are logged onto), type **DIR** after the command prompt (**A>DIR**). For more on Directories see sections 3.2 and 3.3.

2.11 PARTITIONS

2.11.1 PARTITION NAMES

Each partition on the Network Hard Disks has a name. Some may have the names of the people who use them for their own work. Such names may be the same as or similar to a person's Network User Name. A Network User Name, remember, allows a person to log in to the HiNet Network; it is like a key allowing you access to the HiNet system. A named partition is someone's assigned workspace.

Other partition names might identify the partition's contents (Ledgers, Forms, Inventory) or the department that uses the partition (Sales, Personnel, Research). Usually the partition named SYSTEM is used to hold all of the programs used by everyone on the Network.

----------WARNING----------
You should never erase, change, or add anything to the SYSTEM partition (or the SYSTEM partition's files) without first discussing it with the person in charge of the Network.

2.11.2 DIRNET (DIRECTORY NETWORK)

Type the command **DIRNET** (**A>DIRNET <CR>**). This stands for 'Directory of the Network.' Your screen will now show a listing of all the partitions on the Hard Disk. The screen will display a table similar to this:

```
A>DIRNET <CR>

DIRNET Version x.x

Partitions on Volume 0 vol0Mastr

ACCOUNT1   2M   :  MELVIN     2M
ACCOUNT2   1M   :  MRS G     512K
CHOU       1M   :  PERSONNEL  1M
LEROY    512K   :  RESEARCH   2M
MARY2    512K   :  SYSTEM     2M
```

The command **DIRNET MAP <CR>** displays all of the partitions on the Network's Hard Disks along with the type of operating system a partition is formatted for, the storage size in bytes, the write protection mode, and whether or not it is set for flagged backup. (These terms will be described in later sections.) DIRNET MAP gives the Network Administrator quick access to necessary information about the Network's partitions.

2.11.3 PARTITION SIZES

When you look at the DIRNET directory you can see that each partition name is followed by a number. This gives the partition size in bytes. A byte is one character or space in written text. An average single-spaced typed page is about 3,000 bytes, usually abbreviated 3K. The K stands for 'Kilo', the metric word for

thousand. (However, in computer terminology K = 1024 bytes). One million bytes--actually 1024 X 1024 or 1,048,576--would be abbreviated 1M (M stands for 'Mega', one million in metric notation).

The size of each partition is determined by the person in charge of the Network. The partition's size determines the number and size of the files within a given partition. Thus, if you had a 512K partition--which has a 4K directory--you could put into it one file of 520,192 bytes, or any combination of files that added up to no more than 508K or more than 128 individual files. (Note that a 512K partition needs about 4K for a directory which leaves 508K for files.)

2.11.4 PARTITION DEFAULT ASSIGNMENTS

The person in charge of your Network assigns specific partitions to some or all of your drives as 'default partition assignments'. Whenever (and wherever) you log onto the Network, your default partition assignments will automatically be in effect. Thus, if your HIDOS default partition assignments were:

A: SYSTEM B: MAIL C: PAT D: PAYABLE

they would automatically be assigned to drives A through D whenever you logged on to any workstation on your Network.

By typing **ASSIGN** (**A>ASSIGN <CR>**) you can see a table showing your current partition

assignments. The ASSIGN command (as explained in section 2.11.5) also allows you to assign different partitions temporarily to any of your drives. Of course, temporary assignments only last until you log off (or change them again). Whenever you log in again you will get your default assignments.

----------NOTE----------
In computer jargon 'default' refers to whatever choice the computer is programmed to select automatically when it is turned on or reset. Use of the word 'default' implies that you can then switch to a different choice if you desire.

In an office, where people usually have their own desks or workspaces, there is a natural tendency to think of a particular workstation as 'yours'. However, as far as the Master Computer is concerned you can use any station. Any workstation you log onto with your User Name will be treated by the Master Computer as your station, with your default partition assignments, until it is turned off, or reset. Thus, you could use any workstation on the Network as your own, or several people could take turns with the same workstation simply by logging on with their own User Names.

Since every User Name is linked to a specific operating system, you should know which workstations are compatible with the name you are using. If you use more than one operating system, you will need more than one User Name. Here is a list of Digital Microsystems'

workstations and the operating systems that they are capable of using:

	8-BIT SYSTEMS		16-BIT SYSTEMS	
Workstation	CP/M-80	HIDOS	CP/M-86	MS-DOS
DMS-5080	YES	YES	NO	NO
DMS-3/F	YES	YES	NO	NO
DMS-3/501	YES	YES	NO	NO
DMS-3/B	YES	YES	NO	NO
DMS-3/10x	YES	YES	NO	NO
DMS-4	YES	YES	NO	NO
DMS-1280	YES	YES	NO	NO
DMS-5086	NO	NO	YES	YES
DMS-86	NO	NO	YES	YES
DMS-816	YES	YES	YES	YES

2.11.5 TYPES OF PARTITION PROTECTION

Since it is possible to have four operating systems on the Network, different types of partitions are necessary. The most important differences are the ways in which partitions are protected from multiple users writing to them at the same time. On a Network, information is meant to be shared among Users. However, in order for files to be added, deleted or altered by several Users in the same partition, the partition has to be specially structured and Users must observe certain protocols. The four different operating systems and their specific requirements are as follows:

CP/M 2.2 -- When you are writing and reading files to and from partitions, the Basic Disk Operating System (BDOS) keeps track of your work by maintaining a directory of all the files in your partition. If someone else tries to write to a partition that you are writing to at the same time, the BDOS will become confused and can overwrite files already on the Hard Disk. To help prevent the destruction of files, CP/M 2.2 will not allow two users to write to the same partition without one or both of the people getting a BDOS R/O error message. This results in the loss of whatever work has been done since the last save command. CP/M does protect the partition's directory from damage but files currently being edited may be lost anyway.

MS-DOS cannot tell if two people are writing to the same partition. If this they do, more than one file in the partition will probably be destroyed. Even more disastrous is the possibility of the directory being corrupted, thus causing the loss of all the files in the partition. It is therefore very important to use partition protection to guard against this kind of error on the Network. All MS-DOS partitions must be either OWNABLE or Read-Only. The ASSIGN command determines whether you own a partition for writing, or someone else owns write privileges, or the partition is Read/Only.

HIDOS is a DMS-enhanced version of CP/M 2.2 that allows two or more people to write to shared partitions at the same time. However, two or more people cannot alter a single file at the same time. A User- initiated protocol called NETLOCK must be used to control file access.

HIDOS shared partitions are covered in more detail in Section 2.13.

CP/M-86 is the 16-bit version of CP/M 2.2. Workstations operating under CP/M-86 can **read** files from any HIDOS partition as well as from partitions set aside specifically for CP/M-86 commands and applications programs. These partitions should also be OWNABLE. However, any partitions on a HIDOS Network that are marked as Shared in the Master's ALLOC Table (where the partitions are organized) cannot be **written to** by CP/M-86 workstations.

----------NOTE----------
MS-DOS partitions cannot be accessed by either HIDOS or CP/M-86 workstations, and vice versa. A HIDOS workstation can write to CP/M-86 partitions, and most data files can be used interchangeably.

As mentioned above, the HiNet Network has four different modes of partition protection. Here is a more detailed look at them.

R/W Read/Write--anyone can read from and write to a partition. This is the standard CP/M 2.2 status for partitions. Under HIDOS and MS-DOS this method affords no partition protection. This mode is not recommended for **any** partitions, whether HIDOS, CP/M-86 or MS-DOS.

R-O Read-Only--anyone can read from a partition but no one can write to it unless the status is changed in the ALLOC Table. (The ALLOC Table keeps track of the partitions on the

Hard Disk.) This partition protection attribute is available for both CP/M and MS-DOS.

OWNABLE--The user who owns a partition is the only person who can write to it until he or she resets and logs out, or uses the RELEASE or LOGOUT command (section 2.13.3). This is the preferred partition protection method for all unshared partitions. It prevents Read-Only errors in CP/M partitions and loss of files due to accidental writes by two people to MS-DOS partitions.

When you assign an OWNABLE partition to one of your drives, the ASSIGN Table will say that the partition is either OWNABLE, OWNED BY username or OWNED BY YOU.

OWNABLE means that the partition can still be written to by anyone.

OWNED BY USERNAME means that someone else has write permission. If the ASSIGN screen shows your User Name owns a partition, it means that either someone else has logged in under your name or you have logged in on another station and have claimed ownership of that partition.

OWNED BY YOU indicates that you have write privileges to a partition from the workstation you are currently at. You will not be able to write to that partition from another workstation until you release ownership of the partition with the RELEASE command (see section 2.12.3).

----------NOTE----------
If the write ownership of a partition needs to be changed because the person using it no longer needs it but has neglected to log off the Network, the Network Administrator can clear the write protection with the NETALLOC program.

2.12 SHARING PARTITIONS

If you had a metal file drawer with paper files at your desk no one else could simultaneously use it at his or her desk. With the HiNet Network it is possible for more than one person to be electronically linked at the same time to a single partition on the Master Hard Disk. In other words, many workstations could be reading or copying material from files on the same partition at the same time without difficulty.

The previous versions of the HiNet-CP/M Network only allows one person at a time to add, delete, or alter material in a partition. If two people work on a partition at the same time and try to change, add, or delete files stored on the same partition, then one or both will get a **BDOS R/O ERROR** message. When this happens, you will have to enter a CTRL C after the CP/M prompt (A>^C) to reload your directories. As a result, you will remain logged onto the Network but you will lose all the work you have done since the last time you ordered the computer to 'save' your work.

WARNING!---In the case of word processing and other programs that do not create backup files, you may lose your original file completely if you get a BDOS R/O error. It is therefore VERY IMPORTANT that users inform each other before they access the same non-shared partition to perform any kind of WRITE function.

----------NOTE----------
Many people can copy a file from the same partition as described above or in section 2.6. This will not cause any problem as long as the original file is not altered or deleted. This allows everyone to share use of the same programs from a common partition because the files are only being read (by the computer) and not altered.

2.12.1 HIDOS

A Network that is configured with HiNet-HIDOS instead of HiNet-CP/M will allow more than one person to work on different files stored in the same partition and, in some circumstances, to work on different records of the same file.

HIDOS is a modified version of CP/M-80 2.2 that allows multiple users to work with different files in the same partition without error. These partitions are specially prepared SHARED partitions. Not all partitions on a HIDOS Network need be shared. Only partitions marked as shared in the Network Master's ALLOC Table and prepared with the SHRALLOC program can be written to by more than one User at a time. See

your Network Master's Installation Manual for information on preparing Shared partitions.

As a modification of CP/M, HIDOS is completely compatible with CP/M-80 software; any program, Floppy Disk, or file that works with a normally configured HiNet-CP/M will also work on a HiNet-HIDOS Network. Since HIDOS is a multi-user feature, it is only designed to operate with the HiNet BIOS and thus cannot be applied to a stand-alone system.

Since it is possible for HIDOS, CP/M 2.2, CP/M-86 and MS-DOS to be operating on the same Network, workstations running anything but HIDOS cannot write to shared partitions. The DMS-5086 and DMS-86 can be assigned to shared partitions and read files from them when running CP/M-86 but they cannot write to the partition. The assignment will be for Read-Only. When these workstations are running MS-DOS they cannot be assigned to CP/M based partitions at all.

Except as noted below, people working in a shared partition must work with different files. Two people trying to work on the same file at the same time will cause each other serious errors and one, or both, may lose some or all of their work. These errors will occur without any warning or error message appearing on the screen. To avoid such problems, the NETLOCK utility must be used to warn people that a file is in use. (See section 2.14.2.)

----------NOTE----------

It is possible for programmers to adapt software applications programs to provide for automatic

file- and record-locking. This allows two people to access the same file on HiNet and make changes to it. Such adaptation allows simultaneous updating of different records in the same database file. Details can be obtained by writing to the Documentation Department at Digital Microsystems.

2.12.2 NETLOCK IN SHARED PARTITIONS

If more than one person uses files in the same shared partition, NETLOCK must be used to avoid errors which can cause the loss of data. NETLOCK is a warning signal that, **if you use it**, warns people when a file in a shared partition is already being accessed.

----------NOTE----------

Since all un-shared partitions must be assigned write ownership for one user at a time, there is no need to use NETLOCK on ownable partitions.

Before accessing a file in a shared partition, use the NETLOCK command to place a lockstring in the lockstring table. A lockstring is an eight character or less 'word' with an optional 3 letter file type separated by a period--just like a filename. The lockstring must exactly match the filename that you want to work on. For example: **NETLOCK TELE.DIR <CR>** would store the lockstring TELE.DIR in the lockstring table. The program would tell you that "Your lockstring is stored in the lock table".

Now, if someone else wants to alter the TELE.DIR file, he or she would first enter the same command. The NETLOCK program would reply: "***This file or partition is locked***". The User would then know that someone else is altering the file TELE.DIR. A file cannot be altered by more than one User at a time.

----------WARNING----------
NETLOCK will not prevent someone from logging in to a partition already in use; it is only a warning signal. To be effective, each person accessing a shared partition must use NETLOCK. Thus, everyone who is likely to be altering the same partition(s) should regularly use NETLOCK before logging on to such a partition.

As far as NETLOCK is concerned, a lock-string can be any combination of 13 characters or less, however, you must use the actual filename so that everyone enters and looks for the same string. For example, two people who want to access the TELE.DIR file could enter TELE.DIR and TELEDIR. Both lockstrings would be accepted and stored in the lock table. Neither User would realize that someone else is altering the file: disaster could result.

When you finish altering a file the NETLOCK lockstring should be erased so that others will not be erroneously told the file is in use. To erase a lock, type NETUNLOK followed by the lockstring name exactly as it was entered--for example, **NETUNLOK TELE.DIR <CR>**.

----------NOTE----------
Resetting your workstation or doing a 'warm boot' (CTRL C) will erase any NETLOCK lockstring you have entered. Some programs, such as Wordstar and ASSIGN, automatically execute a warm boot whenever you leave or complete the program. This will also erase a Lockstring. However, simply exiting the partition in which you have entered a lockstring will not, by itself, erase the warning; you must use NETUNLOK, RELEASE LOCKS, enter a CTRL C (under HIDOS), or Reset the workstation.

2.12.3 RELEASE COMMAND

The RELEASE command allows you to release all lockstrings that you have entered with one command. It also ends a spool file and clears the ownership of a partition.

To clear all lockstrings from partitions and/or files, use the command:

RELEASE LOCKS <CR>

To clear write ownership of any partition that you may have, enter:

RELEASE W A: B: <CR>

where A: and B: are the drives that are assigned to the partitions you wish to clear. You can enter one or all eight drive designators if necessary. The colons after the drive letters are optional.

To clear write ownership of all the partitions assigned to your drives, enter:

RELEASE W <CR>

To terminate a spool job under MS-DOS, use the command:

RELEASE SPOOL <CR>

This will end the job that was spooling and allow you to print it on the spool printer. See Section 4, Volume 1, for more information on using the spool printer.

To RELEASE all owned partitions and end a spool file, enter:

RELEASE BOTH <CR>

To accomplish all of the functions of RELEASE, use the command sequence:

RELEASE ALL <CR>

This command will clear write ownership on your partitions, as well as release any lockstrings that you have for your files, and will spool any print jobs you have pending.

Entering **RELEASE <CR>** will bring up a menu of all the functions of the RELEASE command.

2.13 ASSIGN COMMAND

The Assign command is used to see what partitions are currently assigned to your drives, and to temporarily change those assignments if desired. It also is used to assign various types of printers to your workstation (see Section 4, Volume 1).

To see a list of your current assignments type ASSIGN at the command prompt (**A>ASSIGN <CR>**). Your screen will display a table similar to this on an 8-bit workstation:

```
A>assign

ASSIGN Utility -- Version x.xx for Separated Boot

                  Current Drive Assignments
                  -------------------------

A: CSYSTEM    1M  HiNet Partition  Owned by Master   user #0
B: MAIL     512K  HiNet Partition  Read/Write
C: ACCOUNTS 512K  HiNet Partition  Ownable (R-O)
D: MARTHA     1M  HiNet Partition  Shared

Printer assigned to SPOOL (HiNet Print Spooler)
```

In this example, CSYSTEM, MAIL, ACCOUNTS and MARTHA are HiNet partitions assigned to the A, B, C and D drives. The CSYSTEM partition usually contains the various CP/M programs used by everyone on the Network and is commonly assigned to drive A. Drives can be assigned to any HiNet partition. These partitions can

be owned by you or by another person, shared by more than one user, write protected entirely or accessed by anyone. These various attributes will be covered in the following sections.

2.13.1 CHANGING DRIVE ASSIGNMENTS

Whenever you assign an ownable partition, you must specify whether or not you need write ownership or just read permission. Shared partitions, of course, need not be owned for writing, since several Users can add or modify files at the same time.

Use the ASSIGN command's W option to claim write ownership of an Ownable partition. For example, the command sequence:

ASSIGN W B: <partition name> <CR>

makes the partition assigned to your B drive Owned by you and Read-Only for everyone else on the Network. Note that you must enter a colon after the drive letter or an error will result. You can enter one or all of your drives after the W to request write permission. However, if a partition is already owned by someone else the message:

WARNING: PARTITION ASSIGNED TO DRIVE __ IS ALREADY OWNED BY username
DO YOU WANT READ-ONLY ASSIGNMENT? (Y/N)=>

is displayed. You must decide if you want the assignment to be Read-Only. If you enter N, for No, the previous assignment will remain active.

To assign a partition to one of your drives only for the purpose of reading files, use the ASSIGN R option. For example,

ASSIGN R C TELEX <CR>

links your C drive to the TELEX partition and gives you Read-Only permission; you cannot write to TELEX unless you reassign with ASSIGN W.

If you forget to specify Read or Write permission, ASSIGN will ask you which you require before making the actual link to the partition.

The same type of message may be displayed when you log in to the Network if your default assignments are for OWNABLE partitions or you have an ASSIGN W command in the login command. Your four default partition assignments in the USERS Table can be automatically assigned as Owned By You when you log in to the Network.

When you have finished writing to a partition that someone else may want to use, you should either unassign it from your drive, reassign that drive or, if you still wish to read from it, use the RELEASE command to change its protection status back to OWNABLE. (See RELEASE, section 2.12.3.)

If you wish to log in to more than one workstation, and your assigned partitions are write-protected, you will have to use RELEASE each time you switch workstations and write to a partition.

----------NOTE----------
The error message:

*****Error: partition on drive __ is not ownable.**

will be displayed if a partition you are trying to make owned by you is not marked as OWNABLE in the ALLOC Table.

2.13.2 ASSIGNING A PRINTER

When you type **ASSIGN <CR>**, the ASSIGN will list the current printer assignment. This tells you how text you send to the printer will be routed. If the printer is assigned to SPOOL, then whenever you issue a 'print' command the text will be sent to the Spool Printer (Spool Printer is the default setting). If your printer is assigned to one of the Serial Ports, text you send to a printer will be routed through that port. Obviously, if the cable from your printer is plugged into Port 2, and you have the printer assigned to Port P, nothing is going to reach the printer until you change the assignment or the cable.

To change a printer assignment, type after the command prompt: **ASSIGN P** and the **Port Identifier.** For example:

A>ASSIGN P PORT2<CR> assigns the printer to Serial Port 2.

---NOTE---
Each workstation on the Network has a default printer assignment in the MACHINE Table. If you are using several different workstations, check the printer assignment with the ASSIGN command.

2.13.3 ASSIGNING DRIVES TO FLOPPY DISKS

You can assign any of the four CP/M drives to a local Floppy Disk. The DMS-3/F has two Mini-Floppy Disk Drives (5.25 inch), the DMS-3/501 has one Mini-Floppy Disk Drive, and the DMS-3 series computers have either one or two 8-inch Floppy Disk Drives.

To assign a Floppy Disk Drive to one of the four CP/M drives, use the format:

ASSIGN <drive letter> <drive identifier> <CR>

where <drive identifier> is the two-character code for the size and type of disk drive. The DMS-3/F and DMS-3/501 both use Double-Density Mini-Floppies. These are designated as M0 (for the 3/F's left drive and the single disk drive on the DMS-3/501) and M1 (for the right drive on the 3/F). 8-inch Floppy Disk Drives are designated as D0 and D1 for left and right, top and bottom double density, S0 and S1 for single density, as the following chart shows:

Floppy Disk Drive Identifiers

DMS-3/F	Left Drive = M0	Right Drive = M1
DMS-3/501	Left Drive = M0	
DMS-3	Left Drive = D1,S1	Right Drive = D0,S0
DMS-4	Top = D0,S0	Bottom = D1,S1

2.13.4 ASSIGNING DRIVES TO LOCAL HARD DISKS

A HIDOS (CP/M) drive can also be assigned to a local Hard Disk's partition. The local partition's name must be preceded with an **H:**. This tells CP/M that the partition you are assigning to a drive is not on the Master Hard Disk but is part of the local storage. To assign a local Hard Disk partition to a CP/M drive use the format:

ASSIGN Drive H:partition name<CR>

For example, entering:

A>**ASSIGN D H:CREDITS<CR>**

will assign to your D drive the partition CREDITS that is on your local Hard Disk.

----------NOTE----------

When assigning local Floppy Disk Drives or Hard Disk Partitions to Network Drives, your User Name must be linked to a FULL SERVICE type of operating system in the USERS Table. If the

User Name has a High Memory OS instead, the local drives will not work on the Network.

2.13.5 ASSIGN HELP SCREEN

To review the parameters and syntax for the ASSIGN command, enter **ASSIGN ? <CR>**. This will display a screenful of information about the ASSIGN command and how to use it.

If you incorrectly enter an ASSIGN command, the screen will display an error message and a short explanation of why the assignment is wrong.

2.13.6 SAVING ASSIGNMENTS IN A FILE

When you log into a workstation, four of your drives are automatically assigned. On 16-bit workstations you can assign up to eight drives to eight different partitions.

It would be tedious if you had to reenter the remaining partition assignments every time you logged onto the Network. Therefore, ASSIGN gives you a way to save all of the assignments in a file. These assignments can later be read to restore all of your drive assignments. This file can be used in the login command to restore all of your drive assignments automatically whenever you log in to the Network.

To save your assignments in a file follow this procedure:

1) Assign some or all of your drives to partitions.

2) Save the assignments in a file by entering the command:

ASSIGN S filename <CR>

To restore your drive assignments use the command sequence:

ASSIGN R filename <CR>

where filename is the file in which you previously saved the assignments. ASSIGN R will ask for partition passwords if necessary. It will also ask if you wish to change the printer assignment if the current one is different from the one specified in the file.

You can create as many different assign files as you need. For example, you may wish to have one assignment file for CP/M and one for MS-DOS if you work regularly in both operating systems. Store the assignment files in partitions of the appropriate operating systems.

2.13.7 ASSIGN COMMAND SUMMARY

ASSIGN <CR> -- lists current assignments.

ASSIGN (drive **letter**) (partition **name**) -- changes the assignment.

ASSIGN (drive **letter**) **U:** -- leaves logical drive unassigned.

ASSIGN S filename -- saves four to eight drive assignments in a file.

ASSIGN R filename -- restores the drive assignments that were previously stored in a file.

ASSIGN W (drive **letter:**) -- grants write privileges to ownable partitions assigned to specified drives if those drives are not already owned.

ASSIGN (drive letter) H:(partition name) -- links a partition on a local Hard Disk to a Network Drive. Files can be transferred between Hard Disks.

ASSIGN (drive letter) <disk identifier> -- links a Network Drive to a local Floppy Disk Drive. The disk identifier must be specified for the drive position and density (M0, M1, D0, D1, S0, S1).

ASSIGN P PORT2 -- assigns the printer to local serial printer port.

ASSIGN P SPOOL -- assigns printer to spool.

ASSIGN P PORTP -- assigns printer to Centronics parallel port.

ASSIGN ? -- displays summary of ASSIGN commands.

2.14 PARTITION PASSWORDS

Partitions may be secured against unauthorized access by use of a password. If this is the case, the words **'ENTER PASSWORD:'** will appear on the screen after you use the ASSIGN command to call up that particular partition. You will then have to type in the password followed by carriage return. Passwords can be in either upper or lower case letters. If you type an incorrect password the station will respond **'ASSIGNMENT DENIED'.**

2.15 USING PARTITIONS AND FILES

One of the best methods of organizing the Network's partitions is to store application programs on one partition and all work or data files on other partitions. If everyone kept copies of the various application programs in his or her workspace partitions, the Hard Disk Storage would fill with duplicated programs. By having a single partition devoted to storage of commonly used utilities and software, everyone can share their use without massive duplication. Also, since application programs are often upgraded, having everyone share a single copy on the SYSTEM partition ensures that everyone has access to the latest version.

Section 2.15.1 describes how to move from one partition to another, and Section 2.15.2 explains how to use programs stored in one partition and data files stored in another.

2.15.1 CHANGING DRIVES AND PARTITIONS

Whenever you are using your workstation you are 'logged' to one of your four (or eight) drives, and the partition assigned to your logged drive is the one you are accessing. In a sense the logged drive/partition is like an open file drawer; unless you specify otherwise, whatever you do will relate to that drive and partition. If you ask for a file and do not specify a particular drive, the computer will automatically search the open partition. If you enter a command the computer will assume you mean it to affect the partition on the logged drive unless you tell it otherwise.

If you are accessing the A drive (and whatever partition is assigned to that drive) you will see the 'A Prompt' (**A>**). To change to another drive (and, of course, the partition assigned to that drive) simply type the letter of the drive you wish to go to, a colon, and a carriage return. Thus, **A>C:<CR>** would log you to the C drive and you would see the 'C Prompt' (**C>**).

----------NOTE----------
You cannot access a partition unless it is assigned to one of your drives. If you wish to access a partition not assigned to one of your four (or eight drives), you must first use the ASSIGN command to put it on one of the drives.

2.15.2 FILES, COMMANDS, & PARTITIONS

Just because you are logged to one drive and partition does not mean that you are barred from the other partitions assigned to your various drives. You can easily specify that a command or file operation is to affect some other drive and the partition assigned to it merely by using the other drive's letter and a colon.

FILES

Often you may wish to use an applications program even though you do not have a copy of the program stored in the partition assigned to your logged drive. You can easily run a program from another drive/partition. Under HIDOS Release 6 (ZCPR) there is no need to specify the location of a .COM file **if the file is stored on either your logged drive or the partition that is assigned to the A drive.** The operating system will first search the partition you are logged to and then the partition assigned to the A Drive. If the .COM file is located on any other drive you must specify where the file is. This is done from the command prompt by typing the letter of the drive/partition where the file is stored, a colon, the command file's name, and carriage return.

----------NOTE----------

The automatic search for COM files applies only to workstations running HIDOS ZCPR (CP/M-80). Workstations running CP/M-86 must specify where the CMD file is if it is not on the logged

Drive. MS-DOS workstations can use the PATH command to locate COM and EXE files automatically.

As an example, the command **B>A:XYZ<CR>** will run the XYZ program from the partition assigned to drive A and allow you to use it with with your files stored on the partition assigned to drive B. Any data files that the XYZ program created or altered would continue to be stored on B (the logged drive/partition).

----------NOTE----------

When invoking a program for use it is not necessary to include the file type identifier (e.g., .COM in CP/M and MS-DOS, .CMD in CP/M-86 or .EXE in MS-DOS). Only the part of the file name before the period need be used. For example, **D>A:CUSTOMIZ<CR>** would call up the CUSTOMIZ.COM (or CUSTOMIZ.CMD) program.

Of course, as soon as you exit the program, reset your workstation, or turn it off, the stored copy of the program would disappear from your station's memory. (If you wanted a permanent copy of the file in your partition, you would have to use the PIP command as explained in section 3.6.)

COMMANDS

Many programs can also operate across partition barriers. This is done by adding the letter of the drive you want the program to

affect, and a colon, to the end of the command invoking that program. For example, if you were in drive A and typed **DIR** you would get a directory of the files on drive A; but if you typed **DIR B:** you would get a directory of the files in the partition assigned to drive B.

THE COLON

When used in a command, the colon (:) signals the computer to open a partition assigned to a particular drive. There are three ways to use the colon to direct your work on drives and partitions.

1) Letter, colon, RETURN orders the computer to change the logged drive to that of the specified letter.

2) Letter, colon, filename, RETURN tells the computer to look for that file on the drive of that letter and bring it into the station's workspace.

3) Command, letter, colon, RETURN tells the computer to carry out the command on the drive specified by the letter.

For example:

B>C:<CR> means change logged drive to C.

C>A:ACROSS.PAR<CR> means search the partition assigned to drive A, load a copy of file ACROSS.PAR into the workstation's memory and remain logged on to drive C.

C>DIR D:<CR> means apply the DIR command to drive D while remaining logged to drive C.

Here are some of the different ways you can use the CP/M and MS-DOS drives to work with partitions and files:

A>B:<CR>	Change logged partition.
B>A:ASSIGN<CR>	Use a program that is stored in another partition.
B>SD D:<CR>	Apply a program to one or more files in another partition.
B>A:SD D:<CR>	Use a program stored in one partition and apply it to another partition.

2.15.3 USER NUMBERS--DIVIDING PARTITION SPACE

Your four drives are linked to four partitions on the Network's Hard Disks. The files you create and store on those partitions normally exist all on one "User Area" in each partition. However, it is possible to divide a partition into 16 separate User Areas, each with a different User Number, 0 through 15. Files stored in one User Area are invisible when working in another User Area. This system of dividing partitions allows you to keep sets of files separate from other sets; it is another method of organizing your partitions.

HIDOS with ZCPR enhances the standard CP/M User Number feature. Originally, once you were in a User Area, all other areas, including other drives were "empty" to your commands. You could not, for example, access a program if it wern't in your current User Area. Now under ZCPR, the Command Processor will first search in the logged User Area, then in the default User Area (usually User 0) and then in Drive A. This means that you do not need multiple copies of a program in different User Areas in a partition.

When you log to a drive you are automatically in User Area 0. To change to another User Area use the command:

USER <user number> <CR>

where <user number> is a number between 0 and 15 inclusive. For example:

USER 2 <CR>

will log you into User Area 2. The prompt in column 1 would change to the drive letter followed by the number 2 (e.g., D2>). At first this User Area would be empty of files. If you need to copy a file from another drive or User Area use PIP with the [G <user number> option. For example, if you are in User Area 2 on the D drive and want to copy a file from User area 0 on the A drive enter:

D2>**PIP D:=A:filename[G0 <CR>**

You do not have to specify where PIP.COM is stored as long as it is in User Area 0 of your logged drive (D0 in this case) or in A0 (User Area 0 of Drive A). Since the Command Processor is searching for the PIP program it may take a few seconds longer than if you were working in User Area Zero.

The **DFU** command tells the Command Processor where to look for COM files instead of on the A Drive. Enter **DFU <user number> <CR>**, where <user number> is one of the User Areas on your currently logged drive. For example, while logged to User Area 2 of Drive D, enter the command:

D2>**DFU 2 <CR>**

to tell the Command Processor to look for COM files on User Area 2 on the D Drive, not on User Area D0 or the A Drive.

2.15.4 PARTITION SIZES & DIRECTORY SPACE

If you work with many small files, such as letters and memos, you must be aware of the limits of the directory space in your partition. The space that is available to store the directory of the files limits the number of files you can have on the partition but does not affect the size of the files. For example, on a 512 Kbytes CP/M partition, there can be stored a total of 128 files, even if each file has only 2 Kbytes stored in it. (A 256K partition, the

smallest you can have, can hold a maximum of 64 files.) Therefore, even though only half of the partition's storage space is used, you would not be able to add any more files.

In a situation like this you will get a **No Space** error message on your screen when you try to save the 129th file. This would result in the loss of the file you were working on.

To prevent this kind of problem, routinely clean out old files from your partition, especially if you have a lot of small letters and memos. Some word processing programs create a backup file for every original file you edit. This can quickly fill up the directory space of a small partition. Be sure to erase the backup files for those jobs that are completed and printed. You could also store important old letters and memos on clearly labeled Floppy Diskettes.

2.16 USING TWO STATIONS AT ONCE

While it is possible for one user to log in simultaneously to multiple workstations (that is, log in with the same User Name to more than one station at a time), the current versions of HiNet-HIDOS and MS-DOS place some restrictions on what can be done under these circumstances.

There is no problem if you log in and work at two different stations, if the work you do at each station is stored on different partitions

(or if you only make changes to files at one workstation). The same is true if you only want to look at files, copy them to some other partition, or print them. However, some word processing programs create a temporary file in the partition when you open a file just to read it. This changes the directory structure and may cause problems for someone else who is writing to the partition.

If you are logged onto two stations--both of which are accessing the same non-HIDOS or non-shared partition--and you modify work on one of them, you will not be able to read your work correctly (that is, as you've changed it) on the other. If you save work on one station you will not be able to save work to the same partition at the second station until you release ownership of the partition from the first station with the RELEASE program. At that point the partition will again be ownable. Before writing to the partition from the second workstation you will have to reassign the drive to the partition and ask for write ownership. This procedure ensures that the workstation's directory is fully up to date; there is no chance of corrupting files or the directory.

Under HiNet-HIDOS, you can add or change different files in the same shared partition from several different workstations. However, you cannot work on or change the **same file** in a partition from several workstations. You must warm boot (enter a CTRL C) before you make new changes on the same file at a different workstation.

----------NOTE----------
Some programs, such as a few word processors and compilers, create temporary files with the same name (e.g., ED.$$$). If two people are using a program of this type in the same shared partition, the two files with the same name will overwrite each other causing many errors that may not be immediately detectable. Be aware of these types of programs and use them in shared partitions with utmost care!

To detect the presence of these temporary files, begin an edit of a fairly long work file (greater than 20K) and jump to the end of the file. Next, jump back to the beginning or middle of the file. From another workstation look at the directory of the partition where the file resides in and search for a file with an extension such as $$$, that is, a file with illegal characters that is not normally in the directory. If one is found, the program cannot be used in a shared partition by more than one person at a time.

2.17 COPYING BETWEEN OPERATING SYSTEMS

The FILECOPY program is used to copy files to and from partitions that have different operating systems. It can also read and write files to Floppy Disks. The CP/M copy program PIP and the MS-DOS program COPY should be used to copy files between partitions with the same operating system.

----------NOTE----------
Don't bother to copy a program file from an MS-DOS partition to a CP/M partition; the program will not work at all.

Currently, FILECOPY can only be run from a workstation (or the Master) under HIDOS (CP/M-80). HOwever, files can be transferred in both directions--from HIDOS to MS-DOS and from MS-DOS to HIDOS.

When you specify a file to be copied, first tell FILECOPY where it is. A file in a HIDOS partition (or Floppy DIsk Drive) is located by the **drive letter** that is assigned to the partition the file is in. A file in an MS-DOS partition is located by the **name** of the partition the file is in.

HIDOS PARTITION — USE DRIVE LETTER: (A: - D:)

MS-DOS PARTITION — USE PARTITION NAME: (SYSTEM:)

The FILECOPY command sequence requires that you first enter the location of the file you are copying, the filename, and then the destination partition and new filename (if necessary).

FILECOPY SOURCE DESTINATION

For example, if while working under HIDOS, you want to copy the file MARCH that is stored in a partition assigned to your B: drive to an MS-DOS partition called DEBITS, the command would look like this:

FILECOPY B:MARCH DEBITS: <CR>

If the file is to have the same name in the destination partition, no name is needed after the partition name. If you are going to make changes to the file you should give it a new name or a variation on the original name so that the updated file will not be confused with the old file. In that case, specify another name after the destination partition or drive letter. You may also use the wildcard symbols * and ? to copy groups of files.

----------NOTE----------
If a partition is protected by a password, FILECOPY will request that you enter it before it will copy a file to or from that protected partition. If the destination partition is owned by someone else, FILECOPY will not allow you to write to it until that partition is released. Note that you cannot assign ownership to an MS-DOS partition from a HIDOS workstation or release ownership of it. FILECOPY does the assign and unassign for you.

USING FILECOPY WITH DISKETTES

The Master or any workstation with Floppy Disk Drives can use FILECOPY to transfer MS-DOS files between partitions and diskettes. The MS-DOS files on the diskette are in a CP/M readable format. You cannot use FILECOPY to read or write IBM-PC or Microsoft compatible diskettes at this time. The TRANSFER program is used for this purpose.

To copy files from an MS-DOS partition to a Floppy Disk, follow these steps:

FORMAT the diskette according to its size and density. (FORMAT5 for 5.25-inch diskettes, FORMAT for 8-inch disks.)

ASSIGN a CP/M drive to the Floppy Disk Drive (either M0 or M1 for 5.25-inch; S0, S1 for single density 8-inch; D0, D1 for double density 8-inch disks).

Use the command format (all in one line):

FILECOPY (source):filename (destination):

where source = (MS-DOS partition name):filename

destination = (disk drive letter): <CR>

For example: **FILECOPY MICRO:SOFTTEXT D: <CR>**

To copy from a diskette to an MS-DOS partition, reverse the order of the disk drive and partition name:

FILECOPY D:filename MICRO: <CR>

You can use the wildcard symbols ? and * to copy groups of files. By specifying a different destination filename the files can be renamed.

FILECOPY--PARTITION DIRECTORIES

FILECOPY also allows you to display a listing of the directories of MS-DOS partitions.

Use wildcard symbols to search for groups of files. For example, the command:

FILECOPY DEBITS: DIR

will display the directory of the MS-DOS partition DEBITS when working on a HIDOS workstation.

COPYING PC-DOS DISKETTES

The TRANSFER utility is used to copy files from PC-DOS diskettes with a DMS-3/501 or DMS-3/F 5.25-inch Disk Drive to Network Hard Disk partitions. Using the TRANSFER program is covered in Section 5.5--Data Storage. However, an important point should be mentioned here.

If an MS-DOS workstation is already assigned to the partition where the PC-DOS diskette is transferred to, the station will not be able to "see" any new files in the partition until the partition is reassigned. Reassigning a partition forces the operating system to read the latest directory of the partition into the workstation's memory. At that point DIR will be able to display the files that were transferred.

2.18 THE WHO COMMAND

You may find out who is currently using the Network by using the WHO command. Your CRT will display a table listing the current users by their User Names. It will show the time each

user last logged on, the last time he or she requested information from the system and whether it was a read or a write. You will notice your own name in the table followed by 'Who' since you are using the WHO command. A second table gives the status of the Network spool printer showing who is currently printing, who is sending material to the spooler, and who is ready to print.

----------NOTE----------
It is possible for a User Name to appear more than once in the WHO Command HiNet Status Table (not counting the Spooler Table), since one person might have logged onto more than one station at a time.

WHO HIST COMMAND

By typing **A>WHO HIST <CR>** you can see a table showing who has used the system since the last time that the Master was reset or turned on; which is usually a day to day event. The table also shows the various times Users have logged on and logged off.

Another version of the WHO command is WHO AM I (which can be abbreviated as WHO A<CR>). Entering this command will result in a display of a single line of the WHO Table with your user name, user number and status.

WHO MAP

The WHO MAP command displays a slightly different format of the WHO Table. The list of Users is sorted according to the time they logged into the Network, starting with the earliest User. The Spooler Table lists the job number and the Spool Blocks that the print job required. This feature may be useful to System Programmers rather than to the average User.

```
A>WHO

    Who for BIOS x.x and later, version x.x

                HiNet Status as of 11:15:07

User No  User Name  Login Time  Last Req Time  request  status
-------  ---------  ----------  -------------  -------  ------
14       AKIKO T    10:21:55    11:14:34       write    active
09       CHOU       10:17:02    10:59:16       read     read
17       DR.GEO     10:45:39    10:50:51       read     active
01       JOY        09:11:12    11:11:07       read     active
06       LEROY      10:01:55    10:11:44       read     active
00       MASTER     09:00:04    09:22:59       read     active
21       MS.MAVEN   11:12:58    11:15:11       who      active
03       PILAR      09:35:47    10:58:32       write    active

User Name   Spool Time  File Length   Status
---------   ----------  -----------   --------
CHOU        10:13:19    287 records   printing
MELVIN      10:32:58      5 records   ready
CHOU        10:45:13     23 records   ready
SUPE3       11:12:32     25 records   spooling
A>
```

2.19 RAM DISKS ON 16-BIT WORKSTATIONS

2.19.1 INTRODUCTION

What is a RAM Disk? You probably know that a Floppy Disk is a flexible plastic disk that stores data by magnetizing tiny spots on the disk's surface. Hard Disks store data in the same way except that they use rigid metal plates that spin at a much higher speed than Floppy Disks and can store much more data. RAM disks function in a totally different way from either Floppy Disks or Hard Disks. However, to you, the user, a RAM Disk behaves as if it were a very fast Floppy Disk. The main difference is that data is accessed much faster than either Hard Disks or Floppy Disks and the data is not permanently stored but must be copied back to the Network's Hard Disk.

Inside a 16-bit workstation (DMS-816, DMS-86, DMS-5086) is the Random Access Memory or RAM. The RAM chips store data electronically--as opposed to magnetically. While the computer is on, information is stored and exchanged in the RAM, depending on the applications program that you are running. When the computer is turned off or reset, the data is lost.

A RAM Disk is created by dividing part of the workstation's internal RAM into two or more parts: the Transient Program Area (TPA) and the RAM Disk(s). The TPA memory is set aside for running applications programs. The RAM Disk acts as local storage for files.

2.19.2 SETTING UP A RAM DISK

The procedures for setting up or "activating" a RAM Disk differ depending on whether you are running CP/M-86 or MS-DOS. Remember that only the 16-bit workstations--the DMS-816, -86, and -5086--can use RAM Disk Storage. HiNet Masters are 8-bit computers and therefore cannot use RAM Disks.

CP/M-86 RAM DISKS

The procedure for activating the RAM Disk Memory is very easy when your workstation is operating under CP/M-86. Simply ASSIGN one of the eight logical drives (A through H) to **ULTRA0.** For example,

A>**ASSIGN H ULTRA0**

The RAM in the workstation will be split in half. If you have 512 Kbytes of memory the RAM Disk will be 256 K in size; 1 Mbyte total RAM will yield a 512 Kbyte RAM Disk. These sizes are fixed. There can be only one RAM Disk per workstation when running CP/M-86.

MS-DOS RAM DISKS

MS-DOS requires a procedure different from CP/M-86 to set up and activate a RAM Disk. A file named **CONFIG.SYS** must be present in the partition that is assigned to your A: Drive. (The contents of this file will be discussed in a moment.) As long as this file is present, with

the proper contents, the RAM Disk will be activated every time you log in under MS-DOS.

The RAM Disk will be assigned to logical **Drive I.** The RAM Disk does not show up when you use the ASSIGN command. You can see if it is active by entering either **DIR I:** or **CHKDSK I:.**

If the CONFIG.SYS file is not already present in your A partition you can create one with either a word processing program or the MS-DOS line editor EDLIN. CONFIG.SYS may have other commands in it if it already exists. Do not disturb these commands unless directed to do so by your Network Administrator.

Enter the following line as the only line of the file, or add it to the existing file:

DEVICE = ULTRA100.SYS

Again, the CONFIG.SYS file must be in a partition that is assigned to your A drive in the USERS Table. However, the partition assigned to A should not be the MSYSTEM partition. (If it is then everyone else who has MSYSTEM assigned to A will also have a RAM Disk. Some applications programs require the memory space that the RAM Disk takes up; other users may need this extra memory. Therefore a personal partition with CONFIG.SYS in it should be assigned to A in the USERS Table.

----------NOTE----------
The ULTRAxxx.SYS file can be in the A drive partition. It can also be in a partition that is assigned to another drive if that drive is

specified in the CONFIG.SYS file. For example, if ULTRA100.SYS is in a partition assigned to the D: Drive, the CONFIG.SYS file device statement should read:

DEVICE = D:ULTRA100.SYS

In this case MS-DOS will look to the partition assigned to the D: Drive to find the ULTRA100.SYS file.

ULTRA100.SYS sets aside 100 Kbytes out of the standard 256K of RAM to be used as a RAM Disk. This leaves 156 K RAM available for applications programs and for MS-DOS (48K).

Both the DMS-816 and DMS-5086 are available with 512K RAM. With this much RAM, ULTRA360.SYS creates a 360 K RAM Disk. A 360K RAM Disk has the same storage capacity as a double-sided 9-sector/track Floppy Disk (IBM-PC format).

The DMS-5086 is also available with 1 Mbyte of RAM memory. ULTRA740 creates a 740 Kbytes RAM Disk out of the total 1Mbyte RAM

----------NOTE----------

The DMS-816 can be upgraded from the basic 256K RAM to 512K. This upgrade involves adding a daughter board with the additional RAM chips to the main CPU board. This upgrade can be done at the time of purchase or later by a qualified technician. Please contact your authorized DMS dealer.

It is possible to create more than one RAM Disk under MS-DOS. If the available memory is large enough you can have, for example, two 360 Kbyte RAM Disks (out of 1 Mbyte memory). Smaller memories could have two or three 100K RAM Disks. To set up additional RAM Disks in your workstation just add another line to the CONFIG.SYS file that defines another DEVICE. For example, a CONFIG.SYS file that has:

```
DEVICE = ULTRA100.SYS
DEVICE = ULTRA360.SYS
```

in it will create two RAM Disks, one with 100 Kbytes in Drive I and the other with 360 Kbytes in Drive J. This would require a total memory of 1 Mbyte for it to work. If there is not enough memory to support the RAM Disks the station will probably get a parity error and you will not be able to log in. In this case you will have to access the CONFIG.SYS file from another workstation that does not have the partition with the CONFIG.SYS file assigned to the workstation's A Drive, and change the file or erase it.

----------IMPORTANT!----------
Under MS-DOS, COMMAND.COM must be copied to the RAM Disk every time the workstation is reset. Otherwise, whenever a large applications program is exited, the workstation will 'hang' because it cannot find COMMAND.COM. There are two ways around this problem:

1) COMMAND.COM can be copied to the RAM Disk with COPY or with the aid of the AUTOEXEC.BAT file.

2) A more permanent solution is to place a command line in the CONFIG.SYS file that specifies where to look for COMMAND.COM if it is not in the logged drive. The drive letter where COMMAND.COM will always be must be specified in the following line:

SHELL = A:\COMMAND.COM A:\ /P

This command line is placed in the CONFIG.SYS file along with the DEVICE statement. Make sure that this line is copied exactly unless the partition assigned to the A: Drive might not have COMMAND.COM in it at all times. (For example, the Transfer programs may destroy the copy of COMMAND.COM in a partition.) Normally, when a partition is marked as MS-DOS in the ALLOC Table, it is automatically formatted and a copy of COMMAND.COM is placed in the partition. If COMMAND.COM disappears from the partition assigned to the A drive, the workstation will not be able to load MS-DOS.

2.19.3 USING A RAM DISK

Using a RAM Disk is much like using a Floppy Disk. However, it is much faster than either a Floppy Disk or a Hard Disk. When an applications program and the files you are working on are all in the RAM Disk, the access time for moving around in files and doing calculations is very short.

The RAM Disk is blank when it is activated. (There is no need to format the RAM Disk as you

do a Floppy Disk.) Files from the Network's Hard Disks are PIPped (CP/M) or COPYied (MS-DOS) to the drive that is assigned to the RAM Disk. The drive assignments may vary between operating systems. Of course, files may also be created in the RAM Disk by application programs.

IMPORTANT---Any files that you need to save must be copied back to the Network's Hard Disks before turning off the workstation, resetting it, logging off the Network or, in CP/M-86 reassigning the drive. A sudden power loss to the workstation will result in the erasure of any work you have not saved to the Network's Hard Disks. If you are doing a series of complex calculations in the RAM Disk, you should periodically copy the results to the Network's Hard Disks to protect your work.

3.0 THE CP/M ENVIRONMENT

3.1 INTRODUCTION

Though it is often thought of as Control Program for Microcomputers, CP/M actually stands for Control Program/Monitor. Produced and sold by Digital Research, CP/M is an operating system used by many different computers. An operating system controls the transfer of information within the computer and organizes files and partitions on Floppy Diskettes and Hard Disks.

The 8-bit CP/M system that comes with the HiNet Network and all DMS 8-bit workstations, CP/M-80, is an extensive and sophisticated program. Digital Microsystems' enhanced version of CP/M 2.2 is called HIDOS. All of the commands and functions described in this section are compatible for both CP/M 2.2 and HIDOS.

Networks receiving updates or new software for HiNet Release 6 will have an altered version of the CCP (Console Command Processor) called ZCPR--Z-80 Command Processor Replacement. This Command Processor has several refinements and additional capabilities not present in CP/M-80. These features will be marked in the text by the initials **ZCPR** to prevent any confusion for people with Networks that have not been updated but who may receive this manual.

This manual will concentrate on those commands and functions most often used by workstation operators. Further information on CP/M can be obtained from Digital Research's manuals (which come with each HiNet installation), or the many books on CP/M available at computer stores.

3.2 DIR (Directory)

The DIR command is used to find out what files are stored in a partition assigned to one of your drives. You invoke DIR from the command prompt. If you do not specify which drive you want listed, you will get a directory of the partition assigned to the drive you are currently logged to. **B>DIR<CR>**, for example, would give you a directory of all the files in whatever partition is assigned to drive B.

If you wanted to find out what files were on some other drive you could either log on to that drive and then invoke the DIR command, or stay on one drive and call for the directory of a different drive by adding that drive's letter and a colon after the DIR command. For example, **B>DIR C:<CR>** would keep you on drive B but give you a directory of drive C.

A typical directory looks like this:

```
B> Dir
B: ACCOUNTS DAT : GEORGE   LTR : WS       COM :
B: MAILIST2 DOC : MAILIST3 DOC : SHOPPING LST :
B: PROP     TXT : SD       COM : TAXDEDUC FIL :
B: DRAFT1   TXT : DRAFT2   TXT : DRAFTFIN TXT :
B: MAILLST1 DOC : INVE     DOC : TAX      LTR :
B>
```

----------NOTE----------
You can only use the DIR command to search for files in partitions assigned to one of your four drives. If you wish to obtain a directory of some other partition, you must first assign it to one of your drives with the ASSIGN command (see section 2.13).

The DIR command can also be used to find a particular file, list specified types of files, or list files with certain identical characters in their names. For example,

A>DIR D:Money.lst <CR>

would cause the computer to search drive D for a file titled 'Money.lst'. If the file were found it would be listed; if not, the screen would show the message: **NO FILE.**

You can search for and list groups of files by their type or by common characters in their names, by using the 'wildcard' symbols * and ? (see section 2.10.4). For example, **DIR *.COM** would list all the COM type files. **DIR**

FI??.* would list out all files of any type that had four characters in their names, the first two of which were 'FI' (File.Doc, Fish.Txt, Find.Ins, Fire.Lst etc.).

B>DIR	--Directory of logged drive.
B>DIR x:	--Directory of some other drive.
B>DIR filename	--Check for particular file.
B>DIR *.xxx	--List files by common type.
B>DIR ???.???	--List files by common characters.

----------ZCPR----------

Under both ZCPR and CP/M, files can be hidden from a directory search. By using the STAT command, a group of files can be made SYSTEM files. Under regular CP/M, the SYSTEM files will not show on the screen when the DIR command lists the partition's directory. However, under ZCPR, all files will be listed with the DIR command unless you specify which files you want listed, SYSTEM (hidden) or DIRECTORY (unhidden).

To hide a group of files use the STAT command:

STAT (file identifier) $SYS <CR>

where (file identifier) is a single file name or a group of files with a common sequence of letters. For example, STAT *.COM $SYS will hide all files in the partition ending with .COM.

Entering DIR will still display all files in the partition. Entering **DIR *.* D <CR>** will only displa unhidden files. Entering **DIR *.* S <CR>** will displa only hidden SYSTEM files. The *.* can be replaced with any combination of wildcard

symbols. See Section 2.10.4 for more information on wildcard letters and directories.

3.3 SD (Super Directory)

SD (for Super or Sorted Directory) is not part of the CP/M system but an independent program. SD performs the same functions and is used in the same way as DIR. However, unlike DIR, it lists all of the filenames in alphabetic and numeric order, gives their size in thousands of characters, and reports the amount of space you have used up in the partition, plus the amount still available. Because it alphabetizes and gives more information, most people like to use SD instead of DIR.

Having the files listed in alphabetic order is a major benefit because partitions often contain so many files that directories fill the entire screen, and locating a particular file amidst such a profusion is time-consuming.

Seeing the size of a file is also very useful, as is knowing how much space you have left in the partition. File sizes are reported in blocks of 2K (K stands for Kilo, the Metric word for thousand). Thus a file that contained between 1 and 2048 characters would be listed as 2K, one between 2048 and 4096 as 4K, and so on.

You can also search for particular files, or groups of files, exactly as with the DIR command.

SD (V 2.01) can also sort the directory in another way. The command: **SD -T <CR>** will sort the directory by extension; files with no extension first, numbered extensions next and then extensions by alphabetical order all arranged in columns. Adding a -Q to the command (SD -QT) arranges the sort across the screen.

Since DIR is part of the operating system it is automatically present no matter what drive you are logged onto, or what partitions are assigned to your drives, and it is not listed as a file in any partition's directory. However, as a separate program, the SD command must be stored on a partition as a file, and invoked as you would an applications program.

For example, if SD were stored in the partition assigned to the drive you are logged onto, you would simply type **C>sd<CR>** to obtain a Super Directory of that partition.

If SD is not stored in the partition you are currently working with, you have to specify the drive of a partition that contains it. If it were stored in the partition assigned to drive A, and you were logged on C, you would call it up by typing **C>A:SD<CR>.**

Of course, just as with the DIR command, you could add on the letter/colon of some other drive after the SD and get a Super Directory of that drive. Thus, **B>A:SD D:<CR>** instructs the computer to take the SD program from drive/ partition A and give you a Super Directory of drive/partition D while you remain logged onto drive B.

3.4 REN (Renaming Files)

NEWNAME=OLDNAME

To rename a file you use the REN command which is part of the CP/M operating system and is automatically present at all times no matter what drive or partition you are using. After the command prompt you type REN, the new file name, an equals sign, and the old file name. The basic format to remember is **NEW=OLD.** For example, **C>REN wine=water<CR>** would change the file on drive C named 'water' into a file named 'wine'.

After executing a REN command the computer displays a new command prompt below your Rename command. To check and make sure that the right file has been given the correct new name, use DIR or SD to look at the directory.

When using the REN command you cannot use the wildcard symbols (*, ?) to change the names of more than one file at a time. If you use one of the forbidden symbols in a filename you will get an error message that says **FILENAME?**

If you mistype the name of the old file, or try to rename one that is not stored in the partition, you will get the message **NO FILE.** If you try to use the name of a file that already exists on the partition as a new name, you will be asked **"DELETE FILE?".** If you do not want the file that already exists with that name, enter Y; the old file will be deleted and the file will be renamed. Enter N if you still need the old file and the rename function will not be completed.

----------NOTE----------
Some applications programs have their own procedures for renaming files which should be used when you are operating within those programs. To use CP/M's REN command the screen must be showing the Command Prompt (**A>**, **B>** etc.).

3.5 ERA (Erasing Files)

The command for erasing a file is **ERA,** (another CP/M function that is always present) followed by the drive letter and full name of the file you wish to erase. For example, **D>ERA C:garbage.lst<CR>** will erase the file on drive C named 'garbage.lst'. If you do not specify a drive letter, ERA will assume you intend to erase a file from the drive you are currently logged on.

CP/M does not ask you to reconfirm your command, so be sure you have correctly named the drive and file to be eliminated before pressing RETURN. The file or files that you specified will be displayed on the screen as they are erased. When the erasure is completed the computer will display the command prompt.

You may use the wildcard symbols (*,?) to erase a group of files that have part of their names in common. For example, **B>era *.ltr<CR>** would erase all files on drive B that had LTR after the period. **D>ERA GONE????.*<CR>** would erase all files on drive D that began with GONE,

had four additional characters in their name, and were of any type.

If you were to type **B>ERA A:*.*<CR>** you would erase every single file stored in the partition assigned to drive A. In this case CP/M will ask you **ALL FILES Y/N?**. If you respond with a 'Y' then all the files will be gone e for good.

REMEMBER---Except when you are erasing all files in a partition, CP/M will not ask you to what you have told it to erase, so be very sure you specify the correct drive and filename to be erased before pressing return. Before erasing a group of files with wildcard symbols, use the DIR or SD commands with the same filename letters and wildcard symbols to see exactly which files will be erased. (For example, before entering ERA ??FIL.*, enter the directory command DIR ??FIL.* .)

3.6 PIP (Copying and Transferring Files)

DESTINATION=ORIGIN

3.6.1 COPYING FILES

Often it becomes necessary to copy a file from one partition to another. For example, you may wish to duplicate some frequently used program (SD for instance) from the SYSTEM partition to your work partition. Or you may want to copy some of your work files from one partition to another. CP/M's PIP program is used

to duplicate permanent copies of files from one partition onto another.

Unlike REN and DIR, PIP is not automatically present on every drive. It is contained in a program file named PIP.COM. If the PIP program is not stored in the partition assigned to the drive you are currently using you must either log in to the drive/partition where it is stored, or bring a temporary copy of PIP into your station's workspace.

In other words, if you are logged onto drive B and the PIP file is on drive A, you can either use **B>a:<CR>** to switch to drive A, or

B>a:pip<CR> to bring a temporary copy of PIP to your computer's workspace.

To use PIP, first make sure that there is room in the new partition for the file you wish to copy (the SD program will show you the space available).

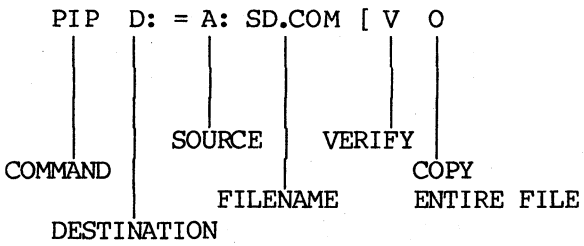
To copy a file from one partition to another, type **PIP, Destination Drive Letter, Colon, Complete Filename, Equals Sign, Origin Drive Letter, Colon, Complete Filename, RETURN.** For example, **A>PIP c:sd.com=a:sd.com<CR>** would copy the SD.COM file from drive A to drive C. The format is always **DESTINATION=ORIGIN** (or, NEW=OLD as in the REN command). When the PIP operation is completed the screen will show the command prompt.

If the destination filename is to be the same as the origin file name, you need not type the destination filename. Thus,

A>PIP C:=A:SD.COM<CR>

will copy the SD.COM file from A to C.

Below is that same PIP command diagrammed for clarity with a command for verification of a complete copy appended to the basic PIP sequence. (See section 3.6.3 and 3.6.4.) Normally there is a space only between the phrase PIP and the first Drive identifier. You do NOT enter spaces anywhere else in the command.



----------NOTE----------
PIP makes copies of files, it does not move a file from one partition to another. If you want a file stored in a partition and nowhere else, first copy it with PIP and then erase it from the original partition with the ERA command.

3.6.2 COPYING MULTIPLE FILES

If you have a number of files you wish to PIP, it is easier to type PIP first followed by RETURN (**A>PIP<CR>**). This puts you into the PIP program until you countermand the order; the screen will show this by an asterisk **(*)**. You need not type PIP again; after each PIP operation you will get another asterisk. Thus, you can do a series of PIP operations by only typing the drives, filenames and equals (=) signs. To cancel the PIP program type either **CTRL C** or **<CR>** after an asterisk.

To PIP a number of files with similar characters in their names use the wildcard symbols. To do this you type only the destination drive letter and colon, followed by an equals sign, and the origin drive letter, colon, and filename with wildcard symbols. You do not name the files on the destination side of the equals sign.

Here are two examples of PIP command lines.

A>PIP a:=b:*.txt<CR>

This PIP command would copy all of the files ending in TXT on drive B to the partition on drive A.

B>A:PIP C:=B:ACCOUNT?.DAT<CR>

This PIP command line would take the PIP program from drive A and copy to drive C all of the DAT type files on drive B that began with ACCOUNT (ACCOUNT1, ACCOUNT2, ACCOUNT3, etc.). PIP

will list on your screen the files as it copies them.

3.6.3 VERIFYING PIP COPIES

If you add **[v** (a 'v' preceded by a left square bracket) to the end of the origin filename before the RETURN, PIP will make an extra pass to verify that the copy is true and accurate. A sample PIP command is:

B>a:PIP c:=d:complex.doc[v<CR>.

It is extremely rare for PIP to make an error in copying a file, but adding the verify option gives an extra measure of safety.

3.6.4 COPYING TEXT AND DATA FILES

Sometimes you may need to make absolutely sure that all the data in a file is copied when you use PIP. For example, in some text files, part of the file may have a special CTRL character (CTRL Z) that CP/M normally interprets as 'end of file'. However, there may be additional information that must be copied after the CTRL Z. To ensure that all of the file is copied, you must add the letter o to the [v option at the end of the PIP command.

B>a:PIP c:=d:complex.doc[vo<CR>.

CP/M recognizes command files and does not need the [o option when copying files ending in .COM.

3.6.4 CHANGING FILE NAMES WITH PIP

You cannot have two files in the same partition with identical names. If you are copying a file to a partition that already contains a file with that exact same name, the existing file will be erased.

You need not make the filenames identical on either side of the equals sign when copying a file from one partition to another. Therefore, with the PIP program you can change the name of the file as you copy it. For example,

```
A>PIP B:SOUTH.PAW=A:LEFT.HND[vo<CR>
```

would copy the file LEFT.HND from Drive A to drive B and switch its name to SOUTH.PAW. If you change the file's name you can even PIP it within a single partition (in other words, create two copies of a file under different names). For example,

```
A>PIP B:mailist3.dat=B:junkmail.lst[v<CR>
```

----------NOTE----------
If you have a work file with the same name in two different partitions, and you work on one of them, you would end up with two files on different partitions with the same name but different content. This could get confusing as to which file had what content. Thus, it is the common practice when PIPping work files (NOT PROGRAM FILES) either to erase the original or rename one of them.

WARNING---Program files can be PIPped to your work partition as you wish, but you should NEVER ERASE the original program copy from the SYSTEM partition.

A series of PIP commands might look like this:

```
A>PIP<CR>
*D:accounts.dat=C:accounts.dat[vo<CR>
*B:applics.lst=C:names.dat[vo<CR>
*C:=B:*.doc[vo
Copying
TICK.DOC
HOLLY.DOC
MASH.DOC
MONEY.DOC
*B:=D:speech.txt[vo<CR>
*CTRL C
A>
```

COMBINING FILES WITH PIP

PIP will also let you combine files. By listing several source files with only a comma between them, the destination file will have all of the source files combined together. The second file will start at the end of the first file, the third file at the end of the second file and so on.

For example, if you want to combine the three files, CHAPTER.1, CHAPTER2, and CHAPTER3, into

one file called FINAL.DOC that contains all three chapters in order, use the PIP command:

```
PIP FINAL.DOC=CHAPTER.1,CHAPTER.2,CHAPTER.3[V
```

In the example all three source files were on the same partition as was the destination file. You could specify different drives for each of the three source files as well as the destination file.

----------NOTE----------
You must create a new file that the source files are combined into. You cannot add one or more files to an already existing file. The first file will be erased instead of being added on to.

3.6.5 PIPPING FILES TO OTHER PARTITIONS

When you transfer files from your partition to another partition that is not Ownable or shared, you must be careful not to do so while another person is working in that partition. If you add a file to another partition it will change the directory of that partition. When the other person tries to ave any work, he or she will get a R/O error message and lose the most recent work.

The correct method of transferring files to another person's partition is to wait until the person is out of the partition or off the network or is prepared to receive the file. (The other person will have to enter a CTRL C

after the CP/M prompt before trying to save any files.)

Alternatively, a person can always PIP a file from another partition to his or her partition without any trouble. If you are trading files with other people, let them PIP the file in your partition to their partition. This is the best method.

3.7 TYPE (To See a File's Contents)

If you wish to look at the contents of a particular file you can use the CP/M command TYPE. This command displays the contents of a file on your CRT screen. (TYPE will only work with files containing letters and numbers. It will not work with files containing graphics or nothing but computer command codes.)

TYPE is part of the operating system and is automatically on every drive. You use it from the Command Prompt by entering **TYPE, Drive Letter, Colon, Filename, RETURN.** For example, **C>TYPE A:QBROWN.FOX<CR>** would display on your screen the contents of the file QBROWN.FOX on drive A.

Under CP/M 2.2 a file that contains more lines than can fit on your CRT screen will scroll up across the screen too fast to read, stopping only at the end with the final lines displayed. However, you can freeze this scrolling action at any time by entering a CTRL S or by pressing the PAUSE key. CTRL S instantly stops the file from moving up the screen.

Another CTRL S (or any other key) restarts the scrolling action. By alternately freezing and scrolling the file you can read it all. (Since the file scrolls fast you have to be quick with your freeze commands; it may take you a little practice to get the timing right.)

The HIDOS (ZCPR) Release 6 version of TYPE displays a file one screenful at a time. There is no need to use the PAUSE Key to start and stop the scrolling text. Hitting any key will display the next page of text. If you do not want the file to stop after each screenful of text, use the command **TYPE <filename> P.** The file will keep scrolling until you press PAUSE.

----------NOTE----------
The TYPE command does NOT print out the contents of a file onto a piece of paper even if there is a printer connected to your workstation. If you wish to have the contents of a file printed onto paper you must use the command **CTRL P** in conjunction with the **TYPE** command. See section 4 for information on printers and section 3.8 for information on CTRL P.

You can also use a word processing program to look at the contents of a file. With a word processing program you can read the contents and also add, change, or delete them. With the TYPE program you can only look at what is in the file, not edit it. However, it takes fewer keystrokes to see a file with TYPE than with a word processing program, so if all you want to do is check what is in the file you may wish to use TYPE.

3.8 CTRL P (Typing to Paper)

If you have a printer connected to either your workstation or the HiNet spooler (see Section 4, Volume 1) you can command the computer to print out on paper whatever you send to the screen. To do this, first ready the printer as described in Section 4 and in the printer's instruction manual, then enter a **CTRL P** command at the command prompt. From that point on, everything subsequently sent to your screen will also be sent to the printer until you enter another **CTRL P** or a **CTRL C** to turn off the send-to-the-printer command.

----------NOTE----------
Anything already on the screen before the CTRL P was entered will not be printed. Everything that appears on the screen after you enter the CTRL P (including your commands) will be printed until another CTRL P is issued.

If you wanted to print out a hard copy of a directory, for example, you would enter a CTRL P before the SD or DIR command. ('Hard Copy' is computer jargon for something printed on a piece of paper.) If you intended to change the names of several files, and wished to have a hard copy record of what was done, you could use CTRL P before starting with the REN commands, and each of your REN commands would be recorded by the printer.

You can also use CTRL P in conjunction with the TYPE Command to print out the contents of a file. **B>CTRL P TYPE B:Warnpees.nov<CR>**, for

example, would send to the printer the command line, the contents of the file Warnpees.nov and everything else you did until you sent another CTRL P or a CTRL C.

3.9 THE LIST COMMAND

Instead of using CTRL P in conjunction with TYPE to send a file to a printer, you can use the LIST command that is available with HIDOS Release 6 (ZCPR). Enter the command:

LIST (filename) <CR>

where (filename) is the name of the file you wish to print. Unlike using TYPE, the file will not be displayed on the screen as it is being printed. The CP/M prompt will return to the screen when all of the text has been sent to the printer. When using the Network Spool Printer you must enter a CTRL C under HIDOS or RELEASE SPOOL under MS-DOS to SPOOL the file so that it can finish printing.

----------NOTE----------
If you wish to print a file created using either a word processing program or some other applications program with its own set of print commands, you should use that program's print commands and not CTRL P. This is because the print commands associated with an applications program allow you much greater control over exactly what is to be printed and in what manner. Also, files created with word processing

programs contain invisible, embedded computer commands that CTRL P or LIST can neither understand nor carry out.

3.10 USING SUBMIT FILES ON HINET

For general information on using Submit see your CP/M Manual; this section will only cover special considerations when using Submit in a Network environment. Here are the basic points to remember when using SUBMIT on the HiNet Network:

The HIDOS Release 6 (ZCPR) version of SUBMIT does not require that you run SUBMIT from the A drive. You can be logged to any Ownable partition on any drive. The Submit file will only affect that drive.

When using a Submit file you must be logged to the partition that the SUBMIT file will be running on and it must be owned by you.

You cannot change drives from within a SUBMIT program.

SUBMIT cannot be used on Shared partitions.

When SUBMIT is running, a closed-parentheses symbol will be displayed in column two after the drive letter. When the SUBMIT file is finished the Drive letter prompt will return.

---NOTE---
If a REN command fails during a SUBMIT execution, the SUBMIT will abort.

---WARNING---
Should another User assign the partition that a SUBMIT file is running on and log to that drive, an error message will appear when a program (e.g., ASSIGN) is called or a warm-boot is attempted. This error message will say that they do not own the partition for writing. The second User's workstation will begin to execute the Submit file which tries to write to the partition that is not owned by that User, resulting in an error. The other User must RESET in order to regain control.

To avoid problems, always run SUBMIT files on private partitions that are not likely to be assigned to any other User's drives.

On Networks previous to Release 6 **NEVER have the SYSTEM partition assigned to your A drive while you are using Submit.** To be safe, follow this procedure when using SUBMIT on pre-Release 6 Networks:

A- If the SYSTEM Partition is assigned to your Drive A, re-assign it to another partition (**A>Assign C: SYSTEM<CR>**). See Section 2.13 for a description of the ASSIGN Command.

B- Assign to your A drive a partition that no one else will be using (**C>Assign A: XXXXXX<CR>**).

C- Log on to your A Drive (**C>a:<CR>**).

D- Run your Submit file (**A>SUBMIT XXXXXX <CR>**). If the partition assigned to your A Drive does not contain a copy of the Submit program (SUBMIT.COM), you can take it from any partition on another drive, and you can also take the Submit file from another drive. Thus, **A>C:Submit D:XXXXX<CR>** would take SUBMIT.COM from Drive C and apply it to the file XXXXX on Drive D.

3.11 ZCPR PROGRAMMERS TOOLS

With the integration of ZCPR in HIDOS Release 6, some additional tools for programmers are available. They are briefly mentioned here for those Users not familiar with ZCPR commands.

The JUMP command is used to jump directly directly to a program or subroutine already in memory. Enter the jump address in Hexadecimal after the command JUMP.

JUMP <jump address in Hex>

GO is the same as JUMP 100 but allows command line parameters to be passed. Use the format:

GO <command line parameters>.

GET loads a program into memory without executing it. Use the format:

GET <load address in Hex> <filename>

SAVE allows the user to save Pages and/or CP/M Sectors. In addition, the number may be post-fixed by the letter H to signify a Hex entry. If the named file exists, SAVE will ask if it should be deleted. Enter Y to delete the old file or N to abort the save.

```
SAVE nn <filename>
SAVE nnh <filename>
SAVE nn <filename> S
```

The USER Number feature of CP/M has also been enhanced. User Numbers are covered more thoroughly in Section 2 of this volume.

----------NOTE----------
Under ZCPR the command line length decreases from 128 bytes to 80 bytes.

4.0 NETWORK MAINTENANCE

The Introduction to this Volume of the DMS HiNet Master manuals briefly discussed the responsibilities of the Network Administrator. In Volume 1, the programs that are used to set up the HiNet Network were outlined. Here in this section, more detailed explanations of the utilities that run the Master's Hard Disk and the Network will be given. The Network Administrator should be familiar with both the procedures and the reasons behind "Network Maintenance" in order to manage the company's information lifeline--the Local Area Network.

Since HiNet Masters run under HIDOS (CP/M-80), that operating system is always included when you buy a Network. To increase the Network's power and versatility, the faster 16-bit operating systems--CP/M-86 and MS-DOS--can be added for use on workstations like the DMS-816, DMS-5086 and DMS-86 (with any terminal). In addition to these three choices, Digital Microsystems' own version of CP/M-80, HIDOS, allows Users on the Network to read and write to the same partitions.

Your Network may have HIDOS, CP/M-86, MS-DOS, and CP/M 2.2 in any combination. By logging in to the Network with various User Names, the User chooses which operating system he or she will use. Not all workstations can use all four operating systems. Users must know which workstations they can use with which operating

system. The following table illustrates this relationship:

	8-BIT SYSTEMS		16-BIT SYSTEMS	
Workstation	CP/M-80	HIDOS	CP/M-86	MS-DOS
DMS-5080	YES	YES	NO	NO
DMS-3/F	YES	YES	NO	NO
DMS-3/501	YES	YES	NO	NO
DMS-3B	YES	YES	NO	NO
DMS-3	YES	YES	NO	NO
DMS-1280	YES	YES	NO	NO
DMS-5086	NO	NO	YES	YES
DMS-86	NO	NO	YES	YES
DMS-816	YES	YES	YES	YES

4.1 HARD DISK MAINTENANCE

You might think that the Hard Disk needs physical maintenance, but it does not. The Hard Disk is sealed in its own dust free environment and should never be tampered with in any way. It does not need any special care except for adequate ventilation and a location protected from mechanical shocks.

Hard Disk Maintenance means keeping the allocated partitions, the operating systems and the User Tables up-to-date and responsive to the Network's Users. As your Network's data and User requirements change, so will the ALLOC and USERS Tables and the applications programs stored on the Hard Disk.

Special DMS utilities allow the Network Administrator to:

- create and modify partitions;
- add User Names;
- add new types of workstations;
- add operating systems and programs.

The basics of ALLOC, USERS, MACHINE and the Transfer programs were given in the Network Installation section of Volume 1. Many of the seldom-used utilities--such as those that add operating systems to the Network--will always be handled by the INSTALL user-interface program. The SYSLIB program (SYSTEM LIBRARY), for example, will always be called by the INSTALL program whenever you receive a new operating system or system update from DMS. All of the proper filenames and Hard Disk addresses will be entered by the INSTALL program. (SYSLIB may be of use to some Systems Programmers, so it is documented in the HiNet Programmer's Manual.)

This section will cover, in more detail, the following subjects and utilities:

- Hard Disk Partitions and the ALLOC Table;
- USER Names and the USERS Table;
- Workstation types and the MACHINE Table;
- Utility PASSWORDS and Network Security.

4.2 ALLOC AND NETWORK PARTITIONS

The structure and basic use of the ALLOC Program was outlined in Volume 1, Section 2. If you have a new Network Master, the INSTALL program created a 2 Megabyte partition named CSYSTEM. This section will explain some of the requirements for other partitions on the Network. Please read them over before proceeding with the ALLOC program and creating any additional partitions.

4.2.1 SYSTEM REQUIREMENTS AND PARTITIONS

PLANNING AHEAD

Before setting up your ALLOC table you should consider what partitions you will need to run your system. This is particularly true if the Master's Hard Disk is going to be the Master Hard Disk for a HiNet Network (as opposed to a single-user stand-alone computer).

Here are some of the most commonly established partitions for Network Hard Disks.

- SYSTEM (1-2 Mbyte)--You should store commonly used programs here to save space in other partitions. With both MS-DOS and CP/M on the network there must be two SYSTEM partitions (CSYSTEM and MSYSTEM).

- SCRATCH (1 Mbyte)--This is used by the MINICOPY program to copy Floppy Diskettes when only one Floppy Diskette Drive and a Hard Disk are available.

- MAIL (512 Kbytes to 1 Mbyte)--For the electronic mail program. (HIDOS Networks.)

- PRTSPOOL (512 Kbytes to 1 Mbyte)--Used for spooling print jobs to a common printer.

PARTITION SIZES AND 5HDBACK

When deciding the sizes of the partitions that you are creating, it is best to keep in mind that the larger the partition, the longer it will take to back the partition up with the backup programs. Since the backup utilities copy the entire partition even if it is mostly blank, the time you spend backing up a 2 Mbyte partition that has only 500 Kbytes in it is almost double the time of backing up a 1 Mbyte partition that has the same amount stored in it. Try to make the partition sizes appropriate for the amount of data that will be stored in each partition.

FDHDCOPY AND MINICOPY

Remember that, when using MINICOPY or FDHDCOPY to copy Floppy Diskettes, you must have a partition called SCRATCH on the Hard Disk. It should be 1 Mbyte in size for a 5.25-inch Floppy Diskette system and 512 Kbytes in size on a 8-inch Floppy Diskette system. If you have a dual floppy DMS-3/F or DMS-3 on the Network you may not want to bother with the SCRATCH partition since it does take up extra Hard Disk storage space.

SPOOL PARTITION REQUIREMENTS

To use a common printer on the Network, you will have to set up a partition for the Spool printer on the Hard Disk. This partition must be called **PRTSPOOL.**

The size of the PRTSPOOL partition depends on how many users you expect to be sending a job to the printer at one time. The PRTSPOOL partition is divided up into sixteen equal Spool Blocks. Each print job can take up one or more Blocks. Therefore, the size of the print jobs and the number of jobs expected in one time period determines the appropriate size of the PRTSPOOL partition. See Section 4, Volume 1 for more details. For systems that have a small demand for printing, you may be able to use a PRTSPOOL partition size of 512 Kbytes but 1 Mbyte is recommended for Networks with more than 10 Users.

When setting up the PRTSPOOL partition you should put a password on it so that no one can assign it to one of their CP/M Drives.

4.2.2 USER REQUIREMENTS AND PARTITIONS

Your requirements for the HiNet system should also be taken into account before setting up the Allocation Table for the Hard Disks. The type of business you have and the number of people on your Network will affect the sizes and number of partitions on the Hard Disk. Each person who uses the network should probably have a personal partition to store work in. Under

HiNet-CP/M, a partition can be read from by several people but can only be written to by one person at a time.

Under HIDOS, specially marked partitions can be shared by more than one person.

THE CSYSTEM PARTITION

The subject of the CSYSTEM partition has been discussed several times in this manual. It is mentioned here to remind you that it is not necessary to store all of the network's programs in every partition. Programs can be stored in a single partition and accessed by everyone on the network. This saves a lot of valuable storage space. The partition in which these shared programs are stored is usually called CSYSTEM and/or MSYSTEM (although you can call it anything you wish).

The INSTALL program created a CSYSTEM partition. The size of the CSYSTEM partition is probably 1 Megabyte. The size that you need it to be may be different; it will depend on the number and size of the programs your network will be using. If you add a few CP/M applications programs to the HiNet utilities, the CSYSTEM partition should probably be at least 2 Mbytes in size.

THE MSYSTEM PARTITION

CP/M and MS-DOS files must be kept on separate partitions. Therefore it is necessary

to have an MSYSTEM partition in which to store the MS-DOS utilities and any software. If all of your Network's workstations are using MS-DOS, the MSYSTEM partition should be 2 Mbytes (while the CSYSTEM partition could shrink to 1 Mbyte).

DATA BASES

If you are planning to set up one or more data bases on your system you should think ahead and try to estimate how much data storage each one will require.

Normally a single data base will occupy one partition. (Some programs require this.) However, data bases tend to grow as you add new fields and data. If you start off with a relatively small data base in a 512 Kbyte partition, you can later create a larger partition and copy the data base to the larger partition if it outgrows the smaller one. On the other hand, if the data base remains small you will not have wasted partition space on the Hard Disk.

This is a good example of why you should not try to allocate the entire Hard Disk the first time around. Remember that it is easier to add a new partition to the Hard Disk than to divide up old partitions into smaller ones.

WORD PROCESSING

Perhaps your business does a lot of word processing. Again, the number and sizes of the

partitions on the Hard Disk will depend on several factors.

How many people do you have that will be writing mostly letters or short reports? This type of word processing requires partitions of minimal size; 512 Kbytes (a partition size of 2) is normal.

The smaller size partitions require routine 'housekeeping'. In other words, old letters and memos must be cleared out of the partitions regularly. The number of letters (files) will often exceed the partition's directory space before the storage space is full. If you get a **Directory Full** error message you will probably lose the file you were working on. If you need to keep permanent records of these old files you can always store them on clearly labeled Floppy Diskettes.

Do you have people who work on long reports or have several projects going on at one time? These people may require partition sizes of 1 or perhaps 2 Megabytes. Alternatively, they may be given several smaller partitions for personal use.

Don't forget about the Spool partition if you are going to have a common printer.

4.2.3 PARTITION MAINTENANCE

Partitions must be maintained to use the storage space on the Hard Disk effectively. This maintenance includes adding, modifying and deleting partitions, setting and clearing write

protection, backing up data, transferring software to the Hard Disk and keeping utilities updated.

NETALLOC

The program NETALLOC is a subset of the main ALLOC utility. Unlike ALLOC, it functions while the network is running. NETALLOC is linked to the Operator's Password; it should be available to certain trained personnel for day-to-day Network Maintenance. Use the NETALLOC utility to:

- change the Read/Write status of a partition,
- list the names of the available partitions,
- check the amount of storage space used, and
- determine how much storage space is still available on the Hard Disk.

The NETALLOC utility can be protected by a password. The PW (PASSWORD) program sets up two passwords, the Manager's and Operator's, to provide security for any utility that has access to User and Partition Passwords. NETALLOC is protected with the Operator's Password. If no password is set, the NETALLOC utility will load without asking for the Operator's Password.

Here is the menu for NETALLOC:

```
Enter Operator's password-->

NETALLOC Menu
-------------
C - CLEAR        Clear an owned partition to not owned.

O - OWNABLE      Change a partition's status to Ownable.
R - READ-ONLY    Set a partition to Read/Only status.
W - READ/WRITE   Set a partition to Read/Write status.
Y - YOU-OWN-IT   Set a partition to Owned by you.

P - PASSWORD     Change a partition's password.

V - VOLUME       Select Hard Disk Volume to work on.
I - INFORMATION  Information on space usage and volumes.
L - LIST         Display the ALLOC Partition Table.
S - SAVE         Save the ALLOC Table to the Control Area.
Q - QUIT         Leave this program, return to CP/M.
```

Use the C option to clear write ownership of an OWNABLE partition. This option can be used when an OWNABLE partition has been set to Owned by a User who then neglects to release it for someone else to use (for example, the owner goes out to lunch without using RELEASE or logging off the Network).

Use option R to change a partition's write status to Read/Only--no user can write to the partition but anyone can read files from it.

Use option W to change a partition's write status to Read/Write--any user can read from and write to the partition. Read/Write does not provide for any error detection; multiple writes

to the partition can destroy files. MS-DOS partitions should never be set to R/W.

The O option changes a partition's write status from Read/Write or Read-Only to Ownable. This option requires a Save before it becomes effective.

The Y option performs two functions: 1) it gives the User at the Master write ownership of an ownable partition, and 2) it changes a non-ownable partition from R/W or R/O to ownable and then gives the user at the Master write ownership of the partition. This second option requires a Save to make it effective; use the S option. If a partition is already owned by another User, NETALLOC cannot change the write ownership.

----------CAUTION----------
Do not change the write ownership of a partition when another User is writing to it. This may cause confusion among Network Users and could result in the loss of work. Always check with the Users of the partitions you will be working with before changing ownership with NETALLOC.

----------NOTE----------
Shared partitions CANNOT be changed to OWNABLE, R/W or R/O with the NETALLOC program. The Shared status of a partition can only be altered from the ALLOC program.

The L option will display a list of all of the partitions on the Hard Disk.

Use the P option to change a Password of a partition. You must know the current password in order to change it. Use the S option to save any changes to partition passwords.

The V option changes the Hard Disk Volume that NETALLOC affects. The DMS-3/501 has only one Hard Disk Volume at this time. This option is for Multi-Volume DMS-3/10x Networks.

Use the S option to save the changes to the Hard Disk. Without using the Save option, certain changes you make with NETALLOC will not have any effect.

WRITE MODE TABLE DISCREPANCIES

Whenever ALLOC or NETALLOC are called, they compare the current Write Mode Table with the version written on the DISK in the ALLOC Table. If there is a difference, a message will be displayed that lists the discrepancies and asks if you want to correct them. In almost all cases enter Y for Yes. These discrepancies are errors that may cause problems when Users try to access partitions. The errors are automatically corrected by the program. This message should be ignored only in special cases involving table manipulation by programmer's.

THE ALLOC UTILITY

The main ALLOC Table program can be protected another level of passwords. Furthermore, the program cannot run on the Master when the Network is up. The Master must be booted from a CP/M floppy diskette with the following files on it: ALLOC.COM, ALLOC1.OVR, ALLOC2.OVR, ALLOC3.OVR and ALLOC.SYS (a copy of the INSTALL #4 diskette). When the ALLOC program is run, it will load and ask for a password if the utility password protection is active. After the correct password is entered the following menu is displayed:

```
A - ADD           Add a partition to the ALLOC Table.
D - DELETE        Delete a partition from the ALLOC Table.
M - MODIFY        Change a partition's attributes.
C - COMPRESS      Reclaim disk space from deleted partitions.

G - GET           Get the ALLOC Table from the control area.
S - SAVE          Save the ALLOC Table to the control area.
Z - ZERO          Clear the ALLOC Table of all entries.

V - VOLUME        Select Hard Disk Volume to work on.
I - INFORMATION   Information on space usage and volumes.
L - LIST          Display the ALLOC Partition Table.

Q - QUIT          Leave this program, return to CP/M.
```

PARTITION PARAMETERS

There are certain parameters that each partition can or must have: size (storage

capacity), name, password, operating system, flagged backup option, and read/write status. Here are the valid options for each parameter:

SIZE --

The partition size may be 256 Kbytes, 512 Kbytes, 1 Mbyte, 2 Mbytes, 4 Mbytes or 8 Mbytes. Each of these sizes is entered in the ALLOC Table as the number with the letter K or M (e.g., 512K or 2M).

NAME --

A partition name is any word or code composed of not more than 8 ASCII characters (letters or numbers).

PASSWORD --

A password is any word or code composed of not more than 6 ASCII characters (letters or numbers).

OPERATING SYSTEM --

A partition can be formatted for either CP/M, which includes CP/M-80, HIDOS and CP/M-86, or for MS-DOS. If a partition is to be shared--written to by more than one user at a time--then it must be marked so in the ALLOC Table.

FLAGGED BACKUP --

A flag can be set for a partition to alert 5HDBACK or CARTBACK to back up the partition automatically when the proper command is given.

PARTITION TYPE --

The write protection status of a partition can be set to Read/Write, Read/Only, Shared, or Ownable.

ADDING PARTITIONS

Once you are in the ALLOC Table Main Menu, the first option is ADD a new partition. When you select this option, the program automatically checks to see if there is room on the Hard Disk to create another partition of at least 256 Kbytes (the smallest size). If there is storage space available on the Hard Disk, the following dialogue will be displayed as you enter the partition's parameters.

```
ADDING an entry to the table. Press ESC to abort this function.

NAME             --> MSYSTEM     (8 characters)
PASSWORD         --> <CR>        (6 characters max.)
SIZE             --> 1           (256K, 512K, 1M, 2M, 4M, 8M)
OPERATING SYSTEM --> MSDOS       (CP/M, MSDOS)
BACKUP           --> Y           (Yes or No)
PARTITION TYPE   --> O           (R/O, R/W, S, O)

Here is the partition that you have created:

NAME     PASSWORD   SIZE   OPERATING    BACKUP    PARTITION
                           SYSTEM                 TYPE
-------------------------------------------------------------
MSYSTEM             1MEG   MSDOS        YES       R/W

Is this correct (Yes or No)--> Y <CR>
```

Notice that the valid options are displayed on the right side of the screen. The cursor is positioned in the middle of the line next to the —> symbol where the new entries are made.

The preceding ALLOC dialogue created a new partition named MSYSTEM that is 1 Megabyte in size. No password was set for accessing the partition. New partitions will be formatted for the appropriate operating system when the modified ALLOC Table is saved to the Hard Disk.

The Partition type was set at O--OWNABLE. The User who assigns write ownership or first writes to an ownable partition is the only user who can write to the MSYSTEM partition. Normally, no user should be writing to this partition. It should be set to owned by the Master in the User Table so that the partition can be written to only from the Master.

The backup selection was set at Yes. This tells the HARDBACK, CARTBACK and 5HDBACK program to include this partition automatically in the backup list when the FLAGGED option is selected. (See Volume 2, Section 5, DATA STORAGE, for more on using the backup programs.)

After entering all the choices, the partition's parameters are redisplayed for approval. If it is correct, respond Y for Yes and the partition will be added to the table. However, until the table is SAVED with the S menu option, the new partition will not really exist on the Hard Disk. If the entries are wrong, respond N ('No') and the entries will be erased.

Once you have saved the partition parameters, you can modify them with the M (Modify) menu option. A partition's size cannot be modified. Changing a partition's size requires deleting the partition, compressing the ALLOC Table and recreating the partition at a larger or smaller size. The operating system for a particular partition cannot be changed from CP/M to MS-DOS (or vice versa) without destroying all of the data in that partition.

MAKING HIDOS PARTITIONS SHARED

The HiNet Network now comes with the DMS-revised version of CP/M-80 (2.2) called HIDOS. Under HIDOS, specially prepared partitions can be written to by more than one user on the Network without getting read-only errors and losing files. In order to make a HIDOS partition shared, it is necessary to follow these steps:

----------NOTE----------
This procedure involves booting the Master from a Floppy Diskette. No one else should be on the Network. If Users will be waiting for the Network to come back up, make sure that you disconnect the HiNet cable from the Master until the procedure is completed.
---

1) Mark a new or established CP/M partition as R/W in the ALLOC Table. Save the Table and boot the Master's Hard Disk to bring the Network up.

2) From the Master, assign a partition that is to be shared to the B drive. Assign Drive A to

the CSYSTEM partition, where the program SHRALLOC.COM is located. Log to the B drive (A>B:<CR>).

3) Run SHRALLOC (B>**A:SHRALLOC<CR>**). The message **"...Successful completion"** will be displayed when the program has finished.

4) Reassign any other partitions that are to be shared to the B: drive and repeat the SHRALLOC command.

5) Boot the Master from the Floppy Disk containing the ALLOC*.* files. Modify each shared partition to make the **Partition Type--> Shared**. Save the Table and reboot the Master.

All partitions that are marked shared in the ALLOC Table and have had SHRALLOC successfully run on them as described above can now be safely written to by more than one person. See Section 2, Volume 2, for details on using Shared Partitions.

MODIFYING PARTITIONS

Use the M (Modify) option to change the parameters of a partition. The program will ask you the name of the partition that you wish to modify. If that partition exists, the partition input dialogue will be displayed. The sequence will look something like this:

```
Menu choice: M <CR>
Name of partition to modify:MSYSTEM <CR>

MODIFYING an entry in table. Press ESC to abort
this function. Press RETURN to keep current setting.

Name               -><CR>        SYSTEM
Password           -><CR>
Operating System   -><CR>        CPM
Backup             ->NO <CR>     YES
Partition Type     -><CR>        R/W

Here is the entry that you have modified:

NAME    PASSWORD   SIZE   OPERATING    BACKUP   PARTITION
                          SYSTEM                TYPE
-------------------------------------------------------
MSYSTEM            1M     CP/M         NO       R/W
```

Notice that the current value for each parameter is displayed on the right side of the screen. The cursor, indicating where the new parameter will go, is in the middle of the line right after the --> symbol. Note also that there is no provision to change the partition's size in the Modify option.

The type of operating system that is linked to a partition cannot be changed unless you are willing to lose all of the data in the partition. Changing the operating system in the ALLOC Table automatically reformats the partition which erases all data.

LIST ALLOC TABLE

Use the L menu option to LIST out the ALLOC table to the screen. Use the PAUSE key or CTRL S to stop and restart the display. Hit ESC to abort the Listing. (Enter CTRL P and then L to print out a hard copy of the ALLOC Table on a printer that is connected to the Master.)

SAVING THE ALLOC TABLE

The S menu option is used to write the modified ALLOC Table to the Hard Disk's Partition Zero. This makes the changes and/or additions effective after the Master is booted from the Hard Disk. Any deleted partitions will no longer be accessible by users on the Network.

COMPRESS ALLOC TABLE

Once partitions are deleted, the storage space they occupy can be recovered with the COMPRESS option. COMPRESS rewrites the partitions on the Hard Disk so that they are all contiguous again; the space that was occupied by the deleted partitions ends up at the end of the ALLOC Table. This space may then be reallocated as partitions.

If a deleted partition is the same size as a new partition you wish to create, ALLOC will use that storage space to make a new partition. In this case, it is not necessary to run COMPRESS. Only when you need to make a partition that is larger than any deleted partitions

should COMPRESS be used. Remember that ALLOC will format the deleted partition for the appropriate operating system so that all data stored there will be erased.

----------WARNING----------
It is very important to have a recent backup of ALL Hard Disk partitions including Partition Zero before compressing the ALLOC Table. If the COMPRESS function should be interrupted by a power failure or other misfortune, the uncompleted process will leave the partitions inaccessible. You wil have to reload the partitions and start over again.

Depending on the size of the Hard Disk, COMPRESS can take several hours to finish. Therefore, COMPRESS should be run only when there are several deleted partitions.

4.3 THE USERS TABLE--NETWORK LOGIN NAMES

The USERS utility allows you to build the Network's USER Table. The USER Table links the login user names with an operating system and four default logical drive assignments.

If you have an established Network and will be adding MS-DOS, you will have to enter new User Names (or modify old ones) and link them to the appropriate operating systems. (The old user names will all be linked to CP/M partitions.)

The USERS utility can be protected by a password. This is part of the Network's

security. The USERS Table lists the login names' passwords and allows them to be changed. If your Network requires security precautions against unauthorized access of data, use the PW utility to set the password for USERS to a six letter (or shorter) word composed of any ASCII characters. If no security is needed for your network, set the blank password to Manager's Level to simplify daily access.

When the USERS utility is called, it will display a list of all of the menu options:

```
A - ADD      Add an entry into the USER Table.
M - MODIFY   Modify an entry in the USER Table.
D - DELETE   Delete an entry in the USER Table.
Z - ZERO     Zero out the entire USER Table.

G - GET      Get the USER Table from the Control Area.
S - SAVE     Save the USER Table to the Control Area.

L - LIST     List the USER Table on the screen.
Q - QUIT     Leave this program, return to CP/M.

Enter Choice-->
```

By entering L, for LIST, the contents of the USER Table will be displayed line-by-line on the screen. On a new network there will probably be only one name, MASTER. This entry was created by INSTALL along with the CSYSTEM partition so that you can login to the Master.

----------NOTE----------
On established network masters, the new USERS program (on the INSTALL #5 diskette) will not list any existing names until the INSTALL program has been completely run. The USERS Table is written to a different location in Partition Zero by INSTALL where the new USERS utility expects to find it.

Each user on the network must have these entries in the USER Table:

- User Name
- Password (optional)
- Four default partition assignments
- Type of operating sytem
- Kind of operating system
- Login command (optional)

USER NAMES

Each User Name can be up to eight characters in length, and is normally the User's first or last name. (It can also be the workstation's PROM serial number for auto-booting.)

PASSWORDS

A password is optional and can be a RETURN if no security is needed. The password is limited to six characters in length.

OPERATING SYSTEMS

The standard choices for operating systems are HIDOS, CPM-86, MS-DOS. CP/M-80 2.2 is available on special request. Each User Name is linked to a specific operating system. When a user logs in with a particular name, the Master will check the USER Table for the required operating system and then check the MACHINE Table to see if the workstation can accept that operating system. If not, login will be denied. Therefore, if a user will be working with different workstations that have different capabilities, he or she will require more than one User Name.

As an example, the DMS-816 can run all four operating systems. If, for some reason, a person wanted the capability to run MS-DOS and CP/M-86, and to access shared HIDOS partitions, he or she would need three different User Names, such as Mark, Mark2 and Mark3. Each User Name would have different default drive assignments and be linked to different operating systems.

When HIDOS or CP/M-80 is chosen as an operating system, you must decide whether the workstation requires FULL SERVICE or HIMEM (HIGH MEMORY) for it to function.

FULL SERVICE means that a DMS-3/F, -3, -4 or -3/501 that is being used as a workstation will be able to use its local Floppy Disk and Hard Disk Drives to communicate directly with the Network Master.

HIMEM means that the operating system has been pared to a minimum to preserve workstation TPA (Transient Program Area--the storage in RAM where applications programs are run). HIMEM, which is necessary to run large applicatiton programs that require at least 53K RAM, eliminates a workstations ability to use local Floppy or Hard Disk Drives to transfer files directly to and from the Network Master. Note that 16-bit workstations running MS-DOS and CP/M-86 have at least 256K RAM; they do not need special HIMEM or FULL SERVICE operating systems.

----------NOTE----------
Even if a workstation uses a HIMEM modified operating system with no provisions for local Floppy Disk or Hard Disk Drives, the station can still access those devices as a stand-alone unit when it is booted from a Floppy Disk or a local Hard Disk.

DEFAULT PARTITION ASSIGNMENTS

Each user has at least four default partition assignments. Workstations with 16-bit processors (DMS-5086, -86, -816) can have up to 8 partition assignments at one time. However, the User Table has room for only four default drive assignments. (The remaining four drive assignments can be saved and restored with the ASSIGN S and ASSIGN R commands. See Volume 2, Section 2.)

When a default drive is assigned to a partition that is OWNABLE, the USERS program

will ask whether or not the user wants the partition write-enabled for him or her immediately upon login if no one owns it already. This allows a private partition to be write protected for the owner without doing some kind of unnecessary write to the partition immediately after login.

The four logical drives can be assigned to either the Master's Hard Disk partitions or to local Floppy Diskette Drives. Local Floppy Diskette Drives have different codes depending on their size and the type of workstation.

The Density of a diskette can be:

S = 8" Single density (IBM standard 3740),
D = 8" Double density,
M = 5.25" Mini double-sided, double density.

The drive numbers can be:

	Drive 0	Drive 1
DMS-3/F	Left side	Right side
DMS-3	Right side	Left side
DMS-4	Top	Bottom
DMS-3/501	Left	---------

For example, to assign the D drive to the left 5.25-inch floppy diskette drive of a DMS-3/F, enter M0 in the USER Table after one of the drive letters. To assign the left Floppy Disk Drive of a DMS-3 (8-inch), enter D1 for a double-density diskette or S1 for a single-density diskette.

LOGIN COMMAND

The login command can be a single CP/M or MS-DOS command or a string of commands up to 31 characters. Each time a workstation logs in to the network, the login command is executed. For example, the login command could be:

ASSIGN^M	--displays default assignments
A:CUSTOMIZ C:KEYS^M	--loads functions keys with CUSTOMIZ program.
A:SETBAUD 2 2400^M	--sets the baud rate for serial port 2.
ASSIGN E ULTRA0^M	--assigns drive E to the Ram Disk Drive. (CP/M-86)
ASSIGN R ALLDRVS^M	--restores the drive assignments stored in the file named ALLDRVS.

The ^M in the above login commands represents a RETURN. You can therefore place several different commands in the USER Table. To place a CTRL command in the string, enter an @ sign first, then the command. For example, @<CR> will place a Carriage Return after a command. The USERS program will then list out the entry that you have just completed.

If the entries are correct, the main menu will be redisplayed and the user entry stored in the temporary USER Table. The entry does not become permanent until it is saved with the S (Save) command.

4.3.1 ADD TO THE USER TABLE

The A menu option lets you ADD an entry to the USER Table. When you use this option the program dialogue might look something like this:

```
Enter choice-->A <CR>

Add an entry into the users table.

Adding Entry 1.

Press RETURN to go back to main menu.

Enter new user name --> LAUREN <CR>
Enter password      --> <CR>
Operating system    --> CPM <CR>

     Choose type of CP/M:

0 - Standard         (HIDOS or CP/M-86)
1 - CP/M 2.2 only
2 - CP/M-86 only
3 - HIDOS            (For sharing partitions)

Enter number  -->3 <CR>

Enter kind of operating system
     'Full' gives you a full service operating system.
     'HIMEM' gives you a limited service operating
             system with more memory available.

Enter kind of O.S.  -->FULL <CR>  (FULL,HIMEM)
```

(Screen continued next page.)

```
Enter the default partition assignments.
Only local Floppy or Master Hard Disk partition
assignments are allowed. Drive A must have a
default assignment. Enter U: to leave a drive
unassigned.

 A: -->CSYSTEM <CR>

 B: -->LAUREN <CR>  This is an OWNABLE partition.
                    Do you want immediate ownership
                    upon login? (Y,N) Y <CR>
 C: -->U:<CR>

 D: -->MO <CR>

Enter command to be automatically executed upon
login. 31 characters maximum. Press RETURN at
end of string. Use BACKSPACE or DELETE to edit
command. Press @ before entering RETURN,
BACKSPACE, DELETE or @ into command.

 -->CUSTOMIZ CUSTOM@^MASSIGN@^M <CR>

NAME    PASSWORD     A       B       C       D       TYPE     KIND
-------------------------------------------------------|-------
LAUREN             CSYSTEM LAUREN   U:      MO       HIDOS    FULL
    Log in command-->CUSTOMIZ CUSTOM^M ASSIGN^M

Is this correct? (Yes or No) --> Y<CR>
```

----------NOTE----------

The USER Table program will not allow you to assign a partition that does not exist in the ALLOC Table. It will also not allow partitions

with different operating systems to be assigned under one User Name.

Notice that when CP/M is chosen as an operating system, you are presented with three choices:

0 - Standard (HIDOS or CP/M-86)
1 - CP/M-86 only
2 - HIDOS (For sharing partitions)

Option 0 - Standard allows one User Name to access both HIDOS and CP/M-86 depending upon which type of workstation you log in to. For example, an 8-bit station, such as a 5080, would get the HIDOS operating system while a 5086, which has a 16-bit processor, would load CP/M-86. However, the DMS-816, which can run both 8-bit and 16-bit operating systems, would get CP/M-86 automatically with a User Name linked to Standard CP/M; the DMS-816 loads the most efficient system for its processor. In order for the DMS-816 to load HIDOS, you must use option 2.

Option 1 - CP/M-86 only, links a User Name to CP/M-86. The User Name cannot be used to log in to an 8-bit workstation.

Option 2 - HIDOS, forces a workstation to load HIDOS instead of CP/M-86. This is necessary for the DMS-816 in particular.

4.3.2 MODIFYING A USER TABLE ENTRY

An entry in the USER Table can be modified by using the **M** menu option. Enter the name of the user that you wish to change. The listing for that name will be displayed. If it is the entry that needs modification enter Y for 'Yes'.

Each option for the entry will be displayed in succession. To leave an option as it is, hit RETURN. To change an option, type in the new entry. The login command can be erased by entering a zero.

When all options have been covered, the entire entry will be redisplayed and you will be asked if it is correct. Enter Y for 'Yes' and N for 'No'.

Remember that the changes you have made will not take effect until you use the S menu option to save the USERS Table.

4.3.3 SAVING THE USERS TABLE

The S menu option saves the USERS Table to Partition Zero (the Control Area) on the Hard Disk, where it becomes effective.

4.3.4 OTHER USER TABLE MENU OPTIONS

The USER Table has several other menu options that will be used primarily by the network administrator.

L--LIST USER TABLE - lists out the entire USER Table. Use the PAUSE key to stop scrolling. Striking the ESC key will abort the listing and return you to the **Enter choice-->** prompt.

D--DELETE AN ENTRY - erases an entry from the USER Table. Does not have permanent effect until the Table is saved to Partition Zero.

Z--ZERO OUT THE USER TABLE - erases the entire USER Table. Does not have permanent effect until the Table is saved to Partition Zero.

Q--QUIT THE USER PROGRAM - leaves the USER Table program. If you have made changes and have not saved them, the program will remind you to do so. If you do not wish to save any changes you have made, enter Y. Entering N will return you to the **Enter choice-->** prompt so that you can save the Table.

----------NOTE----------
Entering **CTRL C** any time during the program will abort the program immediately. Any changes that you have made to the Table and have not saved will be lost.

4.3.5 AUTO-BOOTING WORKSTATIONS

By placing a workstation's unique PROM serial number in the User Table instead of a User Name, a workstation will automatically login to the network when it is turned on and/or Reset. See Section 4.6 for information on how to get the PROM Serial number from each type of workstation.

A workstation that is set up in this way can become an automated workstation that allows untrained personnel to begin working by simply turning on the power.

In order to log in to a workstation that has its PROM Serial Number in the USERS Table with a different name, the LOGIN command must be invoked AFTER the workstation has logged in under its Serial Number.

4.4 PASSWORDS FOR UTILITIES

Certain HiNet utilities may be protected by different levels of passwords. The necessity for protecting utilities from casual and potentially harmful access depends on your Network's security requirements. If it is necessary to have private and protected partitions, the ALLOC and USERS utilities must be password protected to prevent just any User from learning the partition and login passwords. Other sensitive utilities that can harm the network if used improperly, such as SYSLIB and EXPAND, can also be protected by a password.

The PW.COM program is used to set passwords for utilities. The program can be run only on the Master. It can be used on the Master either when the Network is running or when the Master is booted from a Floppy Disk.

The following utilities can be protected by a password:

ALLOC, EXPAND, SYSLIB, USERS, NETALLOC, MACHINE and PW.

In addition to these DMS utilities, there are eight openings reserved for future programs and nine openings for outside vendor applications software. The software company must write or alter its programs to look at the Password Table on the Hard Disk in order to take advantage of this protection feature.

There are four levels of passwords that can be applied to utilities: Manager, Operator, User and No Access. A password may have more than one level of access to utilities. You may add up to eight passwords, along with the two default ones in the Table, for a total of ten passwords.

----------NOTE----------
As of this release the USER access level for passwords is not recognized by any DMS utilities. This level was created for use by software companies. Do NOT assign a password to a utility at the USER level.

The general philosophy behind the password scheme works like this. Since the Network Administrator oversees the maintenance and security of the Network, he or she will have access to all utilities with the Manager Password. If there are Network Operators who are trained for certain tasks, such as using the MACHINE and NETALLOC programs, a separate Operator's Password is entered in the Password Table that is linked to those utilities. All

other utilities are set to No Access for that Password.

There are many combinations of passwords, access levels and utilities that can be implemented with PW. Alternatively, the Blank Password can be set for Manager Level access so that no passwords will be required for any utility. The final choice is up to you and your Network's requirements.

On a newly installed Master, all utilities are listed in the Password Table as having a blank password set at Manager's Level. A utility with a blank Manager's Password does not ask for any password at all when the program is invoked.

Enter **PW <CR>** to call up the Password program. The PW Menu will be displayed:

```
PASSWORD PROGRAM MAIN MENU

A - Add a new password.
D - Delete an existing password.
M - Modify an existing password.

L - List all passwords.
I - List all information about one password.

Z - Clear all passwords.
Q - Quit this program.
```

Before adding or modifying any of the current password settings, use the List menu

option to display the PASSWORD Table. The initial Table will probably look like this:

```
1. ALLOC      5. PW         9. reserved   13. reserved  17.          21.
2. EXPAND     6. SYSLIB    10. reserved   14. reserved  18.          22.
3. MACHINE    7. USERS     11. reserved   15. reserved  19.          23.
4. NETALLOC   8. reserved  12. reserved   16.           20.          24.

          1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
PASSWORD--------------------------------------------------------------------------
          M  M  M  M  M  M  M  M  M  M  M  M  M  M  M  M  M  M  M  M  M  M  M  M
DMS       M  M  M  M  M  M  M  M  M  M  M  M  M  M  M  M  M  M  M  M  M  M  M  M

          M = MANAGER  O = OPERATOR  U = USER  N = NO ACCESS
```

As you can see, there are two entries in the default Password Table: Blank and DMS. Both passwords are set to Manager Level for all 24 entries. Remember that a Manager level Blank password signals the program not to ask for any password at all.

A Blank password set to Operator Level asks for a password that requires only a RETURN to gain access to the program. However, the access given for the Operator's Password may not be the same as that for Manager's Level. The program must be able to differentiate between the two levels and give only what is required. If the program does not know the difference, full access will be given. DMS utilities are currently set in this way:

ALLOC, USERS, PW, EXPAND and SYSUP all require a Manager level password for access,

NETALLOC, MACHINE and SYSLIB can be accessed with either an Operator's or Manager's Password.

There is always one Password that is set to Manager Level for all utilities. In the default Table it is called DMS. The name of the password can be changed but not the access level--it must always be Manager. This is to prevent you from accidentally locking yourself out of the PW program by requiring a Manager password but not including any Manager Passwords in the Table.

If you have decided to implement password security for utilities, the first step you should take is to set the blank password to No Access for all utilities. Use the M (Modify) menu option and enter a RETURN after the question "Enter the password you wish to modify". This accesses the Blank Password in the Table. You will see the ACCESS MAP for the blank password. It will look something like this:

```
                        ACCESS MAP
For password:

Pgm  Pgm Name  Level    Pgm  Pgm Name  Level   Pgm  Pgm Name  Level
---  --------  -----    ---  --------  -----   ---  --------  -----
 1   ALLOC       M       9   reserved  NONE    17   reserved  NONE
 2   EXPAND      M      10   reserved  NONE    18   reserved  NONE
 3   MACHINE     M      11   reserved  NONE    20   reserved  NONE
 4   NETALLOC    M      12   reserved  NONE    21   reserved  NONE
 5   PW          M      13   reserved  NONE    22   reserved  NONE
 6   SYSLIB      M      14   reserved  NONE    23   reserved  NONE
 7   USERS       M      15   reserved  NONE    24   reserved  NONE
 8   reserved  NONE     16   reserved  NONE    25   reserved  NONE

Enter the Access Level for the utilities you wish to change
or press RETURN to verify the Access Map.
(MGR, OPR, USR, NONE) ---> NONE <CR>

Enter the numbers of the utilities that you wish to
change to NO ACCESS. If you want to change all utilities to No
Access, type ALL. Press RETURN for no change.

--->ALL <CR>
```

The ALL option will change the Blank password to No Access for all of the utilities. At this point, every utility that can be password protected will demand the Manager Password "DMS" before you can access the program.

You should now change the main Manager password from DMS to a six character word (letters, numbers, and ! @ # $ % ^ & * ( ) _ +

~ - = ` / ? \ | { } [ ] ; :). Use the M option again to modify the DMS password. The program will ask you for a new password name. Once you have entered your choice, the access map is displayed for confirmation. If the entry is correct, enter Y for Yes; the new password will be recorded in the Password Table. Note that there is no Save command; as soon as you confirm your entry the change is made on the Hard Disk.

Now it is up to you whether or not to include other passwords for Network Users. Do you want certain people to be able to access NETALLOC, MACHINE or other utilities? If so, use the A (ADD) menu option to create more passwords that are linked to specific utilities at the Operator Level.

For each new password, enter the No Access level first (- for No Access) and then use the ALL command to fill in that level for all utilities. (This is quicker than entering all of the numbers individually.) Now enter O for Operator level; next, enter the numbers for each utility that you want to be accessed with the Operator password. Here is an example:

```
Menu choice ---> M <CR>

Enter the password you wish to modify ---> DMS <CR>

Enter a new password or RETURN to keep the old
one ---> 1984 <CR>

The Manager Password is permanently set to
manager level access for all utilities; only the
password can be changed.

                    ACCESS MAP
For password: DMS

Pgm  Pgm Name  Level    Pgm  Pgm Name  Level   Pgm  Pgm Name  Level
---  --------  -----    ---  --------  -----   ---  --------  -----
 1   ALLOC       M       9   reserved  NONE    17   reserved  NONE
 2   EXPAND      M      10   reserved  NONE    18   reserved  NONE
 3   MACHINE     M      11   reserved  NONE    20   reserved  NONE
 4   NETALLOC    M      12   reserved  NONE    21   reserved  NONE
 5   PW          M      13   reserved  NONE    22   reserved  NONE
 6   SYSLIB      M      14   reserved  NONE    23   reserved  NONE
 7   USERS       M      15   reserved  NONE    24   reserved  NONE
 8   reserved  NONE     16   reserved  NONE    25   reserved  NONE

Is this as you wish it to be? --->Y <CR>
```

In the above Password Table the DMS password was changed to 1984. This is the password that will access every utility. You may want another password for an Operator to handle MACHINE and NETALLOC. Again, this is up to you.

Use the D menu option to delete individual entries in the Password Table. The Z option will zero out--clear--the entire Table except for the main Manager password and the Blank password. The Blank password is changed back to Manager level for all utilities when the Table is cleared.

When your Network is updated with the INSTALL program, you will be asked to enter the Manager Level Password at the beginning of the install procedure if you have utilities protected by passwords. INSTALL uses the PW AUTO command to temporarily disable all passwords. This feature prevents the PW program from requesting passwords every time a utility, like SYSLIB, is invoked. At the end of the update procedure the PW MANUAL command is entered by INSTALL to enable the passwords. You can use these commands at the Master whenever you are doing any prolonged procedure that may involve several programs and constant password requests. Enter:

PW AUTO or **PW DISABLE** to turn off password-protection for utilities, and

PW MANUAL or **PW ENABLE** to turn password-protection back on.

You must know the Manager's password to use these commands.

4.5 MAINTAINING THE MACHINE TABLE

The MACHINE Table is an integral part of the new Separated Boot software for the HiNet Network. Every workstation in the Network is listed in this table. When a workstation asks the Master for an operating system to boot, the Master looks at the MACHINE Table to determine exactly what the workstation requires to join the Network.

Any workstation can join the Network without having its PROM number in the MACHINE Table. However, only a default BIOS is available for unlisted workstations. That means that the workstations cannot use local Floppy or Hard Disk drives. The printer assignment is the local Serial Printer Port instead of SPOOL or any other option. To select a different login Printer assignment and use local storage, a workstation must be listed in the MACHINE Table.

Workstations based on the 8-bit Z-80 CPU, (the DMS-5080, -3/B, -3/4, -816, 3/F and 3/501) can access the MACHINE program directly. This lets a User log in to the Network and add the PROM Serial number to the MACHINE Table. Use the ADD option to add the workstation type. MACHINE automatically reads the PROM Number into the Table. The printer and console selections can then be chosen.

As an alternative to each person entering his or her own PROM Number, the Network Administrator can collect each station's number and enter them all in the Table at the same time. This way one person can control the printer

allocations for all workstations. The following steps outline this procedure.

The first step in building the MACHINE Table is to determine the CPU serial number for each workstation in the Network.

To determine the CPU serial numbers for Digital Microsystem's workstations, use the following procedures:

DMS-5080, -3/F, -501, -3/10x, AND PC-ADAPTER CARD

Plug each Z-80 based workstation into an electrical outlet (read the introduction of the manual that came with the workstation if you are not familiar with it), check the voltage setting for your area and turn on the power. For most DMS 8-bit workstations you can access the PROM Monitor by holding in the Interrupt button and pressing the Reset button once. A colon should appear on the screen. Enter, after the colon, the sequence:

:D3FE<CR>

The screen will display:

03FE XX XX
0400 YY YY

followed by several lines of hex numbers. The four numbers immediately after the 03FE (represented here by XX XX) and the four after 0400 (YY YY) constitute the CPU Serial Number. All eight numbers should be entered in the order XXXXYYYY.

DMS-5086, DMS-86

----------NOTE----------
All 16-bit workstations must have new PROMS that are configured for separated boot. Older PROMS will not boot on the new network. (A PROM is a Programmable Read Only Memory chip located on the CPU board inside the workstation.) The documentation accompanying the new PROMs will indicate how to replace the old ones.)

For the 16-bit workstations, (the DMS-5086 and the DMS-86), the CPU serial number can be found by accessing the PROM Monitor (Interrupt and Reset). The screen will display the line:

Station Serial Number - xxxxxxxx Product type - xx

Enter the eight-digit serial number into the MACHINE Table exactly as it appears.

DMS-816

To reset a DMS-816 workstation, press the CTRL, ALT and DEL keys down at the same time for a few seconds. The PROM number will be displayed near the top of the screen like this:

Station Serial number - XXXXXXXX Product Type - 07

----------NOTE----------
If you find that more than one workstation has the same number for a PROM serial number, there will be a problem for these machines on the network. This should not happen. If it does,

contact your dealer or Digital Microsystems for replacement PROMs.

Each workstation must also have default console and printer port assignments. The console assignment is almost always the keyboard and CRT screen. When entering this in the MACHINE Table, a YES after the question: "Will you accept the default console?" will select this assignment.

The default printer assignment can be SPOOL printer (the network's shared printer), Serial Port 2 (a local serial printer), Serial PORT 3, Serial Port 0 (local printer on the DMS-1280), or Parallel Port 2 (Centronics parallel port on DMS-3/F, DMS-816 and DMS-3). There is also an option for a CUSTOM printer driver. Enter your choice of default printer assignment in the MACHINE Table for each workstation.

MACHINE can be run when the Network is up or when the Master is booted from a Floppy Disk. The MACHINE Table can also be accessed from a Network workstation. However, you will only be able to modify the entry for the workstation you are using. The MACHINE utility can be accessed by only one User at a time. The program will tell you if someone else is using MACHINE and ask you to try again later.

The MACHINE utility can be password protected. However, when installing the software for the first time there will be no password. When the MACHINE program is invoked, it will present a menu of options:

```
Choose one of the following:

A - ADD      Add an entry to the Machine Table.
D - DELETE   Delete an entry from the Machine Table.
L - LIST     Display the Machine Table.
M - MODIFY   Modify an entry in the Machine Table
Q - QUIT     Leave this program.
```

To ADD a workstation to the Table use the A option. The program will list out all of the available DMS workstations and their codes. (Press the ESC key to abort the listing.) The program will then ask the following questions:

```
***A listing of all possible DMS workstations.***

Which model code of workstation would you
like to add to the Machine Table? -->

Enter the Serial Number of the new workstation-->

Enter Serial Number again for verification:

The default console for the _____ is _______ .
Will you accept the default console? (Y/N) -->
```

The program will present you with a list of all of the possible workstations that can be on the network. After each name is an abbreviation. Enter the appropriate abbreviation in response

to the question "Which model code of machine would you like to add to the list?".

Next, enter the PROM Serial Number for the workstation. Be sure to enter all eight digits even if they are zeros or letters. (The serial number is in Hexadecimal notation.) If you are running MACHINE from a workstation, the PROM Serial Number will be entered automatically.

MACHINE TABLE DEFAULT CONSOLE OPTIONS

The third question asks you to select the default console assignment. Type Y to accept the default assignment--the keyboard and CRT. Entering N for 'No' will display a list of possible alternatives. Normally, the console is assigned to the port that connects to the keyboard and CRT screen. Under certain circumstances the following console assignments are available:

SERIAL PORT 0 (TTY:) -- the default for workstations that need a CRT Terminal connected to it (e.g., DMS-86, DMS-3/B, DMS-3/10x).

SERIAL PORT 2 (CRT:) -- a possible choice if you need to replace the video monitor of a workstation with another type or a temporary replacement.

PARALLEL PORT 1 (BAT:) -- the default for the DMS-5000 series, the DMS-3/F and DMS-3/501.

SERIAL PORT 3 (UC1:) -- an option for special applications; not normally recommended.

BUILT-IN MONITOR -- the standard selection for the DMS-816.

MACHINE TABLE DEFAULT PRINTER CHOICES

After you have selected a console assignment, the MACHINE program will display a menu of possible printer assignments. Not all of these options will be presented for every type of workstation.

```
Choose a printer type:

1 - Standard (Serial Port 2) (CRT:)
2 - SPOOLER
3 - Serial Port 0 (TTY:)
4 - Parallel Port 1 (LPT:)
5 - Parallel Port 2
6 - CUSTOM
7 - Serial Port 3

Enter your choice -->
```

The printer choices are:

Standard (Serial Port 2) -- for a locally connected serial printer.

SPOOLER -- the HiNet Spool Printer connected to the HiNet Master's serial or parallel port. Print jobs are 'spooled' to the Master's Hard Disk PRTSPOOL partition.

Serial Port 0 (TTY:) -- normally used as the output port for a CRT terminal.

Parallel Port 1 (LPT:) -- for a direct-connect parallel printer with Centronics protocols.

CUSTOM -- for custom-written printer software that has been incorporated in the HiNet BIOS.

Serial Port 3 -- usually the MODEM port, but jumper block can be configured for RS-232.

DEFAULT LOGIN FOR 8-BIT WORKSTATIONS

8-bit Z-80 based workstations have the additional ability to log in to the Network without having their PROM serial number previously entered in the MACHINE Table. In other words, a new addition to the Network can log in and access the MACHINE Table to add its own serial number. The PROM number must be entered in the MACHINE Table in order to change the default printer and console assignments. When the MACHINE Menu is displayed on the workstation's screen, use the ADD option to enter the new workstation's PROM serial number. The program will ask for the name of the workstation. Enter the workstation type and MACHINE will automatically enter the PROM Serial Number. The program will then ask for the default console and printer choices.

4.5.1 OTHER MACHINE TABLE MENU OPTIONS

The MACHINE program also lets you change an entry, list the current table and delete an entry in the table.

Use the M option to modify any entry in the Machine Table. Most commonly this will mean changing the default printer assignment.

DELETE -- used to erase an entry in the Machine Table. Delete an entry only when a workstation's PROM has been changed and the old number no longer exists on the Network.

LIST -- used to view the current listing of the MACHINE Table.

QUIT -- used to exit the MACHINE program and return to CP/M. There is no SAVE command. As each entry is completed it is added directly to the table in Partition Zero on the Hard Disk.

5.0 DATA STORAGE

This section of the manual will explain how to use the local storage capabilities of the Floppy Disk Drives on the HiNet Masters. Depending on the type of Master on your Network, the disk drives will handle either 8" or 5.25" Floppy Disks.

Floppy Disks for the DMS-3/4 series Masters can be either single (243K)or double (486K) density 8" disks. The DMS-3/501 uses 5.25-inch double-sided, double-density Diskettes that store up to 640 Kbytes of data. Sections 5.1 - 5.3 will explain the procedures for handling, formatting and copying Floppy Disks. These sections are divided into two sub-sections when the utilities differ with the Floppy Disk size--8" and 5.25".

5.1 FLOPPY DISK STORAGE

The Floppy Diskette Drive reads and writes data on Floppy Disks. New Floppy Disks must first be formatted with the DMS utilities FORMAT (for 8" Disks) or FORMAT5 (for 5.25" Diskettes). When you receive software from Digital Microsystems it is written onto the Distribution Floppy Disks in a way that is compatible with the Master's Floppy Disk Drive.

5.1.1 HANDLING FLOPPY DISKS

Floppy Diskettes store information on a thin flexible disk that is enclosed in a special protective square sleeve. Never try to take the magnetic Disk out of its sleeve. The Disk and sleeve come in an envelope that help keep out dust.

There are openings in the sleeve that allow the Floppy Drive's heads to read from and write onto the Disk.

Here are some basic rules to follow when using Floppy Diskettes.

- Never touch the Disk itself. A fingerprint on the Disk's surface can wipe out data.
- Don't bend the Diskette or place heavy objects on top of it.
- Always keep the Floppy Diskette in its paper envelope when you are not using it.
- Keep the Disk away from heat and electrical equipment that generate magnetic fields.
- Always make copies of any original software Disks and keep the originals in a safe, protected place.
- When labeling Diskettes, use a felt-tip pen to write on the adhesive labels supplied with the Diskettes.

5.1.2 LOADING FLOPPY DISKS

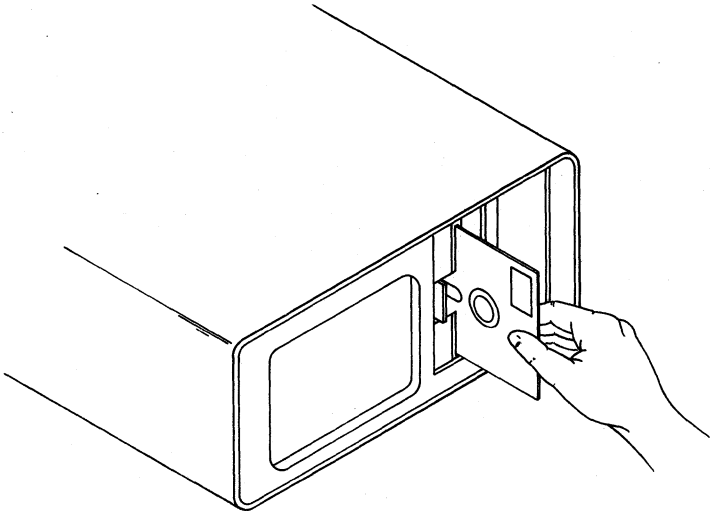
Remove the Floppy Disk from its envelope. Hold the Floppy Disk in your right hand so that your thumb is placed over the manufacturer's label. Insert the Floppy Disk into the Drive while holding it in this manner.

DMS-3/4

On the 8" Floppy Drives, the label must be facing up. Gently slide the Disk all of the way into the Drive. You will feel a slight resistance as the Disk reaches the eject mechanism at the back of the Drive. A little more pressure will push the spring-loaded eject mechanism back until it locks in place. The Disk should now be completely inside of the Drive. Push down on the Disk Drive door to close it.

DMS-3/501

The 5.25-inch Diskette Drives are mounted vertically on the 3/501. On the DMS-3/501 the manufacturer's label on the Diskette must be facing towards the CRT screen. Refer to diagram 5-1 on the following page. The Floppy Diskette must be inserted correctly into the Drive or it will not work. Close the Disk Drive door after the Floppy Disk is inserted into the drive.



INSERTING FLOPPY DISKETTE

When a command is given that requires information to be read from or written to the Floppy Diskette, the Disk Drive light will flash on and the Drive will make a slight buzzing sound. Whenever the Drive's light is on, it means that the read/write heads are either reading information from the Disk or writing new data onto the Disk. The buzzing sound indicates that the read/write heads are being moved to another track on the Disk. Never remove the Floppy Diskette from the Drive when the Drive light is on or the Drive is making a buzzing sound.

Do not leave a Floppy Disk in the Drive when you turn off the power or insert a Disk before turning the power on. A power surge could cause erroneous data to be written onto the Disk, or scramble data already on the Disk.

5.1.3 USING FLOPPY DISKS

Normally, all of the programs that you need to work with Floppy Disks are stored on the Hard Disk's SYSTEM partition. These programs can be accessed from the Hard Disk storage and applied to the Floppy Disk Drive. Some programs must be stored on a Floppy Disk in order for them to function (e.g., ALLOC, 5HDHELP, 5HDBACK, HARDBACK, HARDHELP, CARTBACK).

Data can be transferred to and from a Floppy Disk by assigning one of the CP/M logical drives, A, B, C, or D to the Floppy Disk Drive D0, D1, S0, S1, M0, M1. These are designated as M0 (for the 3/F's left drive and the single disk drive on the DMS-3/501) and M1 (for the right drive on the 3/F). 8-inch Floppy Disk Drives are designated as D0 and D1 for left and right, top and bottom double density, S0 and S1 for single density, as the following chart shows:

Floppy Disk Drive Identifiers

DMS-3/F	Left Drive = M0	Right Drive = M1
DMS-3/501	Left Drive = M0	
DMS-3	Left Drive = D1,S1	Right Drive = D0,S0
DMS-4	Top = D0,S0	Bottom = D1,S1

See Section 2.13.3 for more information on using ASSIGN to link Floppy Disk Drives to the Network or Hard Disk partitions.

Once you have assigned the Floppy Disk Drive to a CP/M drive you can use the CP/M PIP program to copy files from a Floppy Diskette to the Hard Disk or from the Hard Disk to a Floppy Diskette. For example, assign the Floppy Diskette Drive to D and the Hard Disk partition you want the files PIPped onto to Drive A, B, or C. PIP all the files on the Floppy Diskette to a partition (in this example, it is assigned to Drive A) with the command:

A>PIP a:=d:*.*[vo <CR>

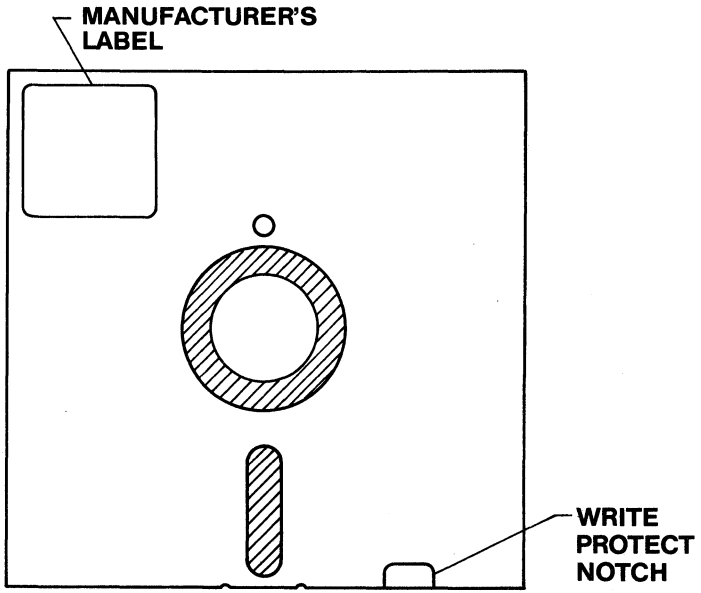
You can PIP individual files from the Floppy Diskette to any partition, or files from any partition to the Floppy Diskette. Use the SD utility to check the space available on the Floppy Disk before transferring files with a PIP *.* command. See Section 3.6 for more about using PIP.

The FILECOPY program is used to transfer MS-DOS utilities from the DMS INSTALL # 3 diskette to a Hard Disk partition.

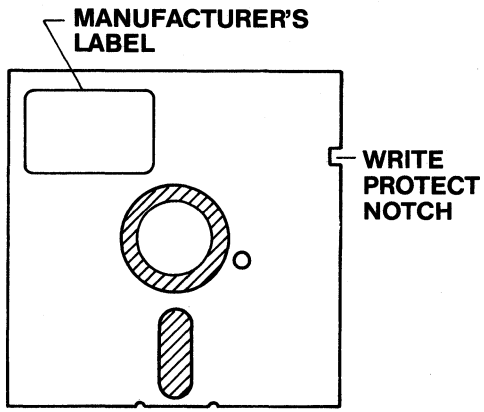
The TRANSFER utility copies files from a PC-DOS format 5.25" diskette to a Hard Disk partition. This utility can be used only on the DMS-3/501 or the DMS-3/F. (See Section 5.5.)

5.1.4 WRITE PROTECT NOTCH

Floppy Diskettes have a notch that makes the Diskette Read Only (Write Protected). This protects Diskettes from accidentally being written to, erased or formatted.



8" FLOPPY DISK



5¼" FLOPPY DISKETTE

DIAGRAM 7-1

On 5.25-inch Floppy Diskettes, the notch is located near the upper right corner of the Diskette when the manufacturer's label is face up (towards you) and in the upper-left corner. When this notch is uncovered, the Diskette can be written to by the read/write heads. If the notch is covered by a tab--such as the adhesive tabs that come with the Disks--then data cannot be written on the Disk nor can it be erased with the ERA command; the disk cannot be formatted with FORMAT5.

The **8-inch** Floppy Disks used on the DMS-3/4 series have a Write Protect notch located near the bottom right corner of the Disk when the manufacturer's label is face up and in the upper-left corner. When this notch is covered by a tab then the Disk can be written to by the Disk Drive. If the notch is uncovered then the Disk is Write-Protected.

5.1.5 STAT--PROTECTING FILES AND DISKS

STAT is a CP/M command that lets you set files or entire Diskettes to either Read/Only or Read/Write. This gives you added protection against loss of data by erasure or accidental overwrites.

Normally a file is designated as R/W. This means you can both read the file and write to it (change its contents). To make a file R/O (Read/Only) enter the following command:

A>**STAT FILENAME $R/O <CR>**

Be sure to enter the $ (dollar sign) before the status.

To verify that the file was changed to R/O status, enter STAT FILENAME <CR>. The filename will be listed along with its R/W status. You can change the status back to Read/Write by entering STAT FILENAME $R/W <CR>.

You can do the same thing with an entire Floppy Diskette (or partition). Instead of entering a particular filename, enter ***.*** to represent every file on the Diskette. (E.g., **STAT *.* $R/O <CR>** will change every file on your currently logged disk or partition to Read/Only.)

STAT has several other useful features that are not covered in this manual. Refer to a book on CP/M for details.

5.2 FORMATTING A FLOPPY DISKETTE

All new Diskettes must be formatted before data can be recorded on them. Formatting a Diskette prepares it to receive data in a way that is special to the Diskette Drive. The program supplied by DMS that formats 5.25-inch (double-sided, double-density) Diskettes is called FORMAT5. 8-inch Floppy Disks require the FORMAT utility. Diskettes that are not formatted will give you the message *****DENS error** when you try to read from or write to them. (See Section 6 for a listing of other possible error messages.)

----------WARNING----------
The FORMAT utilities will ERASE any information that is recorded on a Diskette. You should only format new Diskettes or Diskettes that you wish to erase completely.

5.2.1 FORMATTING FLOPPY DISKETTES

The FORMAT utilities can be used on DMS Masters only when they are booted from a Floppy Disk that has the HIDOS (CP/M) operating system and FORMAT program on it. This means that you cannot format diskettes while the Network is running. Plan ahead and format a box of diskettes during a time when the network is down. If the DMS-3/4 is set up as a stand-alone single user system without HiNet, the FORMAT program can be run at any time.

Once you have booted the Master from a Diskette that has the FORMAT5 program on it, call up the program by entering FORMAT <CR> (or FORMAT5) after the A> prompt. Insert a new Floppy Diskette into the Drive in place of the program diskette.

Here are the screen messages for a complete run of the FORMAT program.

First, here is FORMAT5 for the DMS-3/501:

```
A>FORMAT5 <CR>

5 inch Floppy Diskette format program.

Use ESC to restart, Control C to abort.

ENTER DISK NUMBER (0-7) :0

TYPE RETURN TO START    <CR>

FORMAT COMPLETED

ENTER DISK NUMBER (0-7) :CTRL C

A>
```

Since there is only one Floppy Diskette Drive on the DMS-3/501, the Disk number that you enter is always 0. After the statement, FORMAT COMPLETED, you can remove the Floppy Diskette from the Drive and insert another Diskette that you want to be formatted. Enter **0** again after ENTER DISK NUMBER, and the new Disk will be formatted. When you are done formatting, place the program diskette in the drive and enter a **CTRL C**. The CP/M prompt will return.

Now the program dialogue for the 8" Floppy Disk Version, FORMAT:

```
A>FORMAT <CR>

8 inch Floppy Disk format program. version x.x

Use ESC to restart, Control C to abort.

ENTER DISK NUMBER (0-7) :0

Single or Double density (S or D): D

TYPE RETURN TO START    <cr>

FORMAT COMPLETED

ENTER DISK NUMBER (0-7) :CTRL C

A>
```

Disk identifier numbers vary with the number of drives on the 8" Masters. However, no matter how many drives your DMS-3/4 is equipped with, it can only format one Floppy Disk at a time. Enter 0 to format a single-sided Disk. If you have a double-sided Disk Drive, then you will have to format each side of a double-sided Disk separately. Enter 0 the first time to format the 'top' side and 4 the second time to format the 'bottom' side.

5.3 SYSGEN--COPYING THE CP/M SYSTEM TRACKS

SYSGEN copies the CP/M operating system from one Floppy Diskette to another. CP/M reserves the first three tracks on 5.25-inch Diskettes (the first two tracks on 8-inch Disks) for storing the operating system.

----------NOTE----------
FDHDCOPY and MINICOPY will also copy the system tracks onto a 5.25-inch diskette if you specify either the S or the A menu option.

Normally, when you are using a HiNet Master you will not need the operating system on Floppy Diskettes, since the operating system is loaded from the Hard Disk. However, some of the utilities you will use to control and modify the Hard Disk require that the Master be booted from a Floppy Diskette, not from the Hard Disk. Therefore, you will have to SYSGEN CP/M onto a diskette in order to use ALLOC, FORMAT, FORMAT5, HARDBACK, 5HDBACK, CARTBACK, WRUN0 and READ0.

----------NOTE----------
Refer to the contract from Digital Research that came with your CP/M Distribution Diskette regarding the number of copies you can make of the CP/M operating system.

Digital Microsystems' version of SYSGEN will let you record on the Diskette, along with the system information, commands that will be executed whenever you do a cold boot--i.e., when you RESET the computer. These commands can

include ESC and CTRL codes and can be up to 120 characters in length. However, only one RETURN can be included in the command line.

See Section 4 for information on the USERS' login command.

USING SYSGEN

To copy the CP/M system tracks from one Floppy Diskette to another, insert a Floppy Diskette that has the CP/M operating system on it into the Floppy Diskette Drive. This should have the Drive assignment D. Type **SYSGEN** **<CR>**. The screen will show:

```
A>SYSGEN
SYSGEN for DMS 5" & 8" Floppy Diskettes, Version

Source Disk name: (return to reboot) D
SOURCE ON D, type return to continue. <CR>

CP/M lets you execute a CP/M command on cold boot.
Your current command is: No cold boot command.

Hit RETURN for no change to this command
    C       to enter a new command
    ESC     to eliminate this command
    CTRL C to Exit the program

(The old command is erased when you
  enter the new one.)

Enter a RET, C, ESC, or CTRL C:
```

The first half of the SYSGEN program asks you for the drive letter of the source disk (the disk that the CP/M tracks are on now). When it has verified the drive letter, press RETURN. The program will display the current cold-boot command that is on the source disk; in this example, there is no command.

The menu that follows gives you four options for manipulating the cold-boot command.

Enter a RETURN only to leave the current command as it is.

Enter a C to change the command (or enter a new one).

Enter ESC to erase the current command.

Enter CTRL C to abort the SYSGEN program.

If you enter RETURN, the program will request the destination drive letter. On the DMS-3/501 you must first replace the original source diskette with a new one and then enter the same letter as before (D). The operating system tracks will be copied onto the new diskette (provided it is formatted with FORMAT5).

To enter a new cold-boot command, select the C option. If you enter a RETURN after the C option, the current command will be erased. The program lets you type in whatever CP/M command you desire. (You could, for example, run a CUSTOMIZ program that would set up default values for your workstation.) After entering the command string hit RETURN. You will be asked for

the destination drive. Replace the source diskette with a new one; enter D followed by a RETURN.

Here is an example of the screen dialogue when you are entering a new cold-boot command:

```
Enter a RETURN, C, ESC or CTRL C C

Note: Entering only RETURN will eliminate the
current command.

Enter new command (use RETURN to end, DEL or BS
to erase.

>SETBAUD 2 1200 <CR>

Destination Disk name: D
DESTINATION ON D, type return to continue. <CR>

Destination Drive name:
(type return to reboot) <CR>
Exit SYSGEN
A>
```

For this example, a SETBAUD command was entered; whenever the computer cold boots from this Disk, printer port 2 will have a BAUD rate of 1200 (bits per second).

---NOTE---
Unlike the login command in the USERS program, do NOT enter an @ sign for a RETURN in the SYSGEN cold boot command. This means that you can only enter one cold boot command string per Floppy Disk.

The program asks you to confirm the designated destination Drive and, after you hit RETURN (for Yes), copies the system tracks onto the new Disk. When the system track copy is complete, you have the option of inserting another Diskette that you want the CP/M system copied onto, or returning to the CP/M prompt.

5.4 COPYING FLOPPY DISKS

Once new Floppy Disks are formatted, you can make copies of any original Diskettes that you have. The DMS-3/501 Floppy Diskette copying program is called MINICOPY. The 8" version is called FDHDCOPY for the DMS-3/4 Network.

In order for these copying utilities to function, there must be a partition called **SCRATCH** on the Hard Disk. MINICOPY uses this partition to store the contents of the Floppy Disk that is being copied. First, the original Disk is completely copied onto the SCRATCH partition. Next, a second formatted Disk is inserted in the Disk Drive. The program will then copy the contents of the SCRATCH partition onto the new Floppy Disk.

The SCRATCH partition must have at least the same amount of storage capacity as the Floppy Diskette you will be copying. For a 5.25-inch double-sided, double-density Floppy Diskette, the partition will have to be 1 Mbyte. For copying 8" disks the partition can be 512 Kbytes.

----------NOTE----------
CP/M cannot read the SCRATCH partition once it has been used by FDHDCOPY or MINICOPY. If the SCRATCH partition is to be renamed and used for different purposes, it must first be cleared. To do this, copy a newly formatted Floppy Diskette into it with the appropriate copying utility. You can then rename and use the SCRATCH partition for other purposes.

COPYING DISKS ON HINET

If the program copying utilities are used in a network environment, a special user name can be set up to access the copying program. This will allow you to log in at a workstation under that user name--such as COPY--and have the correct assignments for the MINICOPY program.

To set up a User Name for MINICOPY, invoke the USERS utility as explained in Section 4 and follow this format:

User Name: COPY	(your choice)
Password:	(your choice; to limit access if desired)

Default assignments: A:SYSTEM (MINICOPY stored)
B:SCRATCH
C:U: (unassigned)
D:M0 or D0 (Floppy Diskette Drive 0)

Login Command: ASSIGN W B SCRATCH@

Use the Login command to ASSIGN write ownership to the Scratch partition before writing to it.

USING MINICOPY AND FDHDCOPY

Without a special User Name assign one of the Drives to the SCRATCH partition, one to the SYSTEM partition (where the copying utility is stored) and one to the Floppy Diskette Drive.

Call up the copying program from the System partition by entering, after the A> prompt, **MINICOPY <CR>** or **FDHDCOPY <CR>**.

The program will request information that you must enter:

- First enter what drive the Floppy Diskette is assigned to. Normally the D drive is used as the Disk Drive. Your assignments may be different.

- Next the program requests which drive the SCRATCH partition is assigned to. In this example it is assigned to drive B.

The program will display the number of tracks and total number of bytes on the Floppy

Disk and in the SCRATCH partition. You should double-check these numbers to make sure that your SCRATCH partition is larger than the Floppy Diskette.

o The program then asks you if you want to copy only the CP/M SYSTEM tracks (S), only the DATA tracks (D) or ALL (A) of the tracks on the Diskette.

Here are the screen messages for the first half of the program:

```
C>MINICOPY

Which drive is the floppy disk to be copied (A,B,C,D)? D
Which drive is the Hard Disk partition? (A,B,C,D,)? B

Drive D: 160 tracks of 4096  bytes each = 640  Kbytes total.
Drive B:  64 tracks of 16384 bytes each = 1024 Kbytes total.

Please enter  S to copy System tracks
              D to copy Data tracks
              A to copy All tracks   A

xxx bytes read from floppy.
```

The program copies each track of the Floppy Diskette onto the SCRATCH partition. As each block of 20 Kbytes is copied from the Diskette, the total amount copied is displayed on the screen. The process of copying from the Diskette to the Hard Disk takes about two minutes.

When the entire disk is copied to the SCRATCH partition, the program will tell you to remove the original Diskette from the Disk Drive and insert a formatted Diskette in its place. When the Floppy Diskette is ready, press RETURN.

The program will ask if you wish to continue with the copying process. If you do, hit Y. The program will start copying from the SCRATCH partition onto the Floppy Diskette. If you do not wish to continue--e.g., you discovered that you copied the wrong Diskette--hit N (No). The program will ask if you wish to abort and return to the beginning of the program (Y or N). Here are the appropriate screen messages:

```
Remove Diskette you read from and insert a blank one.
Press RETURN when you have done this.  <CR>

Do you want to continue the copy? (Y or N) Y

Insert the diskette you want to write onto.
Press Return when you have done this.

xxx Kbytes copied from Hard Disk.

Do you want to repeat this copy? (Y or N) N

**JOB COMPLETED**
C>
```

The process of copying from the Hard Disk to the Floppy Diskette takes about six minutes. When the program finishes copying from the Hard

Disk partition to the Floppy Diskette, it will ask if you want to repeat the copy. If you wish to make a second copy, type **Y.** The program will ask you to insert another blank Diskette and then hit RETURN when you have done so.

----------NOTE----------
This process may seem slow if you are used to another manufacturer's system. However, most other floppy diskette drives can only put a half (320K) or a quarter (160K) as much information on a single floppy diskette as can Digital Microsystem's 5.25-inch Floppy Diskettes which hold a full 640 Kbytes of data. This is why the copying process on DMS equipment takes longer for each diskette, but not necessarily for the same total amount of data.

If you do not want another copy enter **N.** The program will ask if you want to make copies of a different Diskette. If you do, answer Y and the program will start over again. If you answer N the program will exit to CP/M. A CTRL C will abort the copying program at any time.

----------NOTE----------
When you enter the Hard Disk partition to be copied to, the program will display an error message if you mistakenly enter a Drive letter that is not assigned to SCRATCH.

ERROR- Drive __ must be assigned to SCRATCH

----------WARNING----------
MINICOPY and FDHDCOPY will overwrite anything already on a diskette. Therefore you should copy files only onto a formatted blank diskette or a diskette that you no longer need.

DMS-3/4

The FDHDCOPY utility's setup is exactly the same as MINICOPY but the program's screen dialogue is different.

```
Source Disk (0-7) :0

Destination disk: (A,B,C,D) B

Density? (S/D): D

COPY:  System tracks, Data tracks, or
       All tracks? (S,D or A)? A

Hit RETURN when ready. <CR>
Track xx read.

Remove Disk you read from.
Insert a formatted Disk.
Then hit RETURN to continue. <CR>

Do you want to continue copy? (Y or N) Y
Track xx read

Do you want to repeat this copy? (Y or N)  N
Source Disk (0-7): CTRL C
```

As you can see from FDHDCOPY's screen dialogue, the program does the same functions as MINICOPY but with slightly different wording. FDHDCOPY asks for the Disk Drive Number (0-7) instead of the logical drive (A, B, C, D) that the Disk Drive is assigned to. It then asks for the logical drive that the SCRATCH partition is assigned to. Next it asks the density of the Floppy Disk you will be copying from. Finally you must enter what tracks you want copied: System tracks, Data tracks or All (both System and Data). To exit the program after a successful copy, enter a CTRL C to warm boot.

COPYING CP/M SYSTEM TRACKS

The copying utilities give you the option of copying only the CP/M system tracks from one Disk to another. You can use this utility instead of SYSGEN when preparing bootable Disks. When the program asks which tracks to copy: S (System), D (Data) or A (All), enter S. The CP/M system tracks will be copied to the SCRATCH partition. Enter S when the second half of the program asks which tracks to copy back to another Floppy Disk.

5.5 COPYING PC-DOS FORMAT DISKETTES

MS-DOS (PC-DOS) software that is not purchased from Digital Microsystems and that is written for IBM-PC compatible microcomputers can be transferred to the Network's Hard Disk with the TRANSFER program.

The TRANSFER program copies every track from a PC-DOS or MS-DOS formatted diskette to the designated Hard Disk Partition. It will overwrite anything else that is in the partition. Therefore, you may want to have a special 512K MS-DOS partition (e.g., MSCRATCH) that can be used solely for this purpose. When the diskette is copied to the partition, use the MS-DOS COPY utility to recopy the files to another partition (such as MSYSTEM).

The TRANSFER program makes an internal assignment to the MS-DOS partition that is specified in the command line. The Floppy Disk Drive does not have to be assigned to a local drive; TRANSFER assumes that the diskette is in Drive 0 (zero) on the DMS-3/F or DMS-3/501.

Follow these steps to copy PC-DOS format software to a Network partition. To begin the copying process, insert the PC-DOS diskette into the left-hand disk drive and enter the command:
TRANSFER (MS-DOS PARTITION NAME) <CR>
where (MS-DOS PARTITION NAME) is the name of the partition you wish to transfer the software onto. The program dialogue looks similar to this:

```
A>TRANSFER MSCRATCH <CR>

IBM PC format floppy disk to DMS Network Hard
Disk copy program. Version x.xx

-It copies from MO to the requested Hard Disk Partition.

-IT WILL COMPLETELY OVER-WRITE THE DESTINATION PARTITION.

Insert an IBM diskette into disk drive 0, then strike any key.

Data will be transfered to drive B: from a double
sided floppy with 512 bytes per sector and 9 sectors per track.

Is this what you want? yes

Beginning Transfer, DO NOT INTERRUPT!

side:x   track:xx   records:xx

-IBM PC to DMS Network copy is complete.
-Please re-assign drive C:
```

Once the transfer of data has begun, do not interrupt the program. An incomplete transfer may show a directory in the partition but some or all of the files will be missing.

Remember that since the TRANSFER program writes every track from a PC-DOS or MS-DOS 48 TPI format diskette to a Hard Disk partition, everything else that is in the partition will be overwritten.

----------NOTE----------
If the TRANSFER program is interrupted make sure that you reassign drive B to a HIDOS partition before proceeding. An accidental write from CP/M to an MS-DOS partition can ruin the MS-DOS directory; all of the files in the partition may be lost.

A PC, such as an IBM PC (XT) or COMPAQ portable computer, with a HiNet Adapter Card can also transfer PC-DOS software to the Network. Use the MS-DOS COPY program to copy form the local disk drive to the Network partition. No special program, like TRANSFER, is needed.

----------IMPORTANT----------
If an MS-DOS workstation is already assigned to the partition where the PC-DOS diskette is transferred to, the station will not be able to "see" any new files in the partition until it is reassigned. Reassigning a partition forces the operating system to read the latest directory of the partition into the workstation's memory.

5.6 COPYPART

By using a program called COPYPART, you can copy all of the data that is stored in one HIDOS or CP/M-86 partition to another, either on the same Hard Disk or a different one. **COPYPART will not work with MS-DOS partitions.**

COPYPART copies every track in a partition even if there is no information stored there; as a result, the larger the partition the longer it takes COPYPART to copy it. (While COPYPART copies a large amount of data much faster than PIP, PIP is faster if you have only a few files in a large partition.)

----------NOTE----------
The source and destination partitions each must be the same size and the same type, whether shared or non-shared.

COPYPART is used by typing **A>COPYPART X=Y<CR>**. **'X'** stands for the letter (A, B, C, or D) of the receiving drive, and **'Y'** stands for the letter of the SENDING DRIVE. (Destination equals source.) Thus, **COPYPART D=C<CR>** would write to the partition logged to drive D a copy of everything in the partition logged to drive C. While COPYPART is working, a line of dots will appear across the bottom of the screen.

----------WARNING----------
It is very important to specify the correct source and destination disks when using COPY-PART. If the destination disk and source disk are switched around, the partition you intended

to copy would be entirely written over by whatever was in the destination partition--even if the intended destination partition was blank! On non-shared partitions, always assign write ownership to the destination partition, not the source partition.

Thus, when entering the COPYPART command, always specify the destination disk first and the source disk second.

For example, to copy the partition ACCOUNTS to a partition called ACCOUNTS2, first assign a drive to each of the partitions and write ownership to the receiving partition only. Leave the source partition Read-Only.

```
A>ASSIGN R B ACCOUNTS <CR>
A>ASSIGN W C ACCOUNTS2 <CR>
```

After assigning the drives, use COPYPART to copy to the C drive (partition ACCOUNTS2) from the B drive (partition ACCOUNTS).

```
A>COPYPART C=B <CR>
```

----------NOTE----------

If the two partitions are on different Hard Disks, an **H:** will precede the partition name of the one located on a workstation's local Hard Disk (A>**ASSIGN C H:ACCOUNTS2<CR>**). The H: signifies that a partition is on a workstation's Local Hard Disk. You must be working from the workstation if you are copying to a local Hard Disk from the Network's Hard Disks.

5.7 HARD DISK BACKUP UTILITIES

HARDBACK, CARTBACK and 5HDBACK are utilities that back up the partitions on the Network's Hard Disks onto Floppy Disks or, in the case of CARTBACK, onto streamer tapes. The programs copy entire partitions, whether they are filled with files or not. The programs prompt you to insert and replace Floppy Disks or Tapes as needed. The date and time that the backup takes place are recorded along with the data.

This section explains how to use all three backup utilities. HARDBACK and 5HDBACK are very similar to use, although the screen dialogues are different. CARTBACK is explained separately as it is totally different from the Floppy Disk backup programs.

PREPARING TO BACKUP ONTO FLOPPY DISKS

Each 5.25-inch Floppy Diskette can copy approximately one-half of a 1 Mbyte partition. 8-inch Disks hold about 512K, or one-half of a 1 Mbyte partition. The Floppy Disks are specially formatted by the HARDBACK and 5HDBACK programs. Each track is made into a 4 Kbyte sector. Once formatted in this way, the Floppy Disk can only be written to and read from by the backup utilities. PIP cannot be used to copy individual files from a backup disk.

Before backing up the Hard Disk, there are certain steps that you should take to prevent any confusion.

FILING THE BACKUP DISKETTES

Keep a special file of the backup Disks. Label each Disk with the day of the week that the set of Disks is to be used for backup, and the partition name that will be copied only on that Disk. Each partition must start on a new Floppy Disk. There is no way to copy two different partitions onto one Floppy Disk when using 5HDBACK or HARDBACK.

In a busy working environment you should make a backup two or three times a week at least. DMS recommends that you back up your Hard Disks every day. The more frequently you back up your Hard Disk, the more sets of Floppy Disks you must keep track of. (But the safer your work will be from user error or mechanical failure.)

As an example, let's say that you back up your system every day of the work week. You should have a set of Floppy Diskettes for each day of the week. On Monday use the Monday set of Disks, on Tuesday the Tuesday set and so on. The Friday set of Disks (the culmination of a week's worth of business) should be stored in a safe place over the weekend. The more you value your work and the more you depend on your computer to do that work, the more careful you should be with your files.

If you change a HiNet partition to a shared HIDOS partition, you will not be able to use the backup diskettes that were made when the partition was not shared. When you change your partitions to shared, back them up as soon as

possible. See section 2.12 for more information on HIDOS and shared partitions.

5.7.1 DMS-3/501--USING 5HDBACK

---NOTE---
If the DMS-3/501 is being used as a HiNet Master, you cannot run 5HDBACK while HiNet is operating. You must boot CP/M from a Floppy Diskette and then call up the 5HDBACK program.

To use 5HDBACK, type **5HDBACK<CR>** after the A> prompt. The screen will show:

```
A>5HDBACK<CR>
Hard Disk to Floppy Diskette backup utility x.xx
(To abort, enter CTRL C)
Volumes present are:00 Vol0
Which volume do you wish to work with (0-3):0

Select one of the following options:

option   meaning    action

B        BACKUP     Backup from Hard Disk to Floppy Diskette
L        LOAD       Load from Floppy Diskette to Hard Disk
D        DISPLAY    Display Hard Disk partition menu
F        FORMAT     Format Floppy Diskette for backup
ESC                 Exit to CP/M

Enter choice:
```

FORMATTING DISKS FOR 5HDBACK

To prepare the backup Diskettes, select option **F**. The program will tell you when the Diskette is formatted. Format as many Disks as you will need to back up the desired partitions and label them. Use a felt tip pen to write on the adhesive labels supplied with the Diskettes. Do not write directly on the Diskette; pressure from the pen can damage it.

When the program formats a Diskette, it demonstrates the process by first displaying an f, when it formats a track on one side, and then changing the small f to a capital F when the track on the other side is formatted. It takes about 1 minute to format all the tracks on the Disk. The program will then verify every formatted track. It will change the F to a v when a track is verified on one side of the Diskette and then change the v to a V when the track on the other side is verified. Verifying takes about another minute per Disk. If the Disk is damaged, and therefore unreliable for backup, the program will print out an error message and list the number of bad tracks. Do not use Disks that have failed the verify procedure; you could lose data.

Here is an example of what you will see on the screen as a disk is being formatted:

```
Enter choice: F

Note: The Diskette will be formatted with 1
sector per track. It can be read from or written
to only by 5HDBACK.

Type RETURN to format, ESC to abort. <CR>

0          1          2          3      4
0123456789ABCDEF0123456789ABCDEF0123456789ABCDEF012345-->
VVVVVVVvFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF-->

FORMAT COMPLETE
Type RETURN to format, ESC to abort: ESC
```

As a rule of thumb, you will need two 5.25 inch Floppy Diskettes to back up a 1 Mbyte partition.

MAKING BACKUP COPIES

After formatting the necessary number of Diskettes, press ESC to return to the main menu. To begin backing up the Hard Disk, enter B after the Enter choice prompt. The program requests that you enter the date (MM/DD/YY) and then the time of day (HH:MM). This information is recorded on the Diskette and will be displayed when the Diskette is used to load a partition.

After you enter the time, the program will display another menu. You are given three choices for backing up the Hard Disk. Here are the screen messages that you will see.

```
Enter choice: B
Enter date (MM/DD/YY): 06/09/83
Enter time (HH:MM): 09:00

BACKING UP TO FLOPPY DISKS FROM HARD DISK.
Select one of the following options:

option  meaning   action

A       ALL       Back up all data partitions
F       FLAGGED   Back up flagged data partitions
S       SELECT    Back up selected data partitions
Z       ZERO      Back up Unit ZERO (control area)
ESC     ------    Return to main menu

Enter choice:
```

If you select:

- **A**, the program will back up each partition on the Hard Disk, prompting you to replace Floppy Diskettes as needed.

- **F** option will back up only those partitions that have been marked **YES** for backup in the ALLOC Table.

- **S** option allows you to enter the names of specific partitions that you wish to back up.

- **Z** option will back up the control partition. This is the easiest and safest method to save the ALLOC, USERS and USERS CONFIG Tables along with the HiNet and CP/M Software. You

should use this option whenever you have made changes to the ALLOC or Users Tables.

- **ESC** will return you to the main menu when you are done backing up partitions or if you need to format more Diskettes.

For the S option, the program will prompt you for the name of the next partition to be backed up. When the partition's name is entered you will be told how many formatted Diskettes are required. You will also be prompted to change Diskettes as needed. A line of dots will progress across the screen as the partition is being copied. A 1 Mbyte partition takes about 3.5 minutes to be backed up. When all of the partitions are copied, hit ESC to return to the main menu and then hit ESC again to exit the program.

Remember---Make sure that you label your Diskettes clearly. Keep them separate from other days' backups.

RELOADING A PARTITION

It is unlikely that you could lose the entire contents of the Hard Disk or even an entire partition. It is more likely that someone will erase a valuable file by accident. That is when the backup diskettes can save the day.

If the problem is with only one file--e.g., a file that was erased--you must still replace all of the files on the partition. It is not possible to copy out only one file from a

5HDBACK Diskette. The best procedure is to PIP all of the files that have been changed since the backup onto another Floppy Diskette. Then load the entire partition from the 5HDBACK Diskette into the Hard Disk partition. After the partition is loaded, PIP back into it all of the files that have been changed. The missing file will be restored.

To load a partition onto the Hard Disk, select the **L** option from the main menu. Here are the screen messages for loading a typical partition:

```
Enter choice: L
Insert first Diskette to load from.
Type RETURN to begin loading, ESC to abort.

Date:07\09\83
Time:09:00
Partition:ACCOUNTS
Size:2
Diskette:01 of 01
Type RETURN to load, ESC to abort. <CR>

.............................................
.............................................

Insert first Diskette to load from.
Type RETURN to load, ESC to abort. ESC
```

To exit the 5HDBACK program press ESC. You must have a Floppy Diskette with the CP/M

operating system on it in the Disk Drive when you press ESC.

When you are loading a partition that is backed up on more than one Floppy Diskette, you must insert the Diskettes in the right order. If the program expects the first Diskette of a series of three, it will give an error message if you insert the second Diskette:

***Error-Diskette number does not match expected number.

This feature protects you from mixing up the order of the Diskettes. The program will also check the date and time and will warn you if you mix in a Diskette from one backup day into a group from another day.

5.7.2 DMS-3/4--USING HARDBACK

----------NOTE----------
If the DMS-3 is being used as a HiNet Master, you cannot run HARDBACK while HiNet is operating. You must boot CP/M from a Floppy Disk and then call up the HARDBACK program.

To use HARDBACK, type **HARDBACK<CR>** after the A> prompt. The screen will show:

```
A>HARDBACK<CR>
Hard Disk to Floppy Disk backup utility x.xx
(To abort, enter CTRL C)

Select one of the following options:

0 - backup on single-sided diskettes
1 - backup on double-sided diskettes
2 - load from single-sided diskettes
3 - load from double-sided diskettes
4 - format backup diskettes

Enter choice:
```

FORMATTING DISKS FOR HARDBACK

To prepare the backup Disks, select option **F**. The program will tell you when the Disk is formatted. Format as many Disks as you will need to back up the desired partitions and label them. Use a felt tip pen to write on the adhesive labels supplied with the Disks. Do not write directly on the Disk; pressure from the pen may damage it.

Here is an example of what you will see on the screen as a disk is being formatted.

```
Enter choice: 4

Note: The Disk will be formatted with 1 sector
per track. It can be read or written only by
HARDBACK.

Enter floppy drive number (0-7) or ESC for main
menu. 0

Type RETURN to start.

FORMAT COMPLETE
Enter Floppy Drive number (0-7) or ESC for main menu: ESC
```

----------NOTE----------
In order to format double-sided Floppy Disks you have to format the Disk twice; one time by entering floppy drive 0 and the next by entering floppy drive 4. This method first formats the top side of the disk and then the bottom side. This procedure is only for double-sided disks and disk drives, available by special order on DMS-3s.

As a general rule, you will need four 8-inch single-sided double-density Floppy Disks to back up a 1 Mbyte partition.

MAKING BACKUP COPIES

After formatting the necessary number of Disks, press ESC to return to the main menu. To begin backing up the Hard Disk, enter B after the Enter choice prompt. The program requests that you enter the date (MM/DD/YY) and then the time of day (HH:MM). This information is recorded on the Disk and will be displayed when the Disk is used to load a partition.

After you enter the time, the program will display another menu. You are given three choices for backing up the Hard Disk. Here are the screen messages that you will see:

```
Enter choice: 1
Which volume do you wish to work with? (0-3) 0
Enter date (MM/DD/YY): 11/09/83
Enter time (HH:MM): 09:00

Enter partition name or RETURN to Scan all: SYSTEM

02 diskettes required.
Insert next diskette and type RETURN. <CR>
```

If you select RETURN to Scan all, the program will back up each partition on the Hard Disk, prompting you to replace Floppy Disks as needed. You can also enter the names of specific partitions that you wish to back up. When the partition's name is entered you will be told how many formatted Disks are required. You will also

be prompted to change Disks when needed. Entering a CTRL S will skip over the partition.

As a general rule of thumb, backing up a 1 Megabyte partition requires two double-sided or four single-sided disks.

Remember---label your Backup Disks clearly and keep them separate from other days' backups.

RELOADING A PARTITION

It is unlikely that you could lose the entire contents of the Hard Disk or even an entire partition. It is more likely that someone will erase a valuable file by accident. That is when the backup Disks can save the day.

If the problem is with only one file--e.g., a file that was erased--you must still replace all of the files on the partition. It is not possible to copy out only one file from a HARDBACK Disk. The best procedure is to PIP all of the files that have been changed since the backup onto another Hard Disk partition or Floppy Diskette. Then load the entire partition from the HARDBACK Floppy Disk into the Hard Disk partition. After the partition is loaded, PIP all of the files that have been changed back into it. The missing file will be restored.

To load a partition onto the Hard Disk, select options **3** or **4** (load from single or double sided Floppy Disks). Here are the screen messages for loading a typical partition:

```
Enter choice: 3
Volumes Present are:
VOL 0
Which volume do you wish to work with? (0-7) 0

Insert first Diskette and type RETURN or CTRL S
for Main menu: <CR>

Date:11\09\83
Time:09:00
Partition:ACCOUNTS
Size:2
Disk:01 of 01
Type RETURN to load, ESC to abort. <CR>
.....

Insert first Disk to load from and type RETURN or
CTRL S for Main Menu: CTRL S
```

To exit the HARDBACK program, insert a Floppy Disk with the CP/M operating system on it and press ESC.

When you are loading a partition that is backed up on more than one Floppy Disk, you must insert the Disks in the right order. If the program expects the first Disk of a series of three, it will give an error message if you insert the second Disk.

***Error-Disk number does not match expected number.

This feature protects you from mixing up the order of the Disks.

5.7.3 THE CARTBACK TAPE BACKUP UTILITY

Eight-inch Hard Disk Networks can use the DMS STD-20 Streamer Tape Drive add-on to backup Network partitions quickly. This method is much faster than using Floppy Disks for backup. One streamer tape can back up 10 Mbytes in 6 minutes as opposed to about 20 minutes for Floppy Disks. Each Tape Cartridge will hold about 20 Mbytes of data. The CARTBACK utility controls the Archive Tape Drive unit. CARTBACK lets you back up or restore one partition, several selected partitions or the entire Hard Disk.

INSTALLING A TAPE DRIVE

The STD-20 is a Tape Drive in a separate cabinet with its own power supply. It is connected to the Master's Tape Drive Port. This port is connected internally to the CPU board's second parallel port. (The first parallel port is used for the Hard Disk Drive.) If the Parallel Printer Port is used for a printer, a switch can be installed to enable the Tape Drive and Parallel Printer to be alternately active. If you are ordering a new system be sure to specify this feature if necessary.

The STD-MHD-102 and -103 have an additional Hard Disk in the cabinet--either 23 or 46 Mbyte--along with the Tape Drive. This unit is always considered Volume 3 of a four volume Master (0, 3, 1, 2). If you are upgrading a Master with an additional Hard Disk and Tape Drive, alterations may be necessary to the Master's CPU board along with the addition of a

Multiplexor board. Your Dealer will help you with any necessary alterations.

CABLING

A Tape Drive with an additional Hard Disk is connected to the Master's cabinet with two cables. A 50-wire ribbon cable connects the Multivol port on the Tape drive (Volume 3) to the Daisy-chained port on the Master's cabinet. A 20-wire ribbon cable connects the TAPE port on the Tape cabinet to the port on the Master labeled STD-20 Option. If there is no extra Hard Disk only the 20-wire cable need be connected between the Master and the Tape drive.

HANDLING CARTRIDGE TAPES

Data is recorded on the cartridge tapes at very high densities. Therefore they are susceptible to damage when mishandled. A dropped tape cartridge may lose recorded data. Whenever you suspect damage to the tape it may be best to replace it. However, first try to save the tape by using the "Retensioning" command in the CARTBACK program. New tapes must also be retensioned before use. Retensioning is explained more fully later in this section.

----------NOTE----------
After retensioning a tape cartridge, the heads should be cleaned with a cotton swab and an approved cleaning solution. Dry the head and cleaning bar with another swab after the solution is applied.

Before removing a tape from the drive, make sure that it is fully rewound. This prevents accidental damage to portions of the tape that contain data.

Each tape cartridge has a write-protect key on it. To write-protect a tape turn the key to **SAFE.** To write-enable a tape turn the key away from the **SAFE** inscription.

Always store the tape cartridge in its case in a location away from heat, magnetic sources and direct sunlight. Keep dust and dirt off of the tapes at all times. A tiny speck of dirt on the tape can cause the loss of data.

USING CARTBACK

When you purchase a STD-20 Tape Drive the CARTBACK utility is sent with it on a Floppy Disk or on a bootable Tape. It is a 50k program which must be run when the Master is booted from a Floppy Diskette or a Tape. Do not use the original Diskette for backup. Instead, PIP all of the files to a second Floppy which has the CP/M system tracks on it and use that Diskette for routine backup. ALLOC is included on the Floppy Disk as a convenience.

Some systems may have only a tape drive along with the Hard Disk. In this case the Master can be booted directly from the Tape. Place a bootable Tape in the Drive. From the PROM Monitor enter **BC** for Boot Cartridge. The CARTBACK program is automatically loaded into memory and the CARTBACK Main Menu is

displayed. The DMS-3 must have a PROM with a version number that ends in C, (e.g., 1.xxC).

----------NOTE----------
The Bootable Tape with CARTBACK came with your system if you do not have a Floppy Disk Drive. Once CARTBACK is loaded from the Tape via the PROM Monitor, the program is stored in RAM. If you replace the original Tape with a new one, retension it and then use it to Load, a copy of the CARTBACK program will be stored on the new Tape. You then have a backup copy of the bootable CARTBACK Tape.

On systems with Floppy Disk Drives, insert the CARTBACK Diskette into the Floppy Drive, call up the Prom Monitor and enter **BF.** Unless commanded to perform an operation when the Tape Drive is empty, the program will not tell you when to insert a Tape; insert one now. Type **CARTBACK <CR>** to load the backup program. CARTBACK will ask you to 'select one of':

```
D - DDT (debugger)
T - Tape Backup/Restore
H - Hardhelp
```

Press D to access memory. Press H to access the HARDHELP menu. After pressing H, enter 0 to access the HARDHELP diagnostic menu.

----------WARNING----------
DDT HARDHELP can destroy files on the Hard Disk. If you are unfamiliar with the program, do not use it. Refer to Section 6 for more information about DDT HARDHELP.

Press **T** for the CARTBACK Main Menu.

The program will ask:

What do you want to do?

B - Backup from disk to tape.
L - Load from tape to disk.

To back up the Hard Disk's partitions onto tape, use the B option. The Main Backup Menu will be displayed on the screen.

MAIN BACKUP MENU

The following screen depiction shows the CARTBACK Main Menu.

```
Selection: B
Hard disk to tape Backup Program
CARTBACK version x.xx

Hard Disk: 8 inch Fujitsu-Memorex, volume number x
Current Volume is VOLx

A - ALL partitions written to tape.
C - CHANGE to new volume.
D - DISPLAY current Alloc table.
F - FLAGGED partitions written to tape.
S - SELECTED partitions written to tape.

Enter choice:
```

Main Menu Options

When you select option A, F or S you will have to perform one of three operations: Rewind, 'Retension', or Erase. These operations are reviewed below under the A option; the review will not be repeated under options S or F.

----------NOTE----------
Retension (a word of our own creation): to correct the tension of the two tapes inside a tape cartridge.

A Option Backup ALL disk partitions

Once you choose option A, the following menu will be displayed:

```
R - Rewind          (up to 2.5 min)
T - Retension       (about 5 min)
E - Erase           (about 5 min)

Enter choice:
```

R <CR> rewinds tapes. Select it before ordering the program to write on a used tape.

T <CR>. Retension. If you look closely at a data cartridge, you'll actually see two separate tapes. One of the tapes is about twice as wide as the other. These tapes have to be aligned. The T option unwinds and then rewinds the tapes, making certain that they are aligned. Always make use of this option with new tapes. This option can also be used when read/write errors occur.

E <CR> erases tapes. The 'E' option also rewinds any tape it has erased.

1. Choose either to rewind, retension, or erase before proceeding. Even if the tape has been rewound, select the R option to test that the tape is all the way back to the beginning. Usually this will take only a few seconds.

2. CARTBACK will ask for the date and time (both entries are optional). The information is for tape identification; it will be written at the beginning of every partition on the tape. At the same time, CARTBACK writes the name of the next partition, the number of the tape (in

the backup sequence), and the size of the partition. This information is displayed on the screen in this format:

DATE: xx/xx/xx TIME: xx:xx NAME: xxxxxxxx Tx SIZE: x

where x represents variable numbers. Tx is the Tape Number (1 - 3). The number after size can be 1 through 8 with the numerals representing partition sizes:

1 = 256K	2 = 512K	3 = 1M	4 = 2M
5 = 4M	6 = 8M	7 = 16M	8 = 32M

3. When a backup is completed you will be notified by the message: 'All partitions written to TAPE'. The tape will be rewound and the Main Menu will return to the screen.

S Option SELECTED partitions written to tape.

1. After rewinding, retensioning or erasing a tape, the following menu will be displayed:

```
Enter name of partition on the disk.

*END        Write final file mark (i.e. mark end
            of tape).

*LIST       List out the hard disk allocation
            table.
```

2. Enter ***LIST <CR>**. This will display the directory of partitions on the Hard Disk.

3. Type in the name of the partition you wish to back up, followed by a <CR>.

4. Once the partition has been copied, CARTBACK returns to the menu above.

5. If you want to back up another partition, return to step three; if not, enter ***END <CR>**.

----------NOTE----------
*END marks the end of tape data. When loading specific partitions back onto the Disk, the *END mark is the only way CARTBACK has of knowing what is supposed to be written on the Hard Disk and what is not. The mark tells the computer to stop writing to the Hard Disk.

Without the mark, the machine will continue to write until the tape's end is reached. This may result in the erasure of data on a partition. Be sure to mark the end of tape data with *END whenever you back up selected partitions.

6. When backup is complete the tape will be rewound and the Main Menu will return to the screen.

C Option CHANGE volumes

---NOTE---
This option applies exclusively to systems with multiple volumes (more than one Hard Disk).

CARTBACK deals with one volume at a time. You have to keep track of the other volumes as they are backed up or loaded. For convenience, the number and name of the volume CARTBACK is working on is displayed with the Main Menu.

1. Enter **C <CR>**. To change the current volume enter the number of whatever volume you want to work with followed by a <CR>. Remember, volumes are numbered 0-3, rather than 1-4. The first volume is 0; the second is 3; the third is 1; and the fourth is 2. The table below illustrates this point.

Volume Numbering

	2-Vol. system	3-Vol. system	4-Vol. system
first	Vol 0	Vol 0	Vol 0
second	Vol 3	Vol 3	Vol 3
third	---	Vol 1	Vol 1
fourth	---	---	Vol 2

2. Enter **^C** to return to the Main Menu.

D Option DISPLAY current Alloc table

1. A D <CR> orders the program to display a list of all partitions on the current Hard Disk.

2. You will be instructed, 'Type RETURN to continue'; upon doing so the Main Menu will return to the screen.

F Option Back up all FLAGGED partitions

1. **F <CR>** will back up all flagged partitions. Flagged partitions are marked as such in the ALLOC Table. When creating or modifying a partition, the program will ask you whether or not you want flagged backup. A Yes response will mark that partition for the CARTBACK program. Even if a partition is not marked as flagged for backup, it can be backed up by entering the partition's name from the LOAD Commands Menu.

2. When the process is complete, the tape is rewound; the Main Menu returns to the screen.

LOAD MENU

To load partitions from the backup tape to the Hard Disks, select the Load option at the beginning of the program. The Rewind and Retension menu is displayed first. Then the Main Load Menu is shown as follows:

```
Tape drive to hard disk LOAD

        Valid LOAD commands are:
        ------------------------

    *ALL      Load all partitions (including system part).
    *CHG      Change Volumes.
    *EXIT     Exit LOAD section.
    *LIST     List the hard disk ALLOC Table.
    *NEXT     Find the next partition.
    *PART0    Load partition zero.
    *REWIND   Rewind the tape.

                    OR

    Enter name of partition to load to Hard Disk.

    Enter LOAD command:
```

Load Menu Options

----------NOTE----------
Enter a **CTRL C** to get the Main Menu back on the screen.

***ALL** Load all partitions.

1. Enter ***ALL <CR>**.

   Program asks: Do you want to load Partition Zero? (Y/N). Normally you would enter Y for yes. However, should you be changing from a

23 Mbyte to a 46 Mbyte Hard Disk Drive you will not be able to load partition Zero from the 23 Meg to the 46 Meg because the firmware is different. You will have to use HARDHELP to initialize the firmware on the new disk, then READ0 all Tables in Partition Zero from the old 23 Mbyte Disk onto a Floppy Disk. Use WRUN0 to write the Tables back to Partition Zero on the new 46 Megbyte Hard Disk. Lastly, use CARTBACK to load all partitions except for Partition Zero.

2. 'Loading all partitions' will show on screen.

3. Date, time, name, type, and size information for the first sector to be displayed will show on the screen. This information appears whenever a partition is about to be loaded.

4. CARTBACK will not load partition 0 until you either approve or reject the loading of the Bad Sector Table and ALLOC Table. It asks, 'Shall Bad Sector Table be loaded from tape (Y/N)?'

The only occasion when this question should be answered **N <CR>** is when a Hard Disk has been replaced. If you were replacing a Hard Disk, you would back up the Disk with CARTBACK, replace the Disk, and finally load the taped data onto the replacement Disk. You would not load the Bad Sector table since it lists the bad sectors of the Hard Disk you have just replaced. Moreover, you will already have a Bad Sector table on the new Hard Disk.

If you haven't replaced a Hard Disk, then the Bad Sector information on tape is correct. You would enter **Y <CR>** (load Bad Sector table).

Next, *ALL will ask 'Shall ALLOC Table be loaded from tape (Y/N)?' If you have modified the Alloc table (i.e., changed the position or number of any partition in the table) since your last tape backup, type **N <CR>**. That is, do not reload the Alloc table). If you have done nothing to modify the Alloc table, type **Y <CR>** (reload the Alloc table).

----------WARNING----------
A partition's name and size must be the same in the ALLOC Table and on the backup tape. If the name or size of a partition has been changed since the last tape backup, CARTBACK cannot reload the changed partition.
---

5. When the loading process is complete, CARTBACK's menu returns to the screen.

6. To exit CARTBACK, reset the computer.

***CHG** Change volume.

Use this menu option to change the volume that CARTBACK is loading or backing up.

***EXIT** Exit LOAD section.

1. ***EXIT <CR>** *EXIT simply returns the Main Menu to the screen.

***LIST** List the hard disk ALLOCation table.

1. ***LIST <CR>** orders the computer to list all partitions of the current Hard Disk.

2. When RETURN is typed, the Main Menu returns to the screen.

***NEXT** Find the next partition.

1. ***NEXT <CR>** is an option which locates the next partiton on the cartridge tape. Once the program option has located the next partition, it asks, 'Load this tape partition onto hard disk? (Y/N)'. If you answer **Y <CR>**, the partition will be loaded. If you answer **N <CR>**, the partition will be skipped and the Load Menu will return to the screen.

***PART0** Load the system partiton.

1. ***PART0 <CR>**. This entry orders CARTBACK to search for partition 0.

2. Once found, the program asks for confirmation: 'Load this partition onto hard disk? (Y/N):'

3. If you respond Yes, the computer will prepare to load the partition. If your response is **N <CR>** the screen will flash the message, 'WAIT...Skipping partition' and the Load Menu will return to the screen.

4. Step 4 above (under *ALL) details the correct responses to CARTBACK prompts.

5. After all this is complete, the Load Menu returns to the screen.

***REWIND** Rewind the tape.

1. ***REWIND <CR>** rewinds the tape and returns the Load Menu to the screen.

Enter name of partition to load to Hard Disk.

This option will retrieve from the tape any partition that you name. But beware: it takes up to five minutes for partitions to be located. If an incorrect name is given, the entire tape will be searched before another chance arises to enter the correct name. If you aren't sure of a partition name, you can always refer to the ALLOC Table with the *LIST option.

----------NOTE----------
If you have entered the Load Menu and performed any operation other than *LIST, use *REWIND to rewind the tape before you use the name option.

Locating a specific partition could be troublesome in a multiple-volume environment. Here again, you must direct the program to the correct volume. *LIST displays the partitions of one volume at a time. If you want the ALLOC Table of a specific volume, you have to direct CARTBACK to that volume. (See Main Menu, C or

*CHG Option.) You can confirm the number and name of the current volume by using the D (Display ALLOC Table) option of the Main Menu or *LIST in the Load Menu.

1. Type in the name of the partition you intend to load back onto the Hard Disk. Follow your entry with RETURN.

Example: **ACCOUNTS <CR>**

2. You will be asked, 'Proceed with tape search?' Type **Y <CR>** or **N <CR>** accordingly. If you have made an error, N <CR> will return the Load Menu to the screen and you can start over.

3. While the Tape is being searched, 'WAIT - searching the tape' will show on screen. When the partition is located, you will be asked for confirmation.

4. If you confirm the partition, it will be loaded onto the Hard Disk; if you reject it, the partition will be skipped. If CARTBACK is directed to an incorrect volume, you will have to start over. In any case the Load Menu will be returned to the screen.

To exit the CARTBACK program, reset the Master.

Make sure to store the tape cartridges in their cases away from the Master, electrical equipment, heat and direct sunlight.

5.8 READ0 AND WRUN0

When you use HARDBACK to back up your Hard Disk, you save your files on Floppy Disks. But there is a section of the Hard Disk that is very important for its operation that is not copied by HARDBACK. Partition 0 stores the Hard Disk's Alloc Table, Users Table (if the DMS-3 is operating as a HiNet Master), the Users Configuration Table, the Bad Sector Table and the Hard Disk firmware. CARTBACK, however, can back up Partition 0; WRUN0 and READ0 are therefore not needed when you have a TAPE Drive.

READ0 is a DMS program that reads the contents of partition 0 from the Hard Disk and writes that data on a backup Floppy. WRUN0 is the DMS program that replaces the contents of partition 0. To apply these programs, you will need the actual physical locations (track and sector) for the contents of Partition Zero.

Here is a listing of the appropriate track and sector information for saving Partition Zero Tables on Networks with Release 5, 6 and later HiNet software. These numbers will always be used when you use READ0 and WRUN0 to save your tables.

----------NOTE----------
The following numbers are for Release 6, HiNet Separated Boot systems. Previous releases will have different Track and Sector numbers for these tables. They are listed in Section 2.1, Volume 1.

	TRACK	SECTOR	CP/M RECORD SIZE**
ALLOC TABLE	0	79	08
USERS TABLE*	0	29	16
CONFIGURE TABLE*	0	39	80
MACHINE TABLE *	1	39	12

* HiNet Only

** "CP/M RECORD SIZE" refers to table length in CP/M's 128-byte sectors. Value is in Hexadecimal notation.

READ0--READ AND SAVE PARTITION ZERO

To save a Hard Disk's ALLOC, USERS and CONFIGURATION tables use the READ0 program. (Be sure to type a zero as the last character in the name, not the letter O.) The procedure for using READ0 is:

1. Boot the Master (or single user stand-alone station) from a special Disk that has only the CP/M operating system, READ0 and WRUN0 on it. Be sure to label the Disk and date it.

2. Type READ0 after the A> prompt.

3. Save the ALLOC table first.

3a. The program will prompt you for the:

Starting track number: **00**
Starting sector number: **79**
Number of sectors to be read: **08**

3b. The program will display on the screen all of the entries you just made. Double check them to be sure they are correct. If they are right, answer **Y** after the program prompt. If you made an error, enter **N** and you will be returned to the first prompt.

3c. Enter a filename that the ALLOC table is to be written to. DMS recommends that you use a date code as a filename extension. For example, use the filename ALLOC.620 for ALLOC table backed up on June 20. The ALLOC table will be saved on the Floppy Disk in a CP/M file.

----------NOTE----------
The saved copy of the Hard Disk's tables can only be read by WRUN0. You cannot look at the tables while they are stored on the Floppy Disk.
---

4. Repeat the procedure to save the USER table. Enter the following track and sector information for the USER table.

4a. Starting track number: 0
Starting sector number: 29
Number of sectors to be read: 16
Enter filename--USERS.xxx (with date extension).

5. Repeat procedure once again to save USER CONFIGURATION table. Enter the following track and sector information.

5a. Starting track number: **0**
Starting sector number: 39
Number of sectors to read: **80**

Enter filename--CONFIG.xxx (with date extension).

6. Save the MACHINE Table with the following track and sector entries:

6a. Starting Track number: 1
Starting sector number: 39
Number of sectors to read: 12
Enter filename: MACHINE.xxx (with date extension).

Every time you make a major change in the ALLOC or USER'S Tables you should READ0 the new tables to a Floppy Disk and store that Disk in a safe place. If for some reason your Hard Disk should crash and you have to reformat the Disk, you will have all of your important tables saved. (HARDHELP will not preserve the USERS and USER CONFIGURATION tables. It will preserve the controller firmware, the ALLOC table and the Bad Sector table when you tell the program to save the first 17K of data.)

WRUN0--WRITE TO PARTITION ZERO

Should you have to reformat a Hard Disk you will have to use the WRUN0 program to write the saved MACHINE, ALLOC, USERS and CONFIGURE tables back on the Hard Disk (partition 00). To use WRUN0 follow these steps.

1. Boot the Master from a CP/M system Floppy Disk that has READ0, WRUN0 and the saved ALLOC, USERS and CONFIGURE tables on it. Make sure that the tables are up to date.

2. Type WRUN0 after the CP/M A> prompt.

3. The program will prompt you for the filename of the table that you want restored. If the file is found on the Disk it will tell you how many sectors are in it.

4. The program will ask you for:

Starting track number: enter appropriate track number.

Starting sector number: enter appropriate sector number.

5. The track and sector information you entered will be displayed. If it is correct, respond with a Y. The program will copy the table to the Hard Disk.

6. Repeat the WRUN0 procedure for each of the three tables.

----------WARNING----------
Be sure you enter the correct track and sector numbers. Each table has a unique position on the Hard Disk which is identified by its sector numbers. Any other entries will corrupt Partition Zero, leaving the data on the Hard Disk inaccessible.

6.0 DIAGNOSTICS AND PROBLEM SOLVING

This section will cover the use of HARDHELP and 5HDHELP for Network disagnostics. It provides a list of tests that can be run by the User, not a complete guide to all of the tests that are available to service technicians. Network Error Messages are listed along with some probable causes of the errors. Please read the entire section before running any tests.

6.1 5HDHELP DIAGNOSTIC TESTS

DDT 5HDHELP.COM will run a number of different diagnostic tests. These tests are intended for programmers and technicians, familiar with CP/M programs. Only the use of Diagnostic Test 120, which is used to identify bad sectors, will be documented here. Do not run this test without first consulting the DMS Customer Service Department, at (415) 261-1034.

WARNING! Routine 120 **DESTROYS ALL DATA** on the Hard Disk. This is a complete disk test. It reads and writes continuously over all tracks and sectors on the disk.

Before running this test make a complete set of backup copies of all partitions, including Partition Zero, to a Floppy Disk with 5HDBACK.

G120 is used to locate and identify bad sectors for inclusion in the Bad Track Table. The routine reports the errors it finds. One run of this test takes approximately three hours and should be run three to five times if you have been getting frequent Hard Disk errors (***HDSK ERRORS).

To use any of the diagnostic routines (including 120), 5HDHELP must be accessed through CP/M's DDT Utility:

```
A>DDT 5HDHELP.COM<CR>

DDT Vers 2.2
NEXT PC
4B00 0100
- G <CR>
```

After the dash (-), call up the 5HDHELP menu: type **G<CR>.**

The screen will show the following menu:

```
Volume 00
Possible device types:
1 = CMI 5619
2 = MINISCRIBE 4020
3 = RMS 13 Mb
4 = SYQUEST SQ306-R
5 = RODIME RO 203
6 = IMI 5018H

ENTER VOLUME TYPE (0 IF NONE PRESENT) -
```

Enter the number that corresponds to the type of Hard Disk you have. (See Section 1, Volume 1.) The basic 5HDHELP menu will be displayed.

```
SELECT ONE OF THE FOLLOWING FUNCTIONS:

0 - ACCESS DIAGNOSTIC ROUTINES
1 - FORMAT
2 - INITIALIZE FIRMWARE
3 - DISPLAY/ADD TO BAD SECTOR TABLE

ENTER 0,1,2 OR 3 - 0
```

Enter 0 to access the diagnostic functions.

```
--------------------WARNING--------------------
Option 1, FORMAT, will erase all data on the
Hard Disk.
-----------------------------------------------
```

Enter **0** (zero) to display the menu of diagnostic routines. The numbers in the left hand column are the hexadecimal addresses for the tests.

```
100H  PRINT THIS MESSAGE
104H  RESTART THIS PROGRAM
108H  RESET HARD DISK CONTROLLER
10CH  ABSOLUTE SECTOR READ
110H  ABSOLUTE SECTOR WRITE
114H  VERIFY READ ENTIRE DISK
118H  FORMAT ENTIRE DISK
11CH  FORMAT ONE TRACK
120H  RUN WRITE, READ, COMPARE TEST
124H  RUN SEEK TEST
12CH  INITIALIZE VOLUME ZERO
130H  HDC INTERFACE/DRIVE TEST
134H  HDC INTERNAL DIAGNOSTICS
140H  REPEAT TEST SECTOR UNTIL ERROR
148H  WARMBOOT
14CH  READ 1K
158H  GET BAD TRACK TABLE
15CH  ZERO BAD TRACK TABLE
160H  COMPARE
164H  CP/M VOLUME/PARTITION SELECT
16CH  ERROR NUMBER DESCRIPTION
170H  GET VOLUME INFO
184H  BUFFER LOCATIONS DESCRIPTIONS
190H  SET DISK TYPE
194H  DEFAULT DISK TYPE (FROM FIRMWARE)
```

To run the Bad Sector Test (Diagnostic Routine 120), after the dash type **-G120<CR>.** On screen you will see:

```
THIS ROUTINE DESTROYS DATA ON THE DISK.
DO YOU WISH TO CONTINUE? (Y/N)
```

Striking Y (Yes) will begin the routine. This routine will test the currently booted volume. Use the summary for entry in the Bad Track Table as described below. Hitting anything else on the keyboard will end the routine.

As the test proceeds bad sectors will be shown in the following format:

```
ERROR AT SECTOR 00XXXX
errcode,adrH,adrM,adrL, command 98 00 XX XX 08
```

Write down each sector error location (the number following SECTOR in the top line). If you have many errors some of these messages may be scrolled off the top of your screen before the test is finished.

Remember, test routine 120 should be run three to five times. When you have completed this, enter into the Bad Track Table all bad sectors that were displayed by the test even if they only showed up once. (See instructions below for entering tracks in the table.) When listing a sector in the Bad Sector Table enter only the last four digits/letters in the ERROR AT SECTOR 00XXXX message. (For example, if your

bad sector were 00D123, you would enter D123.)

----------NOTE----------
If the summary of bad sectors fills the screen you will have to type D6000 (**-D6000<CR>**) to dump the error buffer in order to see all of the bad tracks.

6.2 5HDHELP BAD TRACK TABLE

Occasionally, a sector of your Hard Disk may become damaged. Through the 5HDHELP Utility, your DMS computer maintains a list of all tracks that contain bad sectors. The list is called the Bad Track Table. Once you enter a specific track in the Bad Track Table, HiNet isolates that track so nothing will ever be written to it again.

To display, or add to, the Bad Track Table, invoke 5HDHELP from the CP/M command prompt (A>**DDT 5HDHELP.COM<CR>**). This will bring up the 5HDHELP menu. These menus will vary somewhat depending on what types of Hard Disk you have. To display or add to the Bad Track Table, type in **'3'**.

----------NOTE----------
If you wish to add to the Bad Track table you must first identify the Track/Head/Sector Hex codes of the Hard Disk memory areas you wish to enter into the table. This is done with 5HDHELP Diagnostic Routine 120 as explained in 6.1.

Your CRT will display the message **ENTER VOLUME TO SELECT (0-3).** Type in the volume number of the Hard Disk you are concerned with followed by a <CR> (if you only have one Hard Disk its number is always 0). You will see the message:

```
DEFECTIVE SECTORS
TRACK, HEAD, SECTOR, ALL IN HEX
 XX     XX     XX
 XX     XX     XX

ADD NEW DEFECTIVE SECTOR
TRACK (FF TO STOP, FE TO CLEAR TABLE)-
```

Type in the hex numbers of the bad areas obtained from Diagnostic Routine 120. Enter a RETURN after each entry. Type **FF<CR>** after TRACK (FF TO STOP, FE TO CLEAR TABLE)- to abort the procedure and return you to the CP/M Prompt. Typing **FE<CR>** at the same place will clear all entries out of the table.

----------WARNING----------
The Bad Track Table is vital to the proper operation of your Hard Disk. If you erase the listings for bad tracks, HiNet will try to write data to them and some or all of your data may be lost. Other problems could also occur.

6.3 5HDHELP ERROR MESSAGES

When you are using 5HDHELP, certain errors may occur either from the program, the Hard Disk or the Hard Disk Controller (HDC). The errors will show up on the screen as two digit numbers (e.g., 21). Here is a listing of the possible error numbers and their meanings.

01 NO INDEX DETECTED
02 SEEK NOT COMPLETED
03 WRITE FAULT
04 DRIVE NOT READY AFTER SELECT
06 TRACK 00 NOT FOUND
10 ID FIELD READ ERROR
11 UNCORRECTABLE DATA ERROR
12 ADDRESS MARK NOT FOUND
14 TARGET SECTOR NOT FOUND
15 SEEK ERROR
18 CORRECTABLE DATA ERROR
19 BAD TRACK
1A FORMAT ERROR
20 UNKNOWN COMMAND
21 ILLEGAL ADDRESS
30 RAM DIAGNOSTIC FAILURE
31 MEMORY CHECKSUM ERROR
32 ECC DIAGNOSTIC ERROR
40 COMPARE ERROR

These errors are actually generated by the XEBEC Hard Disk Controller board. Only one of them is self-correcting--ERROR 18 - correctable data error.

The following errors are usually correctable by you:

10, 11, 12, 14, 40 -- Hard Disk Track error. As soon as possible, back up your hard disk partitions onto floppies, especially partition zero. Then reformat the disk with 5HDHELP. Run the G120 Test to determine if formatting the Hard Disk corrected the track errors. If bad sectors are displayed, enter them in the Bad Track Table. Formatting the Hard Disk will usually correct these errors.

19, 1A -- the track is formatted incorrectly but is not in the Bad Track Table. Put the indicated sector in the Table (which will nullify the track).

04 -- might mean the Hard Disk did not reach full power. Try turning it off and then on again. A cable connection may be loose.

The following error message numbers indicate a serious problem with the hardware. If they occur you should call your dealer, service representative or Customer Service at Digital Microsystems, Oakland CA.

20 -- serious software bug.

02, 03, 06 -- Hardware error.

30, 31 and 32 indicate a defective XEBEC Controller Board.

6.4 HARDHELP--DMS-3/4 DIAGNOSTIC TESTS

HARDHELP diagnostic tests are run under the control of either DDT or ZDTI, CP/M Debugging utilities. These tests are available primarily for DMS technical representatives and dealers. They are presented here for reference. Several of them can be run by the User under the supervision of Digital Microsystems' Customer Service department by phone. Should this be necessary, this written reference will help you to take the appropriate action.

----------WARNING----------
Never run any HARDHELP Diagnostic tests without having an up-to-date backup of all partitions, including Partition Zero.

To use HARDHELP diagnostic tests, prepare a Floppy Disk with CP/M System Tracks (use SYSGEN), HARDHELP.COM and DDT.COM (or ZDTI.COM). Boot the Master (DMS-3/4) from the Floppy Disk. Enter after the A> prompt:

A>**DDT HARDHELP.COM <CR>**

The screen will show the DDT message line followed by a hyphen (-). Type G **<CR>** after the hyphen. The following screen will be displayed:

```
DMS HARD DISK UTILITY PROGRAM VER DSC3 X.XX
WAITING FOR VOLUME INFO
ROM VERSION: X.X
FIRMWARE VERSION: X.X

INFO FOR 00: TRACKS,SECTORS,HEAD MASK : XX XX XX LABEL:xxxx
INFO FOR 01: VOLUME NOT PRESENT, ERROR IN OPEN =29
INFO FOR 02: VOLUME NOT PRESENT, ERROR IN OPEN =29
INFO FOR 03: VOLUME NOT PRESENT, ERROR IN OPEN =29

SELECT ONE OF THE FOLLOWING FUNCTIONS

0 - ACCESS DIAGNOSTIC ROUTINES (MUST BE
    EXECUTED BY A> DDT HARDHELP.COM)
1 - FORMAT
2 - INITIALIZE CONTROLLER FIRMWARE
3 - DISPLAY/ADD TO BAD SECTOR TABLE

ENTER 0,1,2, OR 3 -
```

----------NOTE----------
ERROR IN OPEN = 29 means that the volume (Hard Disk) is not present or is not connected, the power is not on, or it is malfunctioning. If you have multiple volumes, or the message appears for the first volume, check the cable connections and power switches.

Enter 0 to access the Diagnostic routines. The screen will show:

```
1 = 11 MBYTE
2 = 23 MBYTE
4 = 46 MBYTE
3 = 14 MBYTE
B = 14 MBYTE WITH FIXED HEADS
7 = 28 MBYTE
F = 28 MBYTE WITH FIXED HEADS
ENTER VOLUME SIZE(1,2,4,3,7,B OR F)-
ENTER VOLUME TO BOOT (0-3):
```

First enter code for the size of the Hard Disk. Hard Disk sizes are can be found on a metal panel on the back of the machine, a tag on the Hard Disk's case and the DMS-3/4's packing slip/invoice:

Model Number	Hard Disk Size	Code To Enter
DMS-3/101	= 11 Megabyte,	enter 1
DMS-3/102	= 23 Megabyte,	enter 2
DMS-3/103	= 46 Megabyte,	enter 4

You must also tell the program which Hard Disk you wish to format. If there is only one Hard Disk in the Network, the answer is "0". Otherwise, for multi-volume systems, each Hard Disk has a different Volume Number as represented below:

SYSTEM COMPONENTS	RESPONSE
Only One Hard Disk	0
First Volume	0
Second Volume	3
Third Volume	1
Fourth Volume	2

Enter the correct Volume number that you want to work on. The following information will be displayed:

```
100H  PRINT THIS MESSAGE
104H  SETUP INTERRUPTS FOR DSC2
108H  RESET HDC
10CH  ABSOLUTE SECTOR READ
110H  ABSOLUTE SECTOR WRITE
114H  VERIFY READ ENTIRE DISK
118H  FORMAT ENTIRE DISK
11CH  LOAD HDC RAM PROGRAM
120H  RUN WRITE, READ, COMPARE TEST
124H  RUN SEEK TEST
128H  GET DISK SIZE
12CH  INITIALIZE USER AREA FROM 4100H
130H  RUN INTERFACE TEST
134H  RUN HDC MEMORY TEST
138H  GET HDC MEMORY BLOCK
13CH  REPEAT READ THS
140H  REPEAT TEST THS
144H  SEND COMMAND 40H TO CONTROLLER
148H  TEST CRC CIRCUITRY
14CH  READ1K (DO NOT USE)
150H  READ AND DISPLAY CONTINUOUS
154H  READ AND DISPLAY
158H  GET BAD SECTOR                (list continued)
15CH  DISPLAY ERROR HISTORY
```

160H COMPARE
164H CPM VOLUME/PARTITION SELECT
168H BOOT VOLUME
16CH ERROR NUMBER DESCRIPTION
170H GET VOLUME INFO
174H MULTI VOLUME SEEK TEST
178H CPM128 BYTE READ
17CH MULTI VOLUME RANDOM WRITE TEST
180H CPM 128 BYTE WRITE
184H BUFFER LOCATIONS/DESCRIPTIONS
188H FLUSH CONTROLLER BUFFERS
18CH MULTI VOLUME READ/WRITE TEST
190H SET DISK SIZE
194H DEFAULT DISK SIZE (FROM FIRMWARE)

The "entry points" are commands to the Hard Disk Controller.

G100 Display the directory of all entry points.

G104 Enable the front panel interrupt ON DSC2 ONLY.

G108 Resets the HDC.

G10C Reads the sector specified by track, head, and sector.

G110 Writes the sector specified by track, head, and sector.

G11C This program loads the HDC user area from 2000H. It is intended that the user programs will be test programs.

G114 This is a read test, it reads all sectors on the disk and reports any read errors. This test looks at the Bad Sector Table and does not test sectors that are marked as bad.

G118 This test formats the entire disk. It destroys all data on the disk. The program asks the user whether he wishes to continue. The first 17 1K blocks of the disk will be saved and restored. The user is asked which volume to boot, which will be the volume to format. Also, as an option, the first 17 blocks can be zeroed rather than saved.

G120 This is a complete disk test. It writes and reads continuously over all sectors on the disk except for track 0. Two types of patterns are used; a cyclically rotated B6D9 pattern, and a random pattern. G120 reports write errors, read errors and compare errors. An error counter at F08 counts the number of errors. Return is through front panel interrupt or "R". Typing an "S" while the program is running causes an error summary to be printed. It tests the currently booted volume. The Error History is located at 6000H. Enter D6000 <CR> after the DDT - prompt to display the listing.

G124 This is a seek test program. It causes the disk to perform random, maximum, or incrementing seeks. Return is via front-

panel interrupt or by typing "R". It tests the currently selected volume.

G128 G128 gets the size of the disk and displays it on the screen. The program assumes that controller firmware has been stored on track0, head 0, sector 1.

G12C Initialize user area from 4100h. This program is very similar to G11C in that both load the HDC user memory area. The difference is that G12C also loads track 0, head 0, and sectors 1,2 and 3 with the same program. Programs that are loaded by 12C must have the same format as the standard controller program. The user is asked which volume to boot which is where the firmware will be written. In multi-volume systems the firmware must be written to all volumes. The user is also asked for a volume label. This can be any 10 ASCII characters, but must be unique for each volume.

G130 Run interface test. This routine tests the CPU/HDC interface. This is achieved by sending data blocks to the HDC and reading them back. Three data patterns are used, a 00 pattern, FF pattern and a random pattern. Any errors are displayed on the screen.

G134 MEMTEST. This program tests the HDC RAM memory. For each test loop containing no errors, an 'OK' is printed. The program first executes at 4100H and tests C000H to FFFFH. After 256 loops it moves

itself to C000H and tests 4100H to 7FFFH. If an error is found, the address, expected contents, and actual contents are printed in hex.

G138 GETMEM. This routine retrieves the HDC read buffer (F000H to F3FFH) and moves it to 5000H in the host's memory. This allows examination of the header which is normally not returned by the HDC.

G13C READTHS. This routine reads the sector specified by TRACK, HEAD, and SECTOR until an error occurs. Get a summary with "S" and exit with "R".

G140 WRITETHS. This routine writes, reads, and compares the sector specified by TRACK, HEAD and SECTOR until an error occurs. Get a summary with "S" and exit with "R".

G148 Test CRC Circuitry. Faulty CRC circuitry will result in many write errors on the Disk; data will be scrambled in files. G148 requests volume number and then runs the test. Three lines of eight two-digit figures will be displayed on the screen. The very last two digits in the third line MUST be 40, otherwise the CRC circuitry is bad. This is a serious problem indicating a need for immediate repair.

G150 RDISPC. Read and display continuously. This routine calls READISP below, increments the physical sector and repeats. Exit with "R".

G154 READISP. This routine reads the sector specified by TRACK, HEAD, and SECTOR and displays the first 100H bytes.

G158 GETBST. This routine reads and displays the Bad Sector Table. Additional entries may be added. The user is asked for volume to boot, which will be the volume whose bad sector table is displayed.

G15C Display Error History. This displays a listing of all the corrected CRC errors that have occurred since the Master was last reset or powered on. The errors are displayed in the format: TRACK, HEAD, SECTOR, COUNT.

G160 COMP. Compares read and write buffers. Useful to locate byte in error after G140.

G164 CPM VOLUME/PARTITION SELECT. Selects volume for CP/M reads and writes.

G168 BOOT VOLUME. Firmware is read from the booted volume, and all reads and writes--until a further boot or select--go to the booted volume.

G16C DISPLAY ERROR NUMBER DESCRIPTIONS. All HDC error numbers and their descriptions are displayed on screen.

G170 GET VOLUME INFO. An 8-byte buffer is displayed. The second and third bytes are the ROM version; the fourth and fifth bytes are the firmware version. In location 5000H a 128-byte block, with volume sizes and labels, is placed.

G174 MULTI DRIVE SEEK TEST. Performs random seeks to random volumes.

G178 CPM 128 BYTE READ. Reads from sector in 1f00, track in 1f01(low), 1f02(high) to 2800. These addresses may change with versions of HARDHELP. Use G184 to see listing of current buffer locations and descriptions.

G17C MULTI DRIVE WRITE TEST. Randomly writes to random volumes.

G180 CPM 128 BYTE WRITE. Writes from sector in 1f00, track in 1f01(low), 1f02(high) from 2000H. Address locations may change with HARDHELP versions. Use G184 to see current buffer locations and descriptions.

G184 BUFFER LOCATIONS/DESCRIPTIONS. Displays on screen the location and description of buffers.

G188 FLUSH CONTROLLER BUFFERS. CP/M reads and writes are buffered and written to disk during idle times. This forces them all to be written.

G18C MULTI VOLUME WRITE/READ TEST. Same set of tests as G120 but done on all present volumes. NOTE: all volumes must have firmware present at beginning of test but will be destroyed by test.

G190 SET DISK SIZE. Use this command to enter the Hard Disk size when the firmware can't be written to the Hard Disk.

G194 DEFAULT DISK SIZE (FROM FIRMWARE). Reads disk size from firmware.

ERROR NUMBER DESCRIPTIONS

When running HARDHELP, the following error numbers may be displayed when a problem occurs.

11H WRITE FAULT
12H UNIT NOT PROCESSED
13H INTERNAL TIMEOUT
14H READ AFTRER WRITE FAULT
15H UNPROCESSED READ ERROR
16H UNIT NOT PROCESSED
17H NO INDEX FLAG
18H TIMEOUT SEEKING TRACK
19H TIMEOUT SEEKING TRACK 0
20H FIRMWARE UNIT ERROR
21H SECTOR-1 MISSING
22H BAD T/H/S (Track/Head/Sector) IN HEADER
23H HEADER CHECKSUM ERROR
24H TRACK INVALID
29H DUPLICATE VOLUME LABEL
30H CPM MAPPING ERROR (listing continued)

31H ERROR FLUSHING BUFFERS
32H INVALID PARTITION SELECTED
40H CRC, NO CORRECTION ATTEMPTED
41H CRC, CORRECTION SUCCESSFUL
42H CRC, CORRECTION FAILED
80H UNRECOGNIZED COMMAND
91H ERROR SAVING 17k (HARDHELP)
92H ERROR RESTORING 17K (HARDHELP)

TEST G120 AND THE BAD SECTOR TABLE

Garbled data may indicate physically bad sectors on the Hard Disk. When a Hard Disk leaves the factory, it is tested with HARDHELP G120. The resulting bad sectors are entered in the Bad Sector Table and listed on a sheet of paper attached to the Hard Disk. Should more bad sectors develop on the Hard Disk--resulting in lost or garbled data--you may have to run test G120 to find these sectors and add them to the Table.

----------WARNING----------
Always back up the entire Hard Disk before running test G120. This test erases all data on the Hard Disk. It takes about 12 hours to run. DMS recommends that it be started at the end of the work day and run throughout the night. In the morning the results will be ready.

To begin the Bad Sector Test, access HARDHELP with DDT as described earlier. Enter the appropriate information for the size of Hard Disk in the Master. Select which volume you

want to test (Vol 0 if there is only one Hard Disk).

First you must completely reformat the Hard Disk. Use the HARDHELP menu option 1. Enter CTRL X after the question "Do you wish to Continue?". This formats the entire Hard Disk including the current Bad Sector Table.

Next, enter G120 <CR> after the hyphen prompt to begin the Read/Write Compare test. The routine will ask you to "Enter number of tracks (in Hex), CR for default"; press RETURN for the default value. Then enter N for No to the question "Use error correction (Y,N)?"

Routine G120 writes test data onto the Hard Disk, reads it back and compares the two values. If there is a difference, the Sector is considered bad.

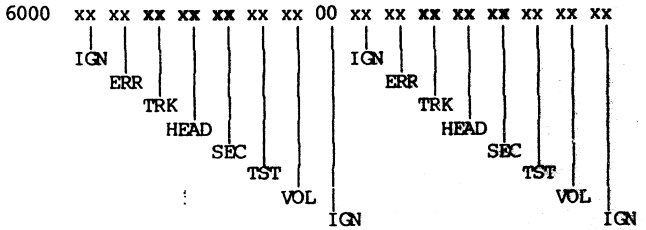
After the test has run for 10 to 12 hours, there should be a list of the Bad Sectors on the screen. Each error will be displayed on a line that looks like this:

XX XX **XX XX XX** XX XX—TYPE (0=WRT,1=RD,2=COMP), ERROR, TRK, HD, SEC, TEST BYTE, VOL

Where XX represents a two digit hexadecimal number. The third, forth and fifth two-digit numbers (boldfaced above) are the Track, Head and Sectors that are bad. Write these numbers down exactly as they appear on the screen.

If part of the list of bad sctors has scrolled off of the screen, you may have to dump the Hard Disk Controller's Memory to see the

entire list. After the hyphen prompt, type **D6000 <CR>**. This will display a block of numbers beginning with 6000. The numbers after the number 6000 are the bad sectors listed by Track, Head and Sector. The numbers will be layed out like this:



where:

IGN means ignore this number,
ERR means the error number,
TRK is the TRACK number in hex,
HEAD is the HEAD number in hex,
SEC is the SECTOR number in hex,
TST is the test byte,
VOL is the Volume number being tested.

The third, forth and fifth two-digit numbers describe the Track, Head and Sector of the first bad sector encountered; the eleventh, twelfth and thirteenth numbers in the same line describe the second error. If there are only zeros in these locations then there are no Bad Sectors. The lines following location 6000 may also contain bad sector numbers. Note that these locations contain bad sector numbers only after

you have run test 120. Write down all of the TRACK, HEAD and SECTOR numbers.

Now enter **G158 <CR>** after the hyphen prompt. This will access the Bad Sector Table. Enter the Volume number you are working with. Then add the bad sectors that you wrote down. You must use upper case characters to enter the numbers and letters. Enter the TRACK number first, the HEAD number next and the SECTOR number last. Continue until you have entered all of the defective sectors. Type FF to exit this routine.

As the last step, run test 114 to see if any bad sectors have been missed. If the test stops and displays 3 numbers, you will have to add those to the Bad Sector Table too and then run test 114 again until it finishes without an error. This may take about a half an hour.

Now you are ready to restore your Hard Disk partitions. If you are using CARTBACK, simply reload all partitions; DO NOT reload the Bad Sector Table. When you reload Partition Zero, CARTBACK will specifically ask you if you want to load the old Bad Sector Table. Respond No or else the old Table will overwrite the new one you have just finished. If you are using HARDBACK to restore the partitions you will have to use the INSTALL program to recreate the operating system files in Partition Zero and then WRUN0 the ALLOC, USERS, USERS CONFIG and MACHINE Tables back onto the Hard Disk.

6.5 DIAGNOSTIC ERROR MESSAGES

The Master may or may not be set to display Network Error Messages. You can use CP/M's DDT utility to change the way the Master is set to either display error messages or not. These errors are usually automatically recoverable; that is, the Master will correct them without intervention.

Having the Network error messages displayed can often aid in identifying the source of a recurring problem. For example, if a workstation is malfunctioning and causing problems for the network, it can be identified by the User Name displayed with the error message.

If your Master Station is set to display these messages, they will appear on the Master CRT whenever the error occurs, even if the Master Station screen is being used for some other operation. Although the message will visually clutter up the CRT, it will not affect whatever is being done with the Master.

To change the way that the HiNet Master is set to display Network BIOS error messages, use the CP/M utility DDT.

Enter DDT <CR> after the A> prompt. Enter after the DDT hyphen prompt the sequence: **S4E <CR>**. The screen will display the sequence **004E** followed by a hexadecimal number such as C7. This number may vary depending on the BIOS version. The next step is to change the number. To display error messages the second digit in

the two-digit number should be 7. To stop error messages from being displayed, the second digit should be 5.

004E x7 -- ERROR MESSAGES ON

004E x5 -- ERROR MESSAGES OFF

It is possible that, with a different Release of HiNet software, the numbers mentioned above may change. However, if error messages are being displayed and you want to turn them off, subtract 2 from the second digit after 004E and enter that value. If error messages are not being displayed, add 2 to the number after 004E and enter that value to start displaying errors.

For example, if the number displayed after 004E is C7, enter C5 and then hit Return. By changing the hexadecimal number to a value that is 2 less than its default value, all error messages will be displayed on the screen until the Master is RESET or turned off. To turn off the error messages, repeat the steps and enter the original value again, e.g., enter C7 after the C5. Here a typical sequence when using DDT to change the 'error display switch'. Note that a small x can represent any number or letter:

```
A>ddt<CR>
DDT VERS 2.2

-S4E<CR>

004E x5 x7<CR>
   (to turn off messages: 004E x7 x5<CR>)

004F xx .<CR>
   (that is, period carriage return)

-^C
```

----------NOTE----------

In the near future, a planned update to Release 6 will include a program called ERROR.COM. This utility will turn on and off the error display and give a count of errors that have occurred since the Master or workstation was cold booted (RESET). Here are the proposed formats:

ERRORS ON <CR> -- displays Network Errors,

ERRORS OFF <CR> -- turns off Error Display,

ERRORS COUNT <CR> -- Gives count of Errors since last RESET.

ERRORS <CR> -- displays help message and tells whether ERROR Display is on or off.

When the Network Master receives either a command or response that is illegal or unrecognizable it will print a message in the format shown below.

```
*** User ww xxxxxxxx yyyy Net error at zzzz
MASTbuf: Mst Usr To  Frm Dsk Track   Sec Vol DmaAdr
         aa  bb  cc  dd  ee  ff  gg  hh  ii  jj  kk
```

where:

ww	=	user number in hexadecimal
xxxxxxxx	=	user name
yyyy	=	error type [LATE, CRC, OVR, SYNC]
zzzz	=	error address in hexadecimal
aa - kk	=	command specific parameters in hexadecimal

These messages indicate that transient errors occured that were corrected automatically. No user intervention is required.

The meaning of the hexadecimal numbers in the error message can vary greatly. In general:

Mst represents a command that the master sends to a station, for example, a poll (50).

Usr represents the command the station sends back to the master, for example, a read or write (11, 12 or 15).

To and **Frm** generally represent user numbers that messages are sent to or received from.

Dsk, Track, Sec, Vol, are usually meaningful for read and write,

DmaAdr may indicate an address in the Master's memory.

Not every number may be meaningful even though it is displayed. Error types have the following meaning:

LATE -- Master did not receive an expected trailing SDLC flag byte, which indicates that the station did not complete the transaction,

CRC -- Master received data with transmission errors,

OVR -- Master received more data than was expected,

SYNC -- Master received unexpected data or command.

Following are some examples of commonly occuring transient errors:

```
***User XX NAME LATE Net error at XXXX
MASTbuf: Mst Usr To Frm Dsk Track Sec Vol DMAadr
         XX  XX  XX XX  XX  XX XX XX  XX  XX XX
```

This indicates that the Master or workstation didn't receive the expected response or acknowledgment during a sequence of transmissions. A station losing power, or being RESET in the middle of a transmission, might

cause this, as would a break or unplugging of the HiNet cable.

```
***User XX NAME OVR Net error at XXXX
MASTbuf: Mst Usr To Frm Dsk Track Sec Vol DMAadr
         XX  XX  XX XX  XX  XX XX XX  XX  XX XX
```

This indicates that the Master Station failed to get a character out of the SIO (Serial I/O chip) before the next character arrived. It may indicate that two workstations have a duplicate User Number, a workstation has a hardware problem, or someone is using Application Software that disables interrupts for too long.

----------NOTE----------

User Numbers. A User Number is not the same as a User Name. A User Number is what HiNet uses to identify the individual workstations. Every time someone logs on to the network, the Master assigns the particular workstation a specific User Number linked to the logged in User Name.

A duplication of User Numbers can be caused by a malfunction of an SIO, or by two workstations simultaneously logging on to the network. Another cause might be unplugging a workstation's HiNet cable and then plugging it in again.

----------NOTE----------
When a station's HiNet cable is unplugged, the Master assumes it has been turned off and may reassign its User Number to another station that logs on. When the first station reconnects its cable it still thinks of itself as having the old User Number and both the first station and the second answer to the same User Number when polled by the Master Station.

```
***User XX NAME CRC Net error at XXXX
MASTbuf: Mst Usr To Frm Dsk Track Sec Vol DMAadr
         XX  XX  XX XX  XX  XX XX XX  XX  XX XX
```

Cyclic Redundancy Check. The data was garbled, and did not check. This is a common error and may be caused by a duplication in workstation User Numbers or a problem in the SIO (Serial I/O Chip) or weak signals. Usually the data is simply resent by HiNet.

```
***User XX NAME SYNC error at XXXX
MASTbuf: Mst Usr To Frm Dsk Track Sec Vol DMAadr
         XX  XX  XX XX  XX  XX XX XX  XX  XX XX
```

This indicates that a transmission was received correctly but it was not what was

expected. In other words, for some reason the Master Station did not understand a message.

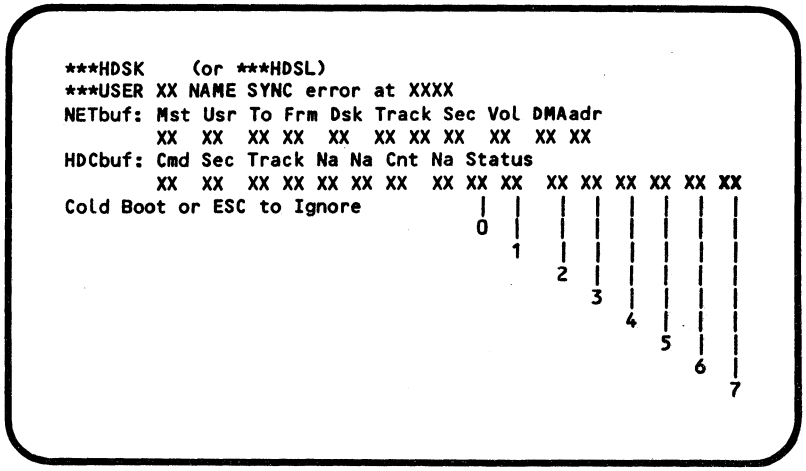
In the table below, each of these error messages gives the error location in hex codes. The exact meaning of the numbers will vary according to the error reported.

Mst	= Master	Track	= Track
Usr	= User	Sec	= Sector
To	= To	Vol	= Volume
Frm	= From	DMAadr	= DMA address
Dsk	= Disk		

HARD DISK ERRORS

While the previous error messages are self-correcting and do not effect the performance of the Network, Hard Disk Errors require attention. Some occurances of HDSK or HDSL errors may be software problems others may be hardware (defective Hard Disk or controller). Unfortunately, the error information presented on the screen is complex. Not all numbers have meaning in all cases. Always write down the error messages.

The following message represents the general format for Hard Disk errors. The very last number (labeled byte 7 on the page, not on the actual screen) in the line below **HDCbuf:** can be the most informative. The meanings of byte 7 are presented on the following pages.



Sometimes the problem resulting in the error message can be "ignored" by pressing the ESCAPE key. You may have to press it several times to clear the command that caused the problem. This will work only for problems caused by software errors. If the message continues to repeat after several ESCAPEs have been entered, you will have to cold boot (RESET) the Master. If the same problem reoccurs there may be a hardware problem with the Master or a workstation. For example, if the last number (byte 7) is 17, one of the Hard Disks may have a loose power connection. Again, you may have to have a DMS service representative check the system.

One way of isolating a Hard Disk error that reoccurs after Resetting is to disconnect the HiNet Cable from the Master and reset again. If the error message returns the problem is with

the Master. If it does not, plug in the HiNet Cable again. If the error repeats you will have to go through the Network and unplug the HiNet cable from each workstation (or branches of the Network) until the offending workstation is isolated. Reset that workstation and rejoin the Network. If the problem goes away it may be a hardware problem such as a temporarly malfunctioning SIO (Serial Input Output) chip. Resetting or turning off the workstation may solve the problem. If the error reoccurs, the workstation may need repair.

Here are the meanings of the last number (byte 7) in the HDC buffer line.

Hex Value of byte	Problem
11	Write fault: Possible drive problem
12	Drive not ready
13	Internal timeout HDC problem
14	Read after write compare error
15	Unprocessed CRC error. ROM detected error but firmware error correcting code was not present.
16	Volume selected (command 13h) not present.
17	No index mark on disk. Indicates no power to disk or disk not present.
18	Timeout while seeking a track.
19	Timeout while seeking track 0.
20	Error in firmware init process
21	HDC cannot find sector header
22	Bad track, sector, or head assignment in header
23	Header checksum error
24	Track invalid (too big)
25	Head invalid for drive

26 Sector invalid for drive
27 Invalid volume selected (command 13)
28 Bad firmware version
29 Duplicate volume label
30 CPM mapping error
31 Error occurred in flush (see note 2 below)
32 Partition invalid (too big) in select
40 Data CRC error
41 CRC error, correction successful
42 Non-correctable CRC error
80 Command error
91 Error saving 17K in format(HARDHELP)
92 Error restoring 17k in format(HARDHELP)

NOTE: A 41h in byte 6 and a 00h in byte 7 of the status block indicates a CRC error occurred and was corrected.

NOTE 2: Error 31 will occur in response to a command 13 (CP/M drive select). The status of the problem is as follows:

Byte 0 = Command generating error
Byte 1 = track
Byte 2 = head
Byte 3 = sector
Byte 4 = block number (low order byte)
Byte 5 = block number (high order byte)
Byte 6 = ACTUAL ERROR
Byte 7 = 31h

Error numbers 24 and 25 may indicate a wrong firmware version on the Hard Disk. When the disk was initialized the wrong size was entered. For example, a 23 Mbyte Hard Disk was given firmware for a 46 Mbyte Hard Disk.

SIO MALFUNCTION

Occasionally a workstation's SIO (Serial Input Output) chip may malfunction and, by sending a signal, jam up or bring down the network. This might be caused by the chip going bad, or a temporary software glitch. To correct the problem it is necessary to identify the offending workstation by disconnecting each station from the network one at a time until the problem disappears.

If the workstation's SIO problem was caused by some temporary software or hardware phenomenon, simply turning off the workstation's power and turning it back on after a minute or so will correct the difficulty. If the chip itself is bad it will have to be replaced by a qualified service technician.

6.6 COMMON NETWORK ERROR MESSAGES

The error messages in this section are listed in alphabetical order to make it easier to look them up. Some of the error messages are for the HiNet Network; others occur when using either Floppy Disks or Hard Disks. Error messages with *** displayed before them are DMS hardware/software errors. Messages without the three asterisks are CP/M errors.

ABORTED

Indicates the process is terminated.

BAD PRODUCT IN LOGIN (product number)

Appears on the Master's screen when a workstation tries to login to the Network and sends a product number that is not supported by the Network. For example, a DMS-5086 tries to login but CP/M-86 Boot Code is not installed on Network.

*****bad cpm trk> _____ (or ***bad cpm sec> ___)**
*****Hard5 error at xxxx**
command> __
status> __

If the first line of this error message contains a track or sector number, it indicates that a program tried to read or write to a non-existant track on the DMS-3/501's 5" Hard Disk. This is a software error. Do NOT press ESC to Ignore. Rather, abort the current program and try again. If problem repeats, the software package may have to be altered.

(cont. next page)

If no number appears after cpm trk> (or cpm sec>), there may be a hardware problem with the Hard Disk or Hard Disk controller. Write down all of the numbers displayed with the message. Back up the DMS-3/501's Hard Disk as soon as possible. If this problem repeats, you may have to run 5HDHELP to determine if there are any bad sectors. Report the error messge to your service representative or to Customer Service at DMS for additional advice.

BDOS ERROR ON X:

BDOS stands for Basic Disk Operating System. The letter following the BDOS ERROR will be one of your four or eight drives A-H. There are five main types of BDOS ERRORS:

BDOS ERROR ON X: BAD SECTOR:

A write error has occurred on a Floppy Disk. Hit any key to ignore or enter CTRL C to reboot. CTRL C will erase any work stored in memory and not saved to disk. This error no longer applies to the Network's Hard Disks.

BDOS ERROR ON X: R/O (for Read Only).

The drive is marked read-only and cannot be written to. Hit any key to reboot. NOTE---This will cause you to lose everything you have done since your last 'save' command.

BDOS ERROR ON X: SELECT.

Means that CP/M cannot find the drive you specified. Probably you typed in a letter that was not A, B, C, or D (A through H in CP/M-86). To recover from this error enter a CTRL-C

Command. If that fails to work you will have to RESET your workstation. In both cases you will lose all of your work since your last 'Save' command.

BDOS ERROR ON X: FILE R/O

The file you are trying to write to (edit) is marked Read-Only. Hit any key to reboot. Work stored in memory and not saved to disk will be lost.

BDOS ERROR ON X: NO LOCKS

The Master's Lock Table is full. This message is for shared partitions only. Hit any key to retry, or enter CTRL C to reboot.

Can't find file named XXX

CUSTOMIZ cannot find the file you have named. Check to make sure you are typing in the correct name and that the file is stored on the drive you are specifying. You may wish to exit CUSTOMIZ and use DIR or SD to verify the file's location and name.

Can't find file on that drive either.

This message may follow the one above if you have named another drive and the file is not there. Exit CUSTOMIZ and use DIR or SD to locate the proper file.

Can't find needed character set in CHARSET.CST file.

This indicates that the file CHARSET.CST is either missing or defective. PIP a clean version of CHARSET.CST to your working drive.

Can't find overlay file CustX.ovl.

One of the Overlay files is missing. PIP the missing file to your working drive.

Can't read character set. This is a FOX.

Neither the DMS-3/F nor the DMS-3/501 can handle a User Defined Character Set. This message may appear if you load to one of these workstations a Settings File that was created on a DMS-5000. Except for the Character Set everything else in the File should function normally.

Can't read in function keys, table too big.

This message will appear if a very large number of Special Function Keys has been programmed outside of CUSTOMIZ.

Can't write to file. See if disk is full.

This message will appear if there is some disk-related problem.

command?

Any error message ending in a question mark indicates that the system could not find the command you typed. Check for typing errors. You can use DIR or SD to check the correct spelling of commands in the directory.

Couldn't load up language.
Do you want to continue?.

This message appears when you are trying to create a Character Set and have selected a User Defined Character Set to begin with but CUSTOMIZ cannot find that file.

Couldn't read information from that file.
You have specified a file that is not a valid CUSTOMIZ Settings File. Check the filename.

Couldn't read language from that file.
You have specified a file that does not contain a valid User Defined language.

DESTINATION IS R/O
Usually occurs during a PIP operation. The file you are trying to send material to is a 'Read-Only' file. There is usually a query associated with this message asking if you wish to delete the file. If you answer **'Y'**, the R/O file will be erased and replaced with the new file you were trying to send to it. If this fails to work consult the person in charge of your system.

DISK READ ERROR
Occurs during PIP or some other disk-reading operation. Indicates the computer is having a problem reading what is on the Hard Disk memory. Try again. If the problem persists, see the person in charge of your system.

DISK WRITE ERROR
Occurs during PIP or some other writing to disk storage operation. Indicates the computer is having a problem writing material to the memory disk, probably due to a full partition. Try again. If the problem persists, see the person in charge of your system.

Failed to read entire file.

This message appears when there is something wrong with a Settings File you are trying to read in.

filename?

When you are using the REN (Rename) command and a filename is repeated with a question mark it means that you have tried to use a wildcard symbol in the filename. REN does not permit the use of wildcard symbols.

FILE EXISTS

This may occur when you are renaming a file with the REN command. It indicates that a file already exists with the new name you have chosen for the old file. The simplest solution is to choose another new name for the file you are renaming. Otherwise you must either change the existing file's name, erase it, or use the PIP program to overwrite it.

FILE NOT FOUND

The computer cannot find the file(s) you named. Check to see if you typed the filename(s) correctly. If you did, then the file(s) no longer exist.

*****HDSK error**

HARD DISK ERROR. See Section 6.5.

*****HDSL error**

HARD DISK SELECT error means that a program has made an inappropriate call to the Hard Disks. See Section 6.5.

INVALID FORMAT

The format you have specified is not valid. Check for typing errors, punctuation, and spaces.

INVALID PIP FORMAT

Check your punctuation marks (for example, a ';' instead of a ':' will give this message). Specifying an incorrect drive will also give this message.

INVALID SEPARATER

Check your punctuation. You may have used a comma instead of a period.

NO FILE

The computer cannot find the file(s) you named. Check to see if you typed the filename(s) correctly. If you did, then the file(s) no longer exist.

Not a valid CP/M filename.
Please re-enter name.

You have specified a filename that does not conform to standard CP/M filename conventions.

Not a valid drive char.
Valid chars are A,B,C and D.

You have hit the wrong letter in specifying a drive.

NOT FOUND

The computer cannot find the file(s) you named. Check to see if you typed the filename correctly. If you did, then the file(s) no longer exists.

On logged drive can't find file: XXX.

The file you have named is not stored on the logged drive. Try another drive letter, or search for the file with DIR or SD.

<PARTITION NAME> LOCKED

A message for shared partitions only. The partition in use has been locked for four seconds. An indication of serious internal HIDOS error. Hit any key to retry, enter CTRL C to reboot.

<PARTITION NAME> NOT LOCKED

A message for shared partitions only. An attempt was made to unlock a partition that was not locked. A sign of a serious internal HIDOS error. Hit any key to ignore, enter CTRL C to reboot.

SHRALLOC

May be repeated across the screen until you reset the computer. This message indicates that you have tried to access a partition that is marked as shared in the ALLOC Table but has not had the SHRALLOC program run on it. The Network Administrator should mark the partition as ownable, run SHRALLOC while logged to the partition to be shared and then remark the partition as shared in the ALLOC Table.

*****SPOOL ERROR**

This probably indicates that the Spooler is full, and no new print jobs can be stored until some of those already on the Spooler have been removed, either by printing them or erasing them. **CTRL-C** will abort your job and put you

back into CP/M; **<CR>** will make another try at sending your job to the Spooler.

That is not a valid intensity level.
When setting Screen Intensity Level CUSTOMIZ only recognizes the numbers 1-15.

There is no user defined version present.
You have selected a user defined keyboard or language but none is loaded into CUSTOMIZ's workspace. You need to load a file containing your User Defined Character Set or Keyboard.

User language is the wrong size.
I can't read it in.
When a DMS-5000 is in the vertical mode it can use only Small Character Sets. This message will appear if you have tried to load a large size User Defined Character Set.

(continued next page)

*****User XX NAME SYNC error at XXXX**
MASTbuf: Mst Usr To Frm Dsk Track Sec Vol DMAadr
XX XX XX XX XX XX XX XX XX XX XX

*****User XX NAME CRC Net error at XXXX**
MASTbuf: Mst Usr To Frm Dsk Track Sec Vol DMAadr
XX XX XX XX XX XX XX XX XX XX XX

*****User XX NAME OVR Net error at XXXX**
MASTbuf: Mst Usr To Frm Dsk Track Sec Vol DMAadr
XX XX XX XX XX XX XX XX XX XX XX

*****User XX NAME LATE Net error at XXXX**
MASTbuf: Mst Usr To Frm Dsk Track Sec Vol DMAadr
XX XX XX XX XX XX XX XX XX XX XX

The above 4 messages appear on the Master after a Network Error. See Section 6.5 for explanations. These errors are automatically recoverable.

*****WAITING**

This message occurs when the station is waiting to communicate with the Master Computer. It usually indicates a minor problem with the HiNet master. Do not RESET or turn off your workstation, as doing so will cause you to lose the work you have done since your last 'Save' command.

7.0 CUSTOMIZING

7.1 INTRODUCTION

The DMS-3/501 is an extraordinarily versatile computer that allows the user to select a wide range of operating modes. This section of the manual will describe the use and operation of various features and capabilities of the DMS-3/501 that are accessed through the CUSTOMIZ utility. This section does not apply to DMS-3/4 Masters since their terminal characteristics are unknown.

----------NOTE----------

CUSTOMIZ cannot be used on a DMS-3/501 when it is running as a Network Master. To create a file that can be used on a DMS-3/501 Master, you must either boot the DMS-3/501 from a Floppy Diskette with CUSTOMIZ on it or use another workstation (DMS-3/F, DMS-5000) on the Network to run CUSTOMIZ and create a file for the Master. **Attempting to load the CUSTOMIZ program on a DMS-3/501 Master may bring down the Network.**

The CUSTOMIZ utility is used to individually customize a DMS-3/501 (or DMS-5000, DMS-3/F) workstation. CUSTOMIZ is an easy-to-operate menu-driven utility, that can be used to:

- Specify various screen features.

- Assign definitions to your Special Function Keys.

- Reconfigure the DMS-3/F and DMS-3/501 to emulate a variety of terminals.

- Choose a foreign language.

- Rearrange your keyboard.

See Section 7.9 for the system requirements and program files necessary to use CUSTOMIZ.

7.1.1 SCREEN ATTRIBUTES -- OVERVIEW

CUSTOMIZ can be used to customize your CRT display by:

- Setting brightness to the most comfortable level (Section 7.3).

- Choosing regular or inverse video (Section 7.4).

7.1.2 SPECIAL FUNCTION KEYS -- OVERVIEW

There are a total of 90 Special Function Keys which you may program as you wish. See Section 7.5 for details on setting up Special Function Keys.

Special Function Keys are used to eliminate frequently repeated keystroke chains. During the writing of this manual, for example, the frequently written word 'CUSTOMIZ' was assigned

to Function Key F1; thus every time 'CUSTOMIZ' was used, only that one key had to be struck. Additional Special Function Keys were assigned other frequently repeated names and phrases.

Special Function Keys may also be used to chain computer commands. For example, one single key might be designated to load and configure a word processor (or other Applications Program) while other keys could be set to carry out frequently used command sequences. Special Function Keys may also be nested, with one invoking another for maximum flexibility. See Section 7.5.9 for some possible Special Function Key ideas.

7.1.3 TERMINAL EMULATIONS -- OVERVIEW

The DMS-3/501 and the DMS-3/F will emulate several different terminals. This allows software designed to run on one of those particular terminals to run on a DMS-3/F or DMS-15. By using the CUSTOMIZ utility you may easily switch among emulations. See Section 7.6.

7.1.4 CHARACTER SETS -- OVERVIEW

The DMS-3/501 offers the ASCII (American Standard) Character Set as the standard setting. You may use the CUSTOMIZ utility to install any of the European character sets supplied by DMS.

7.1.5 KEYBOARD RE-ARRANGEMENT -- OVERVIEW

With the CUSTOMIZ utility you can redefine the keys on your keyboard. For example, the placement of semi-colons, quotation marks, etc., can be changed to the positions they occupy on standard office typewriter keyboards, or the entire layout changed from the standard QWERTY arrangement to another format such as the DVORAK. Since different keyboard layouts can be stored in files, it is a quick and simple matter to change from one to another. See Section 7.8 for more on keyboard layouts.

----------NOTE----------
DMS provides TYPERITE.KBD, a Settings File containing a standard office typewriter keyboard which can be easily loaded with CUSTOMIZ. See Section 7.2.2 for more on loading files.

7.1.6 USING THIS PART OF THE MANUAL

Section 7.2 of this manual explains how CUSTOMIZ is used to make save Settings Files. Because the CUSTOMIZ menus are largely self-explanatory, you may not need to read beyond Section 7.2 for most CUSTOMIZ operations.

Sections 7.3 through 7.8 give detailed descriptions of the different types of settings, how they are used, and how they are created. Most of these sections begin with a step-by-step tutorial demonstrating how to carry out the particular operation, followed by sub-sections

giving informational notes regarding the specific subject.

Section 7.9 contains information on the programs and workstation requirements needed to use CUSTOMIZ. The Appendix contains a list of error messages, an index, and keyboard diagrams.

In the text of this manual, the menu item Highlighted on your screen by inverse video will be indicated in this manual's screen depictions by **BOLDFACED** and in **ALL CAPS.**

7.2 USING CUSTOMIZ

7.2.1 INTRODUCTION

CUSTOMIZ provides menu screens used to select various settings, define Function Keys, rearrange the keyboard, and choose a character set (see Section 7.2.3). Most of your selections will be implemented on your workstation as soon as you choose them. However, some types of settings do not become operative until you exit the CUSTOMIZ utility, and for some others you will be asked if you wish to start using the selection at once (load it) or only include it in a Settings File.

Once you leave the CUSTOMIZ utility, your selected settings will remain operative on your workstation until you turn it off or Reset it, or until you make different choices with CUSTOMIZ.

The Save Settings option of the CUSTOMIZ MAIN MENU COLUMN is used to store your choices in a Settings File. Once your selections reside in a Settings File, you can load them into your workstation with one simple command (see next section).

7.2.2 USING SETTINGS FILES.

A Settings File contains a record of the settings you selected and saved while using the CUSTOMIZ menus (see Section 7.2.3 Save Settings). Naturally, you can save as many different Settings Files as you wish. To load (or make operative) a Settings File, simply type **CUSTOMIZ filename<CR>** from the CP/M prompt. For example, **A>CUSTOMIZ SF2<CR>** will immediately implement all of the settings in file SF2 without taking you through the menus.

To load a Settings File, only the Settings File and the program file CUSTOMIZ.COM need be present in the logged partition or on the logged disk. In other words, all of the other CUSTOMIZ files (see Section 7.9) are only necessary for creating a Settings File, not using one.

7.2.3 CUSTOMIZ MENU SCREEN

The CUSTOMIZ MENU is used to select settings. After you leave the CUSTOMIZ utility your settings will remain in effect until you change them, or the workstation is turned off or reset. You can also use the CUSTOMIZ MENU to save your choices in a Settings File.

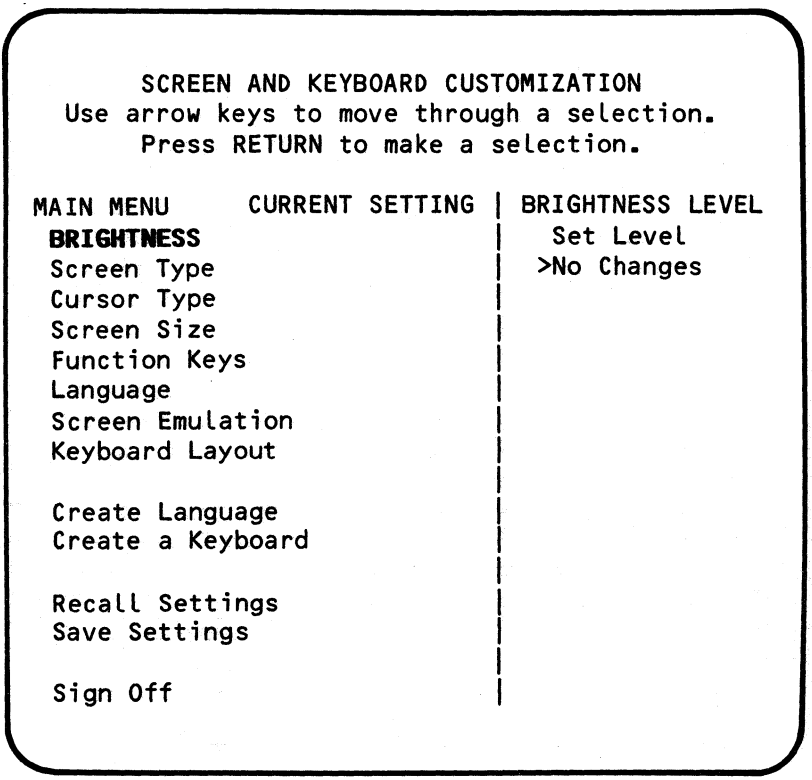
STARTING WITH CUSTOMIZ STEP BY STEP

All of the CUSTOMIZ program files must be present in an assigned partition or on a logged disk. See Section 7.9 for system requirements and a list of the program files.

----------NOTE----------
CUSTOMIZ cannot be used to define settings on the DMS-3/501 while it is emulating some other terminal. If you intend to use one of the terminal emulations you must first use CUSTOMIZ to create your settings, and then enter emulation mode. See Section 7.6 for more on terminal emulations.

1- To call up CUSTOMIZ:
From a logged disk drive, **A>CUSTOMIZ<CR>**,
From a work partition, **C>A:CUSTOMIZ<CR>.**

2- You will now see the CUSTOMIZ Menu Screen.



At the left of the CUSTOMIZ Screen is the MAIN MENU COLUMN which lists the various types of settings available. This list will vary according to the workstation you are using (DMS-5000 or DMS-3/F & DMS-3/501). Reverse video will highlight one of the items in the MAIN MENU COLUMN. At the right of the screen is the Sub-Menu associated with the highlighted item.

---NOTE---
On the DMS-3/F and DMS-3/501 you should see the words **'NO PROG'** in the upper right corner of this screen.

3- The highlight is moved through the MAIN MENU COLUMN with the Number Pad UP and DOWN ARROW keys (8 and 2). As you move through the MAIN MENU COLUMN the various Sub-Menus belonging to the Highlighted entries will be displayed on the right side of the screen. These sub-menus show the various choices available. Hitting RETURN will select the highlighted item and activate the associated Sub-Menu. The Sub-Menu is then used to choose your setting. Use of the individual Sub-Menus will be explained in more detail in the appropriate sections.

As you use the Sub-Menus to make settings, the CURRENT SETTINGS COLUMN at the center of your screen will display your choices. Any Settings Files you create with the Save Settings option will contain whatever selections are listed in the CURRENT SETTINGS COLUMN.

MAIN MENU COLUMN

The MAIN MENU COLUMN is used to select a type of setting or operation. In other words, it lists the various capabilities of the CUSTOMIZ utility. The items in the MAIN MENU COLUMN are highlighted one at a time with reverse video. You can move this Highlight through the list with the Number Pad UP and DOWN ARROW keys (8 and 2). Hitting RETURN activates the Sub-Menu

associated with the highlighted Main Menu item. The appropriate Sub-Menu is used to choose a setting or perform some other operation.

SUB-MENUS

The right side of the screen displays the Sub-Menu associated with a particular item in the MAIN MENU COLUMN. As you move the Highlight through the MAIN MENU COLUMN, new Sub-Menus will appear on the right half of the screen. These Sub-Menus show what settings choices are available. The currently set choice is indicated in the Sub-Menu by an arrowhead.

When a Sub-Menu is activated by moving the Highlight through the MAIN MENU COLUMN and hitting RETURN, the Highlight moves to the currently set choice in the Sub-Menu. While in the Sub-Menu the corresponding MAIN MENU COLUMN item is indicated by an arrowhead. Just as with the MAIN MENU COLUMN, the Number Pad UP and DOWN ARROW keys will move the Highlight through the Sub-Menu. Similarly, striking RETURN will select the highlighted Sub-Menu choice (and in most cases list it in the CURRENT SETTINGS COLUMN). If you wish to exit the Sub-Menu without making any choice, hit ESC.

NO CHANGES

All of the settings Sub-Menus have a NO CHANGES choice which is the normal (default) setting. NO CHANGES means that CUSTOMIZ will leave that aspect of your workstation alone. For

example, a Brightness Level of NO CHANGES means CUSTOMIZ will leave the intensity of your CRT at its current setting. Since NO CHANGES is the default, a setting of NO CHANGES will be included in any Settings File you create, unless you go to a Sub-Menu and choose some other setting.

Normally, if you do not wish to designate a particular category of setting you should simply ignore that item in the MAIN MENU COLUMN and never enter the Sub-Menu.

When NO CHANGES is the setting for a category the Current Settings Column is left blank, indicating that CUSTOMIZ will do nothing with the item. Thus, when you create a Settings File any item that has no corresponding entry in the CURRENT SETTINGS COLUMN will be set at NO CHANGES.

CURRENT SETTINGS COLUMN

When CUSTOMIZ is first invoked the CURRENT SETTINGS COLUMN will be blank. As you use the various Sub-Menus, or read in a Settings File with the Recall Settings option (see Section 7.2.3, Recall Settings), your selections will be listed in the CURRENT SETTINGS COLUMN. For example, if you use the Brightness Menu to set your CRT screen at level 13, the words **level 13** will be displayed. Each time you change a setting, the new setting will be listed in the CURRENT SETTINGS COLUMN. The contents of the CURRENT SETTINGS COLUMN show what will be

included in any Settings File you save with the Save Settings option as explained next.

----------NOTE----------
For some items, Language and Keyboard, for example, what is listed in the CURRENT SETTINGS COLUMN may be different from the settings actually in effect on your CRT and keyboard. This is because some items may be selected but not activated (in other words, listed in the CURRENT SETTINGS COLUMN for the purposes of creating a Settings File, but not put into immediate operation). Thus it is important to remember that only what is listed in the CURRENT SETTINGS COLUMN will be saved into a permanent Settings File.

SAVE SETTINGS

The 'Save Settings' choice will store all of your selections in a Settings File. This permanent record can then be loaded into your workstation without going through the menu by typing **A:CUSTOMIZ C:filename<CR>.**

Step by step

1- Move the MAIN MENU COLUMN Highlight to the SAVE SETTINGS option and hit RETURN.

2- At the bottom of your screen you will be asked to enter a filename. Be sure to specify the drive where you wish the file to be stored (**C:XYZ.SF**, for example). The filename you choose

for your Settings File must conform to the standard CP/M file name conventions. After typing in the filename hit RETURN. You will be asked to confirm the filename you have typed in. If you hit '**Y**' for 'Yes' CUSTOMIZ will create the file and return you to the MAIN MENU COLUMN. If you hit '**N**' for 'No' you will be asked for another filename.

REMEMBER---When you save settings into a file it is the selections listed in the CURRENT SETTINGS COLUMN that are recorded. Because you have the option of selecting some types of settings (Language, Keyboard) without having them immediately take effect, some of the items listed in the CURRENT SETTINGS COLUMN may not correspond to what shows on the screen or the keyboard you are using at the moment.

OVERWRITE

When you save a file and give a name that is already present on the logged disk or partition, CUSTOMIZ will inform you that the file already exists and ask if you wish to overwrite it. When you overwrite a file you erase the old contents and put in the new contents. If you have modified or expanded an existing file you will probably wish to overwrite the old Settings File so you would respond with a '**Y**' for 'Yes Overwrite'. If you answer '**N**' for 'No don't overwrite', you will be asked to supply another filename.

RECALL SETTINGS

The Recall Settings option is used to load the contents of a Settings File into the CUSTOMIZ utility. This is done when you wish to alter or update an existing Settings File. Recall Settings can also be used when you wish to use part, or all, of an existing file in the creation of a new file.

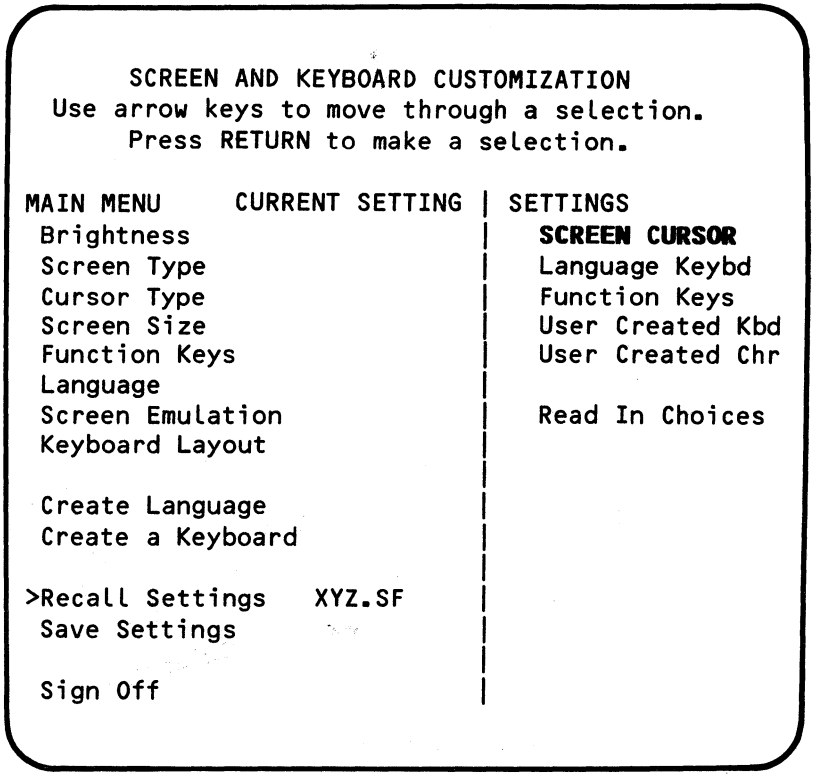
Step by step

1- Move the MAIN MENU COLUMN highlight to the RECALL SETTINGS option and hit RETURN.

2- At the bottom of your screen you will be asked to enter the filename you wish to load. Type in the filename and hit RETURN. The filename will appear in the CURRENT SETTINGS COLUMN opposite Recall Settings.

3- You will then be asked if you wish all settings in the file to be read in. If you respond '**Y**' for 'Yes', everything in the file will be loaded and the appropriate entries made in the CURRENT SETTINGS COLUMN. You will then be returned to the MAIN MENU COLUMN.

4- If you responded '**N**' for 'No don't read in all settings', a list of settings categories will be displayed at the right side of your screen.



5- The Sub-Menu now lists the categories of settings which you can select to be loaded. As usual, you move the highlight through the list with the Arrow Keys and select the items you want by pressing RETURN. The categories you pick will be marked with an arrowhead. You may choose one or more items in any combination. If you change your mind about an item, hitting RETURN a second time will cancel its selection. In other words RETURN acts as a toggle switch selecting and un-selecting an item.

----------NOTE----------
User Created Keyboard and **User Created Characters** only load a keyboard of character set into CUSTOMIZ's workspace for alteration with MAIN MENU COLUMN items **Create Language** or **Create a Keyboard,** or for selection with the **Language** and **Keyboard Layout** items.

When you have made your choices place the Highlight over the **Read-In Marked Choices** option and hit RETURN. The appropriate settings will be loaded into CUSTOMIZ and displayed in the Current Settings Column. You will then be returned to the Main Menu Column.

----------NOTE----------
If you read in more than one Settings File, the last settings loaded will overwrite any existing settings. However, if you choose to read in only certain categories of settings from one file, you can then read categories from another Settings File into the empty slots and thus combine groups of settings from more than one file.

This ability to select the type of setting you wish loaded is very useful for creating a series of Settings Files that have some settings in common. For example, if you do word processing in several languages you may wish to have several Settings Files containing the same Special Function Keys but different foreign language Character Sets. By modifying one Settings File, or combining parts of different Settings Files, and saving the results under new

filenames, you can easily create a series of files appropriate to every necessity. (Manager Mode is often used for this purpose; see Section 7.2.6, Manager Mode.)

DMS-3/F & DMS-3/501

Since neither the DMS-3/F nor the DMS-3/501 are able to accommodate User Defined Character Sets, the message **Cannot load character set, this is a FOX** will appear if you load a file that was created on a DMS-5000. You can, however, use all other aspects of CUSTOMIZ including the standard Foreign Language Character Sets.

LEAVING CUSTOMIZ

To exit the CUSTOMIZ utility, move the Highlight over the **Signoff** choice in the MAIN MENU COLUMN, then hit RETURN.

If you made no changes in any settings since the last time you created a Settings File, you will be returned to CP/M. If you have made a setting that has not been saved to a file you will be reminded and asked if you still wish to exit. If you answer '**Y**' for 'Yes, I want to signoff' you will be returned CP/M. If you answer '**N**' for 'No, I don't want to leave' you will be returned to the MAIN MENU COLUMN. (Some Applications Programs allow you to leave temporarily and run some other program. If you have entered CUSTOMIZ from an Applications Program CUSTOMIZ will return you to that program, not to CP/M.)

----------NOTE----------
Your settings will remain in force on your screen and keyboard whether you save your settings to file or not. They will remain in force as you have chosen them until you use CUSTOMIZ to alter them or reset or turn off your workstation.

UPDATING A SETTINGS FILE

To update, expand, or alter an existing Settings File it is first necessary to load the file into CUSTOMIZ with the Recall item in the MAIN MENU COLUMN.

Because settings remain in effect on your screen and keyboard after you leave CUSTOMIZ, and even after you re-enter CUSTOMIZ, it is easy to forget that you first have to load the file in order to amend it.

For example, you may load a Settings File, begin to work with it, and then decide to add another Special Function Key. When you re-enter CUSTOMIZ your screen will continue to display all of the currently loaded settings, but as far as CUSTOMIZ is concerned there is nothing in the CURRENT SETTINGS COLUMN. If you now add the new key and re-save the Settings File, the only thing left in that file will be the new key; everything else will have been erased (overwritten). Since the settings erased from the file are still operational on your

workstation until you turn it off, you won't know anything is wrong until you restart your workstation and reload that file, at which time you will discover that all your settings (except the one new key) are gone.

7.2.4 CUSTOMIZ AND HINET LOGIN

The person in charge of your network can, if you wish, assign CUSTOMIZ to your Network User Name's type-ahead buffer. This would automatically call up CUSTOMIZ every time you logged onto the network. Below are three possible ways to take advantage of this capability:

1- If you always use your workstation with the same Applications Program (a word processor or accounting program, for example), you could have CUSTOMIZ, a Settings File, and your application program all attached to your User Name. Thus, whenever you logged onto the network your terminal would automatically be customized to your preference, the appropriate function keys designated, and your Applications Program brought up ready to go.

2- If you use more than one Applications Program, but still wish to have your workstation customized to some specified standard settings, you can easily do so by attaching CUSTOMIZ and a Settings File to your user name. This way, the terminal would be automatically adapted to your needs whenever you logged on. You could also assign each Applications Program and appropriate Settings File to a different Special Function

Key and thus invoke and configure with a single keystroke.

3- If you vary the manner in which you customize your workstation you can still have the CUSTOMIZ utility assigned to your User Name. When you log in this would either bring you right to the CUSTOMIZ Main Menu, or allow you to specify which Settings File you wish to use.

7.2.5 SETTINGS FILE INTERCHANGEABILITY

Settings Files are interchangeable between the two types of workstations (DMS-5000 and DMS-3/F & DMS-3/501), but Terminal Emulations will not work on the DMS-5000. The DMS-3/F and the DMS-3/501 cannot use different cursors, the Small Character Sets, or User Defined Character Sets.

MANAGER MODE

Manager Mode can be entered by typing **MGR** after CUSTOMIZ (**A>Customiz mgr<CR>**). Manager Mode is used to create Settings Files for later use on the two different types of terminals. When used on a DMS-5000 this mode displays a menu that contains all of the possible choices for both the DMS-5000 and the DMS-3/F -3/501, thus allowing you to create files applicable to either type of workstation.

While files created on one type of workstation are usable on the other, you are still limited by a particular station's capabilities. If a Settings File contains a

setting that a particular unit cannot handle, that portion of the file will be inoperable. For example, you can load a file containing a User Defined Character Set into a DMS-3/501 but the Character Setting will not work.

7.3 SCREEN BRIGHTNESS

The brightness of the screen is measured in increments from 1 to 15, with 15 the maximum and 1 so dim as to be practically invisible. As with all CRTs, the brighter intensity levels may cause a slight blurring of the characters.

----------NOTE----------
The most comfortable brightness level will vary from person to person, and may change as the amount of light in the room increases and decreases.

SETTING INTENSITY STEP BY STEP

1- Move the MAIN MENU COLUMN highlight to the **BRIGHTNESS** option and hit RETURN.

2- The current (default) Brightness Sub-Menu choice will be Highlighted in reverse video. Use the Arrow Keys to place the Highlight over your choice and hit RETURN. (ESC will bring you back to the MAIN MENU COLUMN without making any alterations in any settings.)

3- If you select the **NO CHANGES** option you will be returned to the MAIN MENU COLUMN and nothing will be listed in the CURRENT SETTINGS COLUMN opposite **'Brightness'.** See Section 7.2.3 for an explanation of the No Changes option.

```
          SCREEN AND KEYBOARD CUSTOMIZATION
      Use arrow keys to move through a selection.
           Press RETURN to make a selection.

MAIN MENU          CURRENT SETTING | BRIGHTNESS LEVEL
>Brightness                        |   Set Level
 Screen Type                       |  NO CHANGES
 Cursor Type                       |
 Screen Size                       |
 Function Keys                     |
 Language                          |
 Screen Emulation                  |
 Keyboard Layout                   |
                                   |
 Create Language                   |
 Create a Keyboard                 |
                                   |
 Recall Settings                   |
 Save Settings                     |
                                   |
 Sign Off                          |
```

4- If you select **SET LEVEL** the command line **>>> ENTER A BRIGHTNESS LEVEL BETWEEN 1 AND 15:** will appear at the bottom of your screen. Type in the number of the desired intensity level and hit RETURN. Your CRT screen will immediately go to the specified brightness level

and you will be returned to the MAIN MENU COLUMN. The level you chose will be listed in the CURRENT SETTINGS COLUMN opposite the Brightness item.

7.4 SCREEN TYPE

There are two types of screen available on the DMS-5000, DMS-3/F & DMS-3/501 workstations -- **Normal Video** (green glowing characters on a dark screen) and **Inverse Video** (black characters on a green screen). You should choose whichever is more comfortable for you.

SCREEN TYPE STEP BY STEP

1- Move the MAIN MENU COLUMN highlight to the **Screen Type** option and hit RETURN.

2- The current (default) Screen Type Sub-Menu choice will be Highlighted in reverse video. Use the Arrow Keys to place the Highlight over your choice and hit RETURN. (ESC will bring you back to the MAIN MENU COLUMN without making any alterations in any settings.)

```
        SCREEN AND KEYBOARD CUSTOMIZATION
   Use arrow keys to move through a selection.
        Press RETURN to make a selection.

MAIN MENU     CURRENT SETTING  | SCREEN TYPE
 Brightness                    |   NORMAL VIDEO
>Screen Type                   |   Inverse video
 Cursor Type                   |   No Changes
 Screen Size                   |
 Function Keys                 |
 Language                      |
 Screen Emulation              |
 Keyboard Layout               |
                               |
 Create Language               |
 Create a Keyboard             |
                               |
 Recall Settings               |
 Save Settings                 |
                               |
 Sign Off                      |
```

3- If you selected the **NO CHANGES** option you will be returned to the MAIN MENU COLUMN and nothing will be listed in the CURRENT SETTINGS COLUMN opposite **SCREEN TYPE.**

4- If you selected either **NORMAL VIDEO** or **INVERSE VIDEO** your screen will immediately become the type you have specified and you will be returned to the MAIN MENU COLUMN. Your selection will be listed in the CURRENT SETTINGS COLUMN opposite **SCREEN TYPE.**

When using the DMS-3/F or the DMS-3/501 you may switch between Normal and Inverse Video from the CP/M Command Prompt (**A>, B>,** etc.) without using the CUSTOMIZ utility. This is done by striking first the ESC key and then a capital **'T'** followed by a RETURN (**A>ESC T <CR>**). Each time this is done the screen will alternate between regular and inverse video. Using ESC T will not affect any other CUSTOMIZ settings or any Settings File. ESC T should not be used while you are working in an Applications Program.

7.5 SPECIAL FUNCTION KEYS

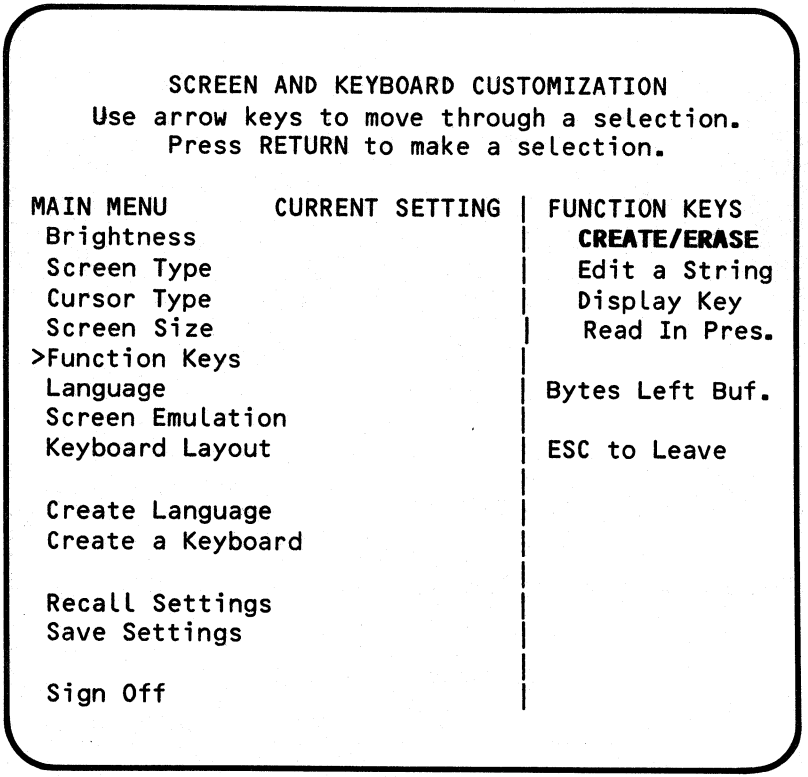
Both character strings and computer command chains may be assigned to individual Special Function Keys. For example, during the writing of this manual a Special Function Key was defined with the word 'CUSTOMIZ', and hitting that single key produced the entire word. Similarly, a Special Function Key was assigned the entire chain of commands used to call up and configure the word processing program which was used to write this manual. See Section 7.5.9 for examples of typical Special Function Key uses.

7.5.1 DEFINING/ERASING A FUNCTION KEY

1- Move the MAIN MENU COLUMN highlight to the FUNCTION KEYS option and hit RETURN.

2- The current (default) FUNCTION KEYS Sub-Menu option will be Highlighted in reverse

video. The Sub-Menu choices are explained below. If you wish to create a new key, erase a key, or replace the contents of an existing key, choose the CREATE/ERASE option. If you wish to modify an existing key select the EDIT option. Use the Arrow Keys to place the Highlight over the choice you wish to select and hit RETURN. (ESC will bring you back to the MAIN MENU COLUMN without making any alterations in any settings.)



CREATE/ERASE

This menu item is used both to create and to erase a Special Function Key. When this option is selected the message **>>> PRESS FUNCTION KEY YOU WISH TO CREATE OR ERASE** will appear at the bottom of your screen.

ERASING

There are 90 Special Function Keys (see Section 7.5.4). Pressing one of them will automatically erase everything currently assigned to it and you will see the message: **DEFINING FUNCTION KEY xx.** If you do not wish to assign anything new to the key, hit RETURN and the key will remain empty. You will now be back at the **>>> PRESS FUNCTION KEY YOU WISH TO CREATE OR ERASE** message. From there you can either erase/define another Special Function Key or return to the MAIN MENU COLUMN or FUNCTION KEY Sub-Menu.

DEFINING

When you see the message **DEFINING FUNCTION KEY xx** you may begin typing in the characters and control commands you wish to assign to that key. What you type will appear at the bottom of your screen. When you are finished hit RETURN and you will be returned to the **>>> PRESS FUNCTION KEY YOU WISH TO CREATE OR ERASE** message. From there you can either erase/define another Special Function Key or return to the MAIN MENU COLUMN or FUNCTION KEY Sub-Menu.

EDITING A SPECIAL FUNCTION KEY

The Sub-Menu option **Edit a String** is used to modify an already existing Special Function Key. When you place the Highlight over this choice and hit RETURN the message **>>> PRESS FUNCTION KEY YOU WISH TO EDIT:** will appear on the bottom of your screen.

When you press the Special Function Key you wish to modify, the string of characters and commands currently assigned to that key will appear on the bottom of your screen along with a flashing cursor.

When you are finished editing the string hit RETURN and you will be returned to the **>>>PRESS FUNCTION KEY YOU WISH TO EDIT** message. From here you can either edit another key or return to the other menus.

CORRECTING ERRORS

You can move the cursor through the string with the Number Pad LEFT and RIGHT ARROW keys (4 and 6). Wherever the cursor is placed you can type in new characters. If you make an error, use the DEL key to erase the character to the left of the cursor.

THE @ AND COMMAND KEYS

CUSTOMIZ recognizes RETURN, DELETE, LEFT ARROW (4), RIGHT ARROW (6), ESC, and @ as

command signals for this part of the program. If you want to assign one of these characters to a Special Function Key you must first order CUSTOMIZ not to treat it as a command signal.

This is done by entering an **@**. The '@' commands the CUSTOMIZ utility not to obey the next character you enter, but rather to assign it to the Special Function Key. Since the '@' is a command signal it will not show on the screen or be assigned to your Special Function Key unless you first precede it by another '@'.

For example, to include the DELETE character in a Special Function Key string you would first type @ (which would not appear on the screen) followed by the DELETE key which will appear on the screen as **DEL**.

To Include in a Special Function Key Definition:

Character	Type in	Appear on screen
DELETE	**@DELETE**	**DEL**
RETURN	**@RETURN**	**^M** (Arrow/Capital M)
@	**@@**	**@**
LEFT ARROW	**@4**	**F18** (Number Pad 4)
RIGHT ARROW	**@6**	**F24** (Number Pad 6)
ESC	**@ESC**	**ESC**

NESTING FUNCTION KEYS

It is possible to 'nest' Special Function Keys, in other words, to have one Special Function Key refer to (or call on) another. For example, if Function Key F4 was programmed with the string **1 2 3 4 F9 A B C**, and Function Key F9

was assigned the string **X Y Z = @,** then hitting Special Function Key F4 would produce the string **1 2 3 4 X Y Z = @ A B C.** Naturally, if the character string assigned to F9 were altered the change would also affect the output of F4.

CHARACTER LIMIT

'Bytes Left in Buffer' tells you how many characters are available to be assigned to various Special Function Keys. A total of 934 characters may be assigned to Special Function Keys for the DMS-5000, and 1,958 for the DMS-3/F and DMS-3/501.

There is also a maximum limit to the number of characters you can assign to any single Special Function Key. With the DMS-5000 this maximum is 125 characters per Key. For the DMS-3/F and DMS-3/501 250 characters may be assigned t any given Key.

----------NOTE----------
When nesting Special Function Keys the character count of the nested key does not count against the number credited to the first key. Thus, by nesting keys a much longer string may be invoked by a single key.

7.5.2 DISPLAY ALL KEYS

The **DISPLAY ALL KEYS** Sub-Menu option is used to show the contents of all currently loaded Special Function Keys, in other words,

those keys that were contained in a Settings File loaded by Recall Settings and/or programmed with the FUNCTION KEYS Sub-Menu screen during this present use of the CUSTOMIZ utility.

When you place the Highlight over this choice and hit RETURN a message will appear instructing you to hit any key to begin the display, or hit ESC to abandon it. The definitions of all designated Special Function Keys will be listed on the left side of your screen. If there are too many to fit on a single screen, hitting any key will clear the first screen and show the next one.

7.5.3 READ IN PRESENT SETTINGS

The FUNCTION KEYS Sub-Menu option **Read In Present Settings** will only appear if you are using a DMS-3/F or a DMS-3/501. With the DMS-3/F & DMS-3/501 you can program Special Function Keys without using the CUSTOMIZ utility (see Section 7.5.8). The Read In Present Settings Sub-Menu option is used to load such independently programmed Function Keys into CUSTOMIZ so that they may be included in a CUSTOMIZ Settings File.

To do so, place the Highlight over the **Read In Present Settings** option and hit RETURN. You will be asked to confirm your choice. If you hit **'Y'** for 'Yes' whatever Special Function Keys are currently in operation on your keyboard (from whatever source) will be read into the CUSTOMIZ utility.

7.5.4 AVAILABLE SPECIAL FUNCTION KEYS

Across the top of the keyboard are 16 Special Function Keys labeled F1 through F16. The three blank keys in the Main Section of the keyboard are Special Function Keys. The 11 keys of the Number Pad (0-9 plus the period) are also Special Function Keys (ENTER is the same as RETURN and is not a programmable Special Function Key). This adds up to 30 keys, each of which can be used normally, with the CONTROL key held down, or with the SHIFT key held down for a total of 90 Special Function Keys (30 x 3).

7-1 SPECIAL FUNCTION KEY TABLE

KEY	Regular	CTRL	SHIFT
	(Top Row Section)		
F1	F1	^F1	$F1
F2	F2	^F2	$F2
F3	F3	^F3	$F3
F4	F4	^F4	$F4
F5	F5	^F5	$F5
F6	F6	^F6	$F6
F7	F7	^F7	$F7
F8	F8	^F8	$F8
F9	F9	^F9	$F9
F10	F10	^F10	$F10
F11	F11	^F11	$F11
F12	F12	^F12	$F12
F13	F13	^F13	$F13
F14	F14	^F14	$F14
F15	F15	^F15	$F15
F16	F16	^F16	$F16

SPECIAL FUNCTION KEY TABLE CONTINUED

KEY	Regular	CTRL	SHIFT
	Number Pad Section		
7	F17	^F17	$F17
8	F18	^F18	$F18
9	F19	^F19	$F19
4	F20	^F20	$F20
5	F21	^F21	$F21
6	F22	^F22	$F22
1	F23	^F23	$F23
2	F24	^F24	$F24
3	F25	^F25	$F25
.	F26	^F26	$F26
0	F27	^F27	$F27
	Main Section Blank Keys		
Upper	F28	^F28	$F28
Upper	F29	^F29	$F29
Lower	F30	^F30	$F30

Each Special Function Key has a unique number (see table 7-1). When used with the CONTROL key held down, an Up Arrow (^) is placed in front of the Function Key's number. When used with the SHIFT key held down, the number is preceded on the screen by a dollar sign ($).

----------NOTE----------

When you look at the Special Function Keys Table you will see that the Function Key numbers for the Number Pad keys do not run sequentially. This might seem confusing at first, but if you look at the arrangement of the keys on the key board you will see that the 3 top keys of the Number Pad (7,8,9) are F17, F18, F19; the next row (4,5,6) contains Special Function Keys F20,

F21, F22; and so on. In other words, the Special Function Key number sequence runs through the Number Pad from left to right, top to bottom, like text in a book.

The DMS-5000, DMS-3/F, and DMS-3/501 use CTRL/SHIFT KEYS for various functions. These keys are not programmable by the user.

7.5.5 FUNCTION KEYS & APPLICATIONS PROGRAMS

When you use a Special Function Key in association with an applications program (such as a word processor) the key will occasionally fail to operate correctly. This is usually caused by the computer entering the key's assigned characters too fast for that particular program to handle them. This problem can often be remedied by including a meaningless character (such as BACKSPACE) at the beginning of the key's character string, or before whatever character the program is having difficulty catching. (When defining Special Function Key character strings the BACKSPACE key is displayed on the CUSTOMIZ screen as ^H.)

7.5.6 NUMBER PAD KEYS

The DMS-3/F and DMS-3/501 Number Pad keys are not automatically programmed to act as numbers. If you want to use the Number Pad for entering numbers you must first use the FUNCTION KEYS option of CUSTOMIZ to define each key as its appropriate number. In other words, the Number

Pad keys are empty Special Function Keys until you assign them a Number character.

One simple way to do this is to use the Customiz Settings File named **PADKEYS.SF** which is included on your Distribution Diskette. PADKEYS.SF is loaded like any other Settings File (**A>Customiz Padkeys.sf<CR>**).

7.5.7 TEMPORARY SETTINGS FILE KEYS

On the DMS-3/F and the DMS-3/501 it is possible to define Special Function Keys without using the CUSTOMIZ utility. These definitions are temporary (that is, they are erased whenever the workstation is Reset or turned off); they can, however, be saved into a file with CUSTOMIZ or with the commands KEYSAVE and KEYLOAD. You cannot use a KEYSAVE file with CUSTOMIZ.

To temporarily assign a character string to a Special Function Key first hit CTRL/SHIFT F1 (key F1 with the CTRL and SHIFT keys simultaneously held down). You will then be asked to hit the key you want to define. When you have done so you will see the symbol > <.

You now type in the characters or commands you wish to assign to the key. As you do so the characters will appear between the arrowheads. Striking CTRL/SHIFT F2 will erase the last character in the string. When you are finished hit CTRL/SHIFT F1 again and you will be returned to whatever you were doing when you started. If you want to designate another Special Function

Key, hit CTRL/SHIFT F1 again and repeat the process.

Keys defined in this way can be saved in a CUSTOMIZ Settings File by using the **READ IN PRESENT SETTINGS** option of the FUNCTION KEYS Sub-Menu.

7.5.8 SOME IDEAS FOR FUNCTION KEYS

1- Some people regularly use several different Applications Programs. A key could be assigned to call up and configure each of those programs. For example, F1 might be designated: **A:PWxxxxxxxxxx<CR>** (the xxxx represent filenames and/or special configuring commands).

By programming a Special Function Key with CUSTOMIZ, Settings Filename, RETURN, and the Function Key assigned to call up an Applications Program, you could simultaneously load the appropriate Settings File and invoke each Applications Program. For example F2, might be: **A:CUSTOMIZ SFPW1<CR>F1.**

If you included these Special Function Keys in every Settings File, you could move from one Applications Program to another with the stroke of a single key.

2- A programmer working on assembly code might wish to assign a key to each program filename (F3 for example), then have keys designated ASM F3, LOAD F3, (word processing program)F3, etc.

3- Headers for form letters could be stored on Special Function Keys. Special Function Keys could also be used to call up files containing standard text.

4- The command string used to call up Electronic Mail and identify yourself could be assigned to a Special Function Key.

5- Special Function Keys could be assigned the command strings necessary to configure Application Programs for 66 lines or 132 columns. (NOTE---Only some Applications Programs have such capabilities.)

7.6 TERMINAL EMULATIONS

7.6.1 REQUIREMENTS

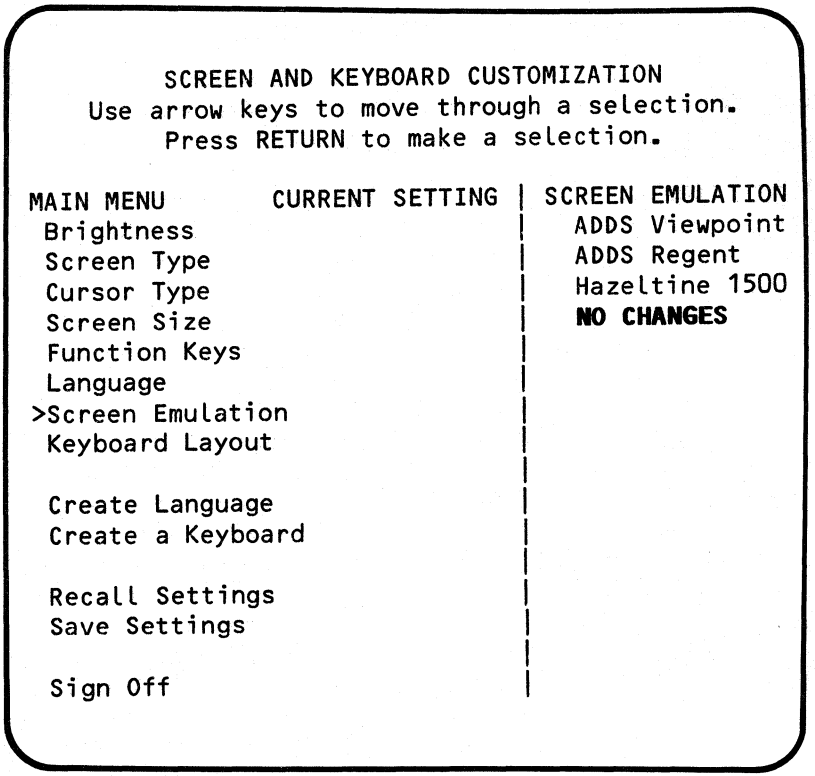
Terminal Emulations can only be done with the DMS-3/F and the DMS-3/501. In addition to their standard DMS configuration, these workstations can emulate three other terminals--Adds Regent 20/25, the Adds Viewpoint, and the Hazeltine 1500. In order to change emulations the appropriate emulation program must be available in memory storage (a logged partition, a floppy disk, or a hard disk).

Terminal Emulation	Program
Adds Regent 20/25	Regent.Com
Adds Viewpoint	View.Com
Hazeltine 1500	Haz15.Com

7.6.2 TERMINAL EMULATION WITH CUSTOMIZ

1- Move the MAIN MENU COLUMN highlight to the SCREEN EMULATION option and hit RETURN.

2- The current (default) Emulations Sub-Menu choice will be Highlighted in reverse video. Use the Arrow Keys to place the Highlight over your choice and hit RETURN. (ESC will bring you back to the MAIN MENU COLUMN without making any alterations in any settings.)



3- If you selected the **NO CHANGES** option you will be returned to the MAIN MENU COLUMN and nothing will be listed in the CURRENT SETTINGS COLUMN opposite 'Screen Emulation'.

4- If you selected one of the emulation options you will be returned to the MAIN MENU COLUMN and your selection will be listed in the CURRENT SETTINGS COLUMN opposite **Screen Emulation.** As soon as you exit the CUSTOMIZ utility your workstation will be adapted to run software designed for the terminal you have selected. (When you leave CUSTOMIZ the words **'DOWNLOAD STARTING'** and **'DOWNLOAD COMPLETED'** should flash across your screen before the CP/M prompt appears.)

While using an emulation your screen will display an abbreviation identifying the emulation you are in. You may change to another emulation by loading another emulation program in the same manner.

----------NOTE----------
Since there is no specific program for the standard DMS terminal the only way to go from an emulation back to standard is to reset your machine.

7.6.3 EMULATION WITHOUT CUSTOMIZ

A Terminal Emulation may be adopted without using the CUSTOMIZ utility (but only CUSTOMIZ can include an emulation in a Settings File). From the CP/M command prompt simply invoke the

appropriate Terminal Emulation COM file as you would any other program--type the name of the program without the period or COM and press RETURN. For example, **A>Haz15<CR>** would command your DMS-3/F or DMS-3/501 to emulate the Hazeltine 1500.

7.7 CHARACTER SETS

A Character Set is the group of letters, numbers, and symbols assigned to the Main Keyboard Section keys, in other words, everything in the Main Section except Special Function Keys and Computer Command Keys.

The standard (default) Character Set is ASCII (American) containing the characters used in the English language and commonly found on American computer keyboards. CUSTOMIZ allows you to select Character Sets containing special letters and symbols used in a number of other languages. These European Sets assign to some of the keys at the right side of the Main Section those letters not contained in the ASCII set. (See Section 7.7.2 for a full description of the Language Character Sets.)

If you are using a DMS-5000 you also have the option of creating your own Character Set. In other words, you can draw any set of letters or symbols you wish and assign them to your keys. (See Section 7.7.4.)

7.7.1 SELECTING A CHARACTER SET

1- Move the MAIN MENU COLUMN highlight to the LANGUAGE option and hit RETURN as described in Section 7.2.3.

Your screen should now look like this:

```
        SCREEN AND KEYBOARD CUSTOMIZATION
     Use arrow keys to move through a selection.
          Press RETURN to make a selection.

MAIN MENU          CURRENT SETTING | LANGUAGES
 Brightness                        |   ASCII
 Screen Type                       |   British
 Cursor Type                       |   Danish
 Screen Size                       |   Dutch
 Function Keys                     |   French
>Language                          |   German
 Screen Emulation                  |   Italian
 Keyboard Layout                   |   Norwegian
                                   |   Swedish
 Create Language                   |   User Defined
 Create a Keyboard                 |   NO CHANGES
                                   |
 Recall Settings                   |
 Save Settings                     |
                                   |
 Sign Off                          |
```

2- The current (default) LANGUAGES Sub-Menu choice will be Highlighted in reverse video. Use the Arrow Keys to place the Highlight

over the choice you wish to select and hit RETURN. Press ESC to return to the MAIN MENU COLUMN without making any alterations in any settings.)

3- If you selected the **NO CHANGES** option, you will be returned to the MAIN MENU COLUMN. Nothing will be listed in the CURRENT SETTINGS COLUMN opposite **'Language'.**

4- If you selected one of the Language Character Sets a message at the bottom of the screen will ask if you wish that Language Set loaded to your screen and keyboard at this time.

If you type '**Y**' for 'Yes' the Language Set you selected will be loaded to your screen and keyboard, and listed in the CURRENT SETTINGS COLUMN. You will then be returned to the MAIN MENU COLUMN. However, no foreign characters will appear on your screen until CUSTOMIZ has occasion to change the current menu, or you type a foreign character in a filename.

----------NOTE----------
Since the European Language Character Sets replace some of the symbol keys with special alphabet characters, and since the CUSTOMIZ screens use some of those same symbols to draw lines with, the CUSTOMIZ screens may look different once in operation with a Language Character Set. This will not affect the operation of CUSTOMIZ.

If you hit **'N'** for 'No, you do not want to load the Language Character Set now' you will be returned to the MAIN MENU COLUMN. The Language Set you selected will be listed in the CURRENT SETTINGS COLUMN but not activated on your screen or keyboard. However, since it is the Current Setting for the purpose of creating Settings Files it will be included when you save a file with the Save Settings option. When you load a file that includes a Character Set, the Character Set is then activated.

Thus, if you wish to use a Language Character Set immediately, tell CUSTOMIZ to load it now. If you are creating a list of settings to be included in a Settings File for later use, answer that you do not want the Language Set loaded now.

7.7.2 THE LANGUAGE SETS

The European Language Sets use five keys on the right side of the keyboard plus the # key for special characters that are not standard on American keyboards. In other words, when you load a Language Character Set the non-alphabet characters normally assigned to these keys are replaced with specific language characters.

ASCII	#	= | ~ { ' * }	- \ ↑ [@ :]
BRITISH	£	= | ~ { ' * }	- \ ↑ [@ :]
DANISH	#	= Ø Ü Æ ' * Å	- ø ü æ @ : å
DUTCH	£	= IJ ~ { ' * }	- ij ↑ [@ :]
FRENCH	£	= ç ↑ ° à * §	- ù ê é ' : è
GERMAN	#	= Ö ↑ Ä § * Ü	- ö ß ä ' : ü
ITALIAN	£	= ò | à ù * è	- ç ↑ ° § : é
NORWEGIAN	#	= Ø ~ Æ @ * Å	- ø ↑ æ ° : å
SPANISH	#	= Ñ ~ { ' * }	- ñ ↑ ¡ @ : ¿
SWEDISH	#	= Ö Ü Ä É * Å	- ö ü ä é : å

SPANISH CHARACTER SET

Due to the lack of a standard Spanish Language Character Set for computers, Spanish is available at this time only with the DMS-5000, which can accommodate user created characters. The Spanish Set has been specially drawn with the Create Character Set MAIN MENU COLUMN option (see Section 7.7.3) and must be loaded as a User Defined Character Set. In other words, to use the Spanish Character Set you must select **User Defined** in the Language Sub-Menu and specify the Spanish Character Set file you wish to use: **SPANISH.CSL** (large characters) or **SPANISH.CSS** (small characters).

7.7.3 PRINTING ALTERNATE CHARACTER SETS

When you strike a key it sends a code (called a Hex Code) to the computer. This Hex

Code informs the computer which character to display on the screen. When you are linked to a printer the code originally sent by your keyboard is relayed by the computer to the printer. The printer is designed to print a specific character for each different Hex Code.

Unfortunately not all printers print the same symbol for the same code. In other words one printer may print { for a certain hex code while another prints >. (In most cases these differences affect the non-alphabet symbols.) The result is that the symbols (or special characters) of a particular printer may not match what is shown on your screen.

With a few of the more sophisticated printers the match-up between code and character can be altered to equal the match between keyboard and CRT screen, but with most printers that is not possible.

Since the DMS-3/F and the DMS-3/501 cannot accommodate a User Defined Character Set the only way to approach a printer-CRT-keyboard matchup problem for these workstations is to alter the Hex Code assignments with the CP/M utility DDT. This should be done by an experienced computer programmer.

USER DEFINED CHARACTERS

There are three basic ways to obtain printouts with a User Defined Character Set:

1- Draw your characters to match those of the printer you wish to use.

2- Obtain a dot-matrix or other type printer that allows you to program its character set.

3- If using a letter quality printer, have wheels or thimbles custom made by the manufacturer to match your character set. If using a dot-matrix type printer, obtain custom made PROMs containing your character set.

7.8 KEYBOARD LAYOUT

The CUSTOMIZ utility allows you to redefine most of the keys on your keyboard. In other words, you can tell the keys to send different characters to the computer. One use for this capability would be to rearrange the location of punctuation symbols so that they match the keyboards of standard office typewriters (see Section 7.8.1 Typists Keyboard). Or you could make more drastic modifications such as changing the entire alphabet layout from QWERTY (the American standard layout) to DVORAK (a layout specially designed for maximum typing speed).

Naturally, since the CUSTOMIZ utility only changes what is sent from the keyboard into the

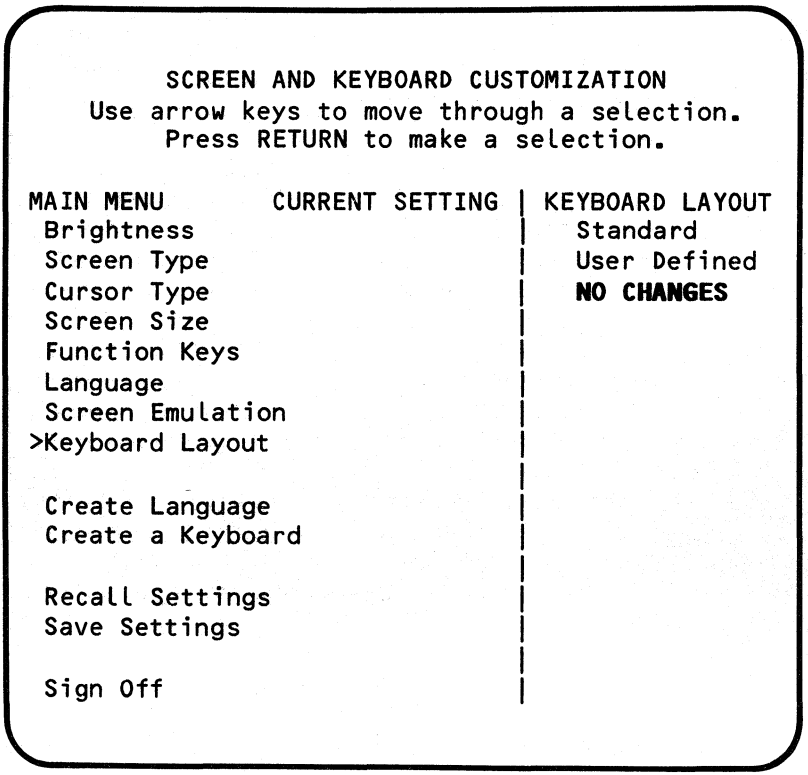
computer the plastic keys on the keyboard will remain exactly as they are unless you physically move or replace them (see Section 7.8.3).

7.8.1 CHOOSING A KEYBOARD

There are two keyboard items in the CUSTOMIZ MAIN MENU COLUMN: **CREATE KEYBOARD** and **KEYBOARD LAYOUT.** CREATE KEYBOARD is used only to build a User Defined Keyboard File (see Section 7.8.2). KEYBOARD LAYOUT is only for selecting the keyboard you actually wish to use.

With KEYBOARD LAYOUT you can choose either the standard DMS keyboard or a User Defined keyboard that you have designed with CREATE KEYBOARD. Thus, if you want to use a keyboard different from the standard DMS board, you first have to define the keys you want with the CREATE option and store them in a file, and then use the LAYOUT option to make the file operational.

Step by step



1- To make operational a specially defined keyboard (for example, an office typewriter key arrangement), or to include that configuration in a Settings File, place the MAIN MENU COLUMN Highlight over the **KEYBOARD LAYOUT** option and hit RETURN. This will bring you to the KEYBOARD Sub-Menu where there are two choices --**STANDARD** and **USER DEFINED.** Place the Highlight over USER DEFINED and hit RETURN.

The message **USER DEFINED** will appear in the CURRENT SETTINGS COLUMN opposite **KEYBOARD LAYOUT.** (**'Standard'** means the original key arrangement provided by Digital Microsystems; if that is selected nothing will appear in the CURRENT SETTINGS COLUMN).

2- If there is no User Defined Keyboard present (from a recent use of the **Create Keyboard** option or from a file) you will be asked for the file that contains the keyboard arrangement you wish to use. Type in the filename (such as **B:TYPERITE.KBD<CR>** for the office typewriter key arrangement). The filename you specify will appear in the CURRENT SETTINGS COLUMN opposite the **CREATE KEYBOARD** menu item.

3- Once you have selected which special keyboard you wish to use (either the one already present or one from a file) you will be asked if you wish to load the User Defined Keyboard now.

If you answer **'N'** for 'No, don't load it now', the special keyboard will not become immediately operational on your keyboard but it will be included in any Settings Files you save. When you later load a Settings File containing a User Defined keyboard, the board will become operational at that time.

If you answer **'Y'** for 'Yes, load it now', the new configuration will immediately take effect (under your finger tips, so to speak)

You can also save it in a Settings File for later use.

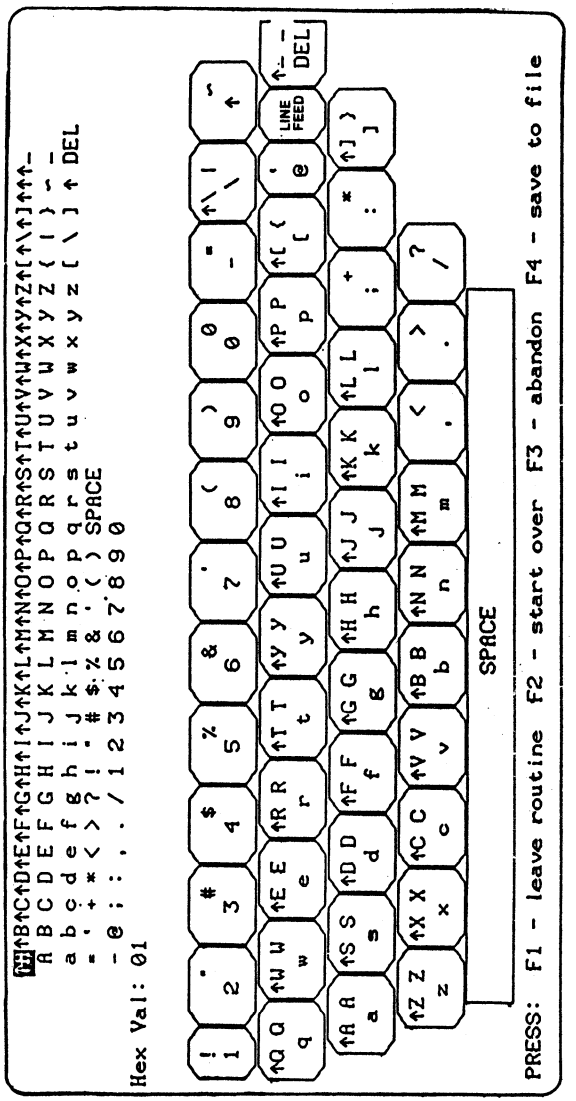
THE TYPIST'S KEYBOARD

We have included on the distribution disk a sample keyboard file called **Typerite.kbd.** This file will redefine your punctuation keys to approximate the layout of standard office typewriters. (See the appendix for a picture of the keyboard layout.) If you wish a different key arrangement you can use the **CREATE KEYBOARD** menu item to design any board you wish.

7.8.2 CREATING YOUR OWN KEYBOARD

The **CREATE KEYBOARD** item in the MAIN MENU COLUMN is used to design your own key arrangement.

After placing the Highlight over the **CREATE KEYBOARD** item in the MAIN MENU COLUMN and hitting RETURN you will see an instruction reminder screen. When you finish reading the screen hit RETURN. (If you already know the instructions, hitting RETURN twice at the MAIN MENU COLUMN will bypass the screen.) A diagram of the keyboard showing the keys you can redefine and the characters it is possible to assign will now appear on your CRT.


Hex Val: 01
SPACE
DEL
LINE FEED
PRESS: F1 - leave routine F2 - start over F3 - abandon F4 - save to file

CHARACTERS

At the top of your screen are five rows of characters. You can assign any of these characters to any key (Normal, SHIFT, or CONTROL).

Control Characters. The top row contains the CONTROL characters which can be assigned to a key. Control characters are computer command signals and are indicated by an UP ARROW preceding the character. Even though Control characters use letters for identification purposes, they are not part of the alphabet; rather, they are a separate set of signals that are used to issue instructions to the computer. Normally a Control Character is assigned to a key's CONTROL VALUE (a key struck while holding down the CTRL Key). However, you can assign a Control Character to a key's NORMAL or SHIFT VALUE if you wish.

KEYBOARD DIAGRAM

Each key has two values, NORMAL and SHIFT. A Normal value is sent to the computer when you hit the key. A SHIFT value is sent to the computer when you strike the key while also holding down the SHIFT KEY. Some keys also have a CONTROL value which is sent to the computer when you press the key while holding down the CTRL KEY.

In the keyboard diagram the character sent to the computer when the key is struck normally is shown on the lower part of the key square.

The character sent to the computer when the key is struck with SHIFT Key held down is shown in the upper right portion of the key square. The character sent to the computer when the key is hit while the CTRL key is held down (if any) is shown in the upper left portion of the key square.

```
          Upper Right = CONTROL VALUE
^R  R     Upper Left  = SHIFT VALUE
  r       Lower       = NORMAL VALUE
```

----------NOTE----------

Since the Number Pad keys are programmable Special Function Keys they cannot be reassigned with CREATE KEYBOARD.

REASSIGNING KEYS

Inverse video will highlight one of the characters at the top of the screen. You can use the Number Pad arrow keys (8,6,2, and 4) to move the Highlight through the Character Set.

Striking a definable key on the keyboard will assign the Highlighted character to that key. For example, if the Highlight is over the capital **'K'** and you hit the 'g' key without SHIFT held down, the capital 'K' will then be assigned to the NORMAL (lower case) 'g' key. When the board is used with this configuration, striking the 'g' without SHIFT will send a capital 'K' to the computer.

You can assign any of the characters at the top of the screen to any of the keys and any of

their values. You could, for instance, reassign all of the Control Characters to keys at Normal Values (so that hitting the key without CTRL held down would send the computer a Control Value).

When a new character is assigned to a key the old character is erased. If you are rearranging many keys you may wish to maintain a list of which characters are eliminated. This would help keep track of what characters still need to be reassigned to some key.

SAVING YOUR KEYBOARD

The **F4** key is used to save a User Defined Keyboard to a file. You will be asked for the name of the file. When you have typed in the filename, and confirmed it, you will be brought back to the KEYBOARD DIAGRAM.

To leave the KEYBOARD DIAGRAM hit F1. This will take you back to the MAIN MENU COLUMN.

STARTING OVER

Hitting **F2** while working with the Keyboard Diagram will erase all of the changes you have made and return the board to the layout that is standard for whatever language you are using.

ABANDONING YOUR WORK

Hitting **F3** will erase any changes you have made to the keyboard and bring you back to the MAIN MENU COLUMN. Nothing you have done since your last 'save' will be stored on disk or remembered by CUSTOMIZ.

COMMAND KEYS WARNING

Your computer accepts certain Control Characters as commands. For example, Control H (^H) is the BACKSPACE command. When the 'H' Key is struck with the CTRL Key held down a Control H is sent to the computer, causing the cursor to move one space to the left.

There are six Special Command Keys on your keyboard (RETURN, TAB, etc.). These keys duplicate the Control Characters assigned to specific alphabet keys. Thus, the BACKSPACE Key is assigned to send to the computer the Control Value of the H Key.

RETURN key	=	CTRL M (^M)
ESC key	=	CTRL [(^[)
LINE FEED key	=	CTRL J (^J)
BACKSPACE key	=	CTRL H (^H)
PAUSE key	=	CTRL S (^S)
TAB key	=	CTRL I (^I)

If you reassign one of these alphabet keys Control Values, the matching Command Key will send to the computer the alphabet key's new Control Value and the computer will not recognize it. In other words, if you assign

something other than Control H (^H) to the Control Value of the H Key, the BACKSPACE Key will no longer operate because it now sends to the computer something other than a Control H.

If you attempt to reassign the Control Value of one of these special keys you will get the message: **WARNING you have asked to redefine a command key. Please confirm (y/n).** If you answer '**Y**' for 'Yes' you can go ahead and reassign that value.

7.8.3 CHANGING THE KEYCAPS

Reassigning the keys with CUSTOMIZ will not, of course, change the plastic key caps on your keyboard. If you wish you can change the caps or place new decals over them.

----------WARNING----------
Be sure the workstation is **turned off** before changing keycaps.

The key caps can be pulled straight up and removed. Since it is difficult to get an adequate grip on the side of the key it is necessary to pull it up from the bottom. The best way to do this is to use a key pulling tool which fits down between the keys and hooks around under the key's bottom. If no key puller is available, pressing down the surrounding keys or removing the keyboard cover may make it easier to get hold of the bottom of the key. To put keycaps back on simply push them straight down over the peg.

----------WARNING----------
DO NOT PUSH DOWN TOO HARD ON THE KEYCAP AS THIS MAY DAMAGE THE CIRCUIT BOARD!

7.9 CUSTOMIZ SYSTEM REQUIREMENTS

7.9.1 CRT VERSIONS

The CUSTOMIZ utility (Version 1.2) will run on the:

DMS-5000	CRT version **1.3** or above
DMS-3/F	CRT version **1.9** or above
DMS-3/501	CRT version **1.9** or above

----------NOTE----------
The current CUSTOMIZ version is 1.2. Both CUSTOMIZ 1.0 and 1.2 (or higher) will work identically on the DMS-3/501 and DMS-3/F. However, if your DMS-5000 CRT version is 1.2, then you should use CUSTOMIZ version 1.0. If your DMS-5000 is version 1.3 or higher then you should use CUSTOMIZ version 1.2.

7.9.2 KEYBOARD VERSIONS

In order to use the Typist's keyboard portion of CUSTOMIZ (TYPERITE.KBD Settings File) it is necessary to have keyboard version 2.2 or above. The remaining portions of CUSTOMIZ will operate on earlier versions of DMS-5000, DMS-3/F, and DMS-3/501 keyboards.

7.9.3 OBTAINING VERSION NUMBERS

If you are not certain of the version installed in your workstation, a Version Read Out will supply this information. From the CP/M Command Prompt type ESC, Capitol V, RETURN (C>**ESC** **V<CR>**). You will see **5000** (or **FOX**) followed by a version number, and **KYBD** followed by a version number.

7.9.4 PROGRAM FILES

To use the CUSTOMIZ utility the following program files must be available in a logged partition or disk drive:

DMS-3/F, DMS-3/501, & DMS-5080	DMS-5086
CUSTOMIZ.COM	CUSTOM2.CMD
CUSTOM2.COM	CUSTOMIZ.CMD
CUST1.OVL	
CUST2.OVL	
CUST3.OVL	
CUST4.OVL	
CUST5.OVL	
LANGUAGE.CST	
CHARSET.CST	(DMS-5000 series only -- for creating character sets)

Plus any Settings Files you may wish to use.

TYPERITE.KBD	Typists Keyboard Setting File
SPANISH.CSL	Spanish Character Set (Large)
SPANISH.CSS	Spanish Character Set (Small)
PADKEYS.SF	Installs Number Pad numerals and set of default Special Function Key values on the DMS-3/501 and 3/F

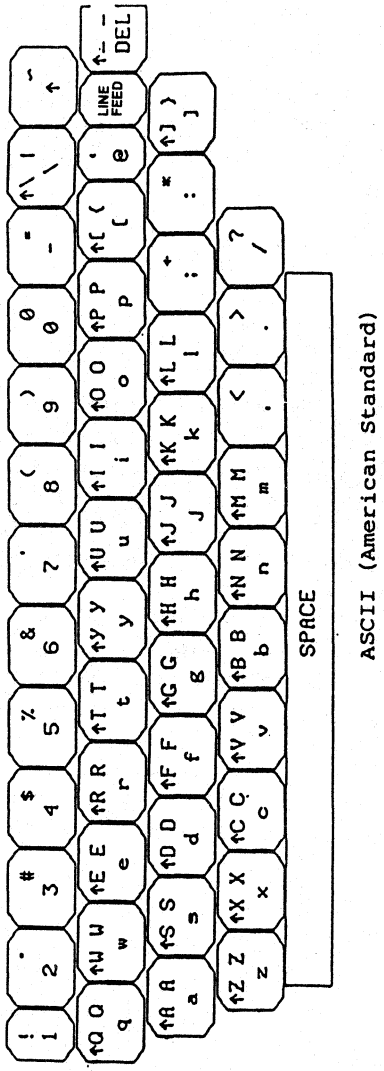
To emulate different terminals with the DMS-3/F and DMS-3/501 the proper Emulation Files must also be present:

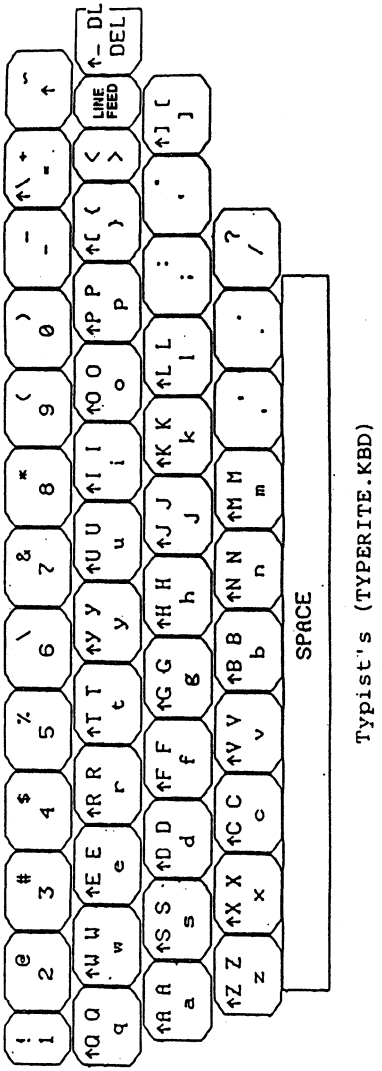
HAZ15.COM (Hazeltine 1500)
REGENT.COM (for Adds Regent 20/25)
VIEW.COM (for Adds Viewpoint)

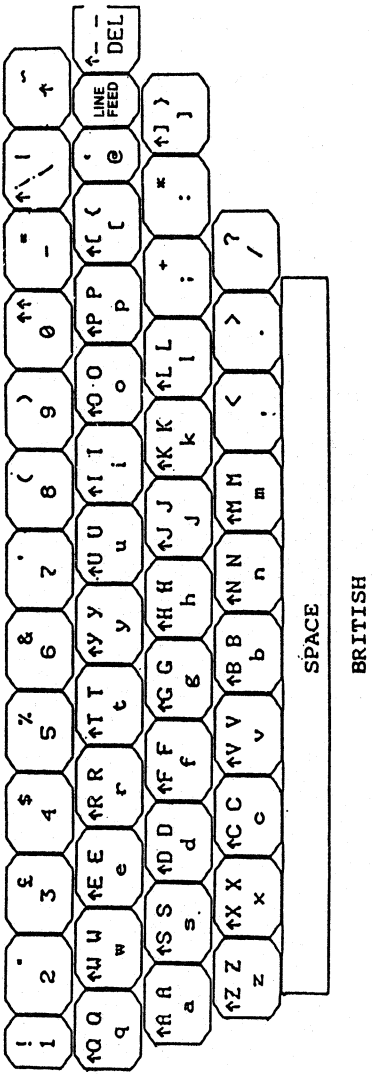
7.9.5 SAVING DISK SPACE

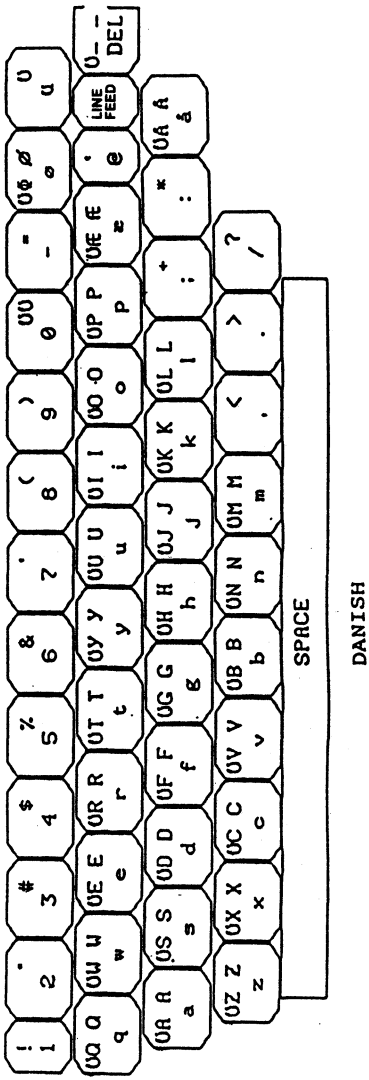
Once a Settings File is created the only program necessary to load it is CUSTOMIZ.COM (or CUSTOMIZ.CMD for the 5086). Thus, if disk space is limited, CUSTOMIZ.COM (or CMD) and a Settings File alone could be used to configure your workstation. For example, CUSTOMIZ.COM and a Settings File could be copied to a Data Base Management Disk. However, you cannot modify a Settings File unless you have the appropriate program files present.

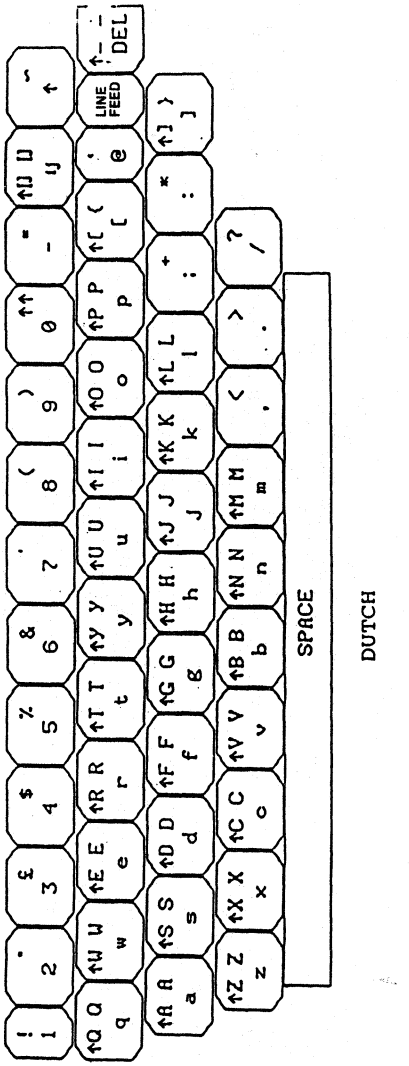
----------NOTE----------
If your Settings File contains a Terminal Emulation, the appropriate Emulation File must also be present.

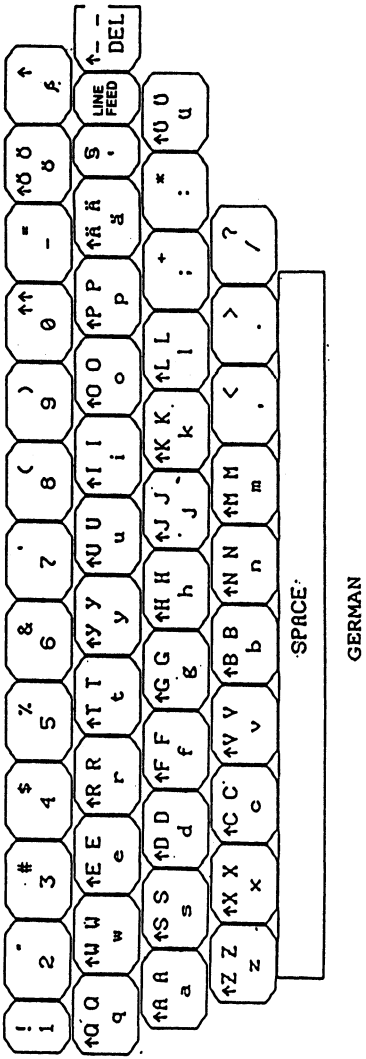

SPACE
LINE FEED
DEL
ASCII (American Standard)

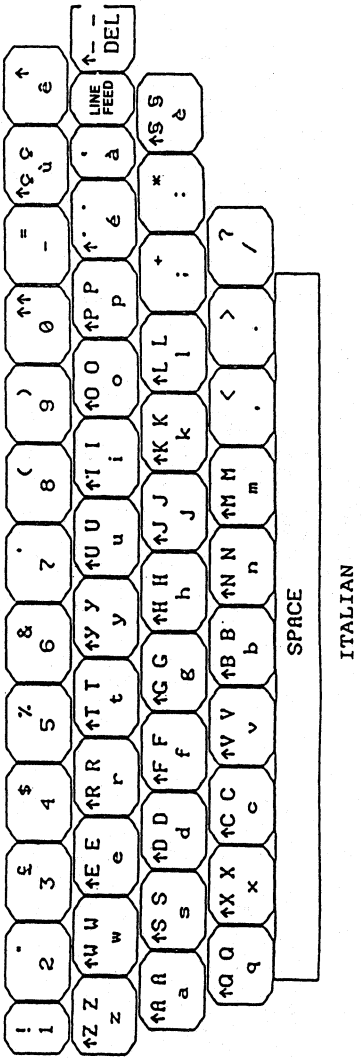

SPACE
LINE FEED
DEL
Typist's (TYPERITE.KBD)

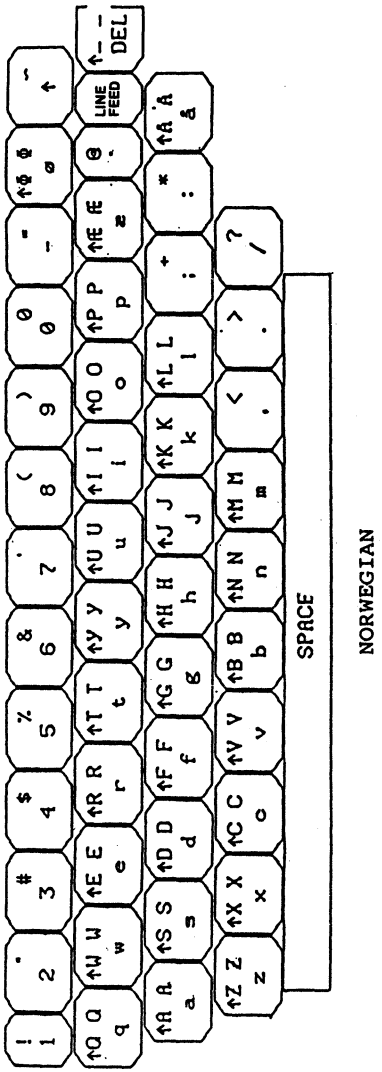

DEL
LINE FEED
SPACE
BRITISH

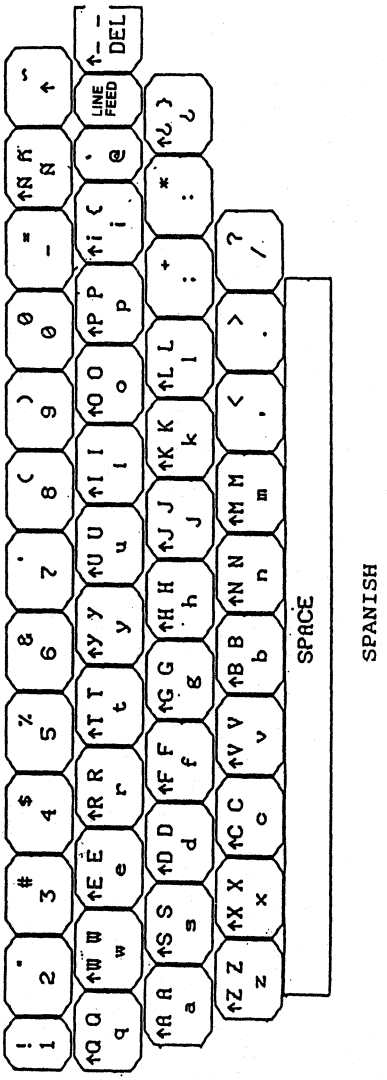

DEL
LINE FEED
SPACE
DANISH

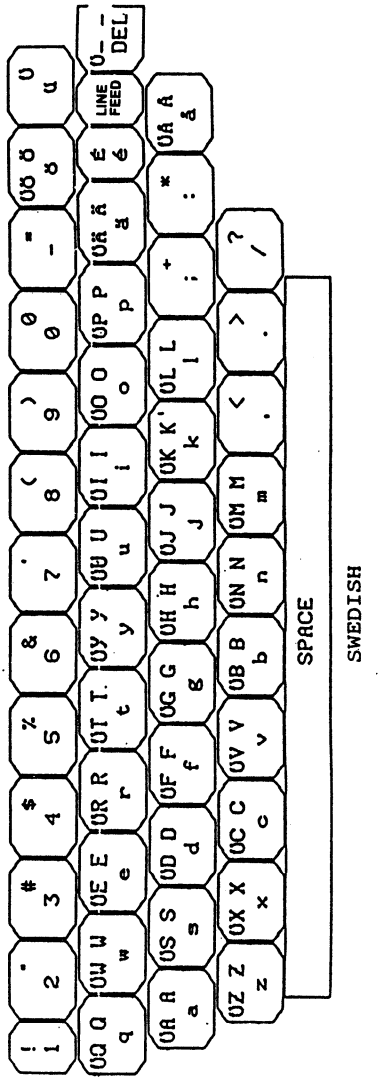

SPACE
DUTCH
LINE FEED
DEL


GERMAN
SPACE
LINE FEED
DEL


DEL
LINE FEED
SPACE
ITALIAN


DEL
LINE FEED
SPACE
NORWEGIAN


SPANISH
SPACE
LINE FEED
DEL


SPACE
SWEDISH
LINE FEED
DEL

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