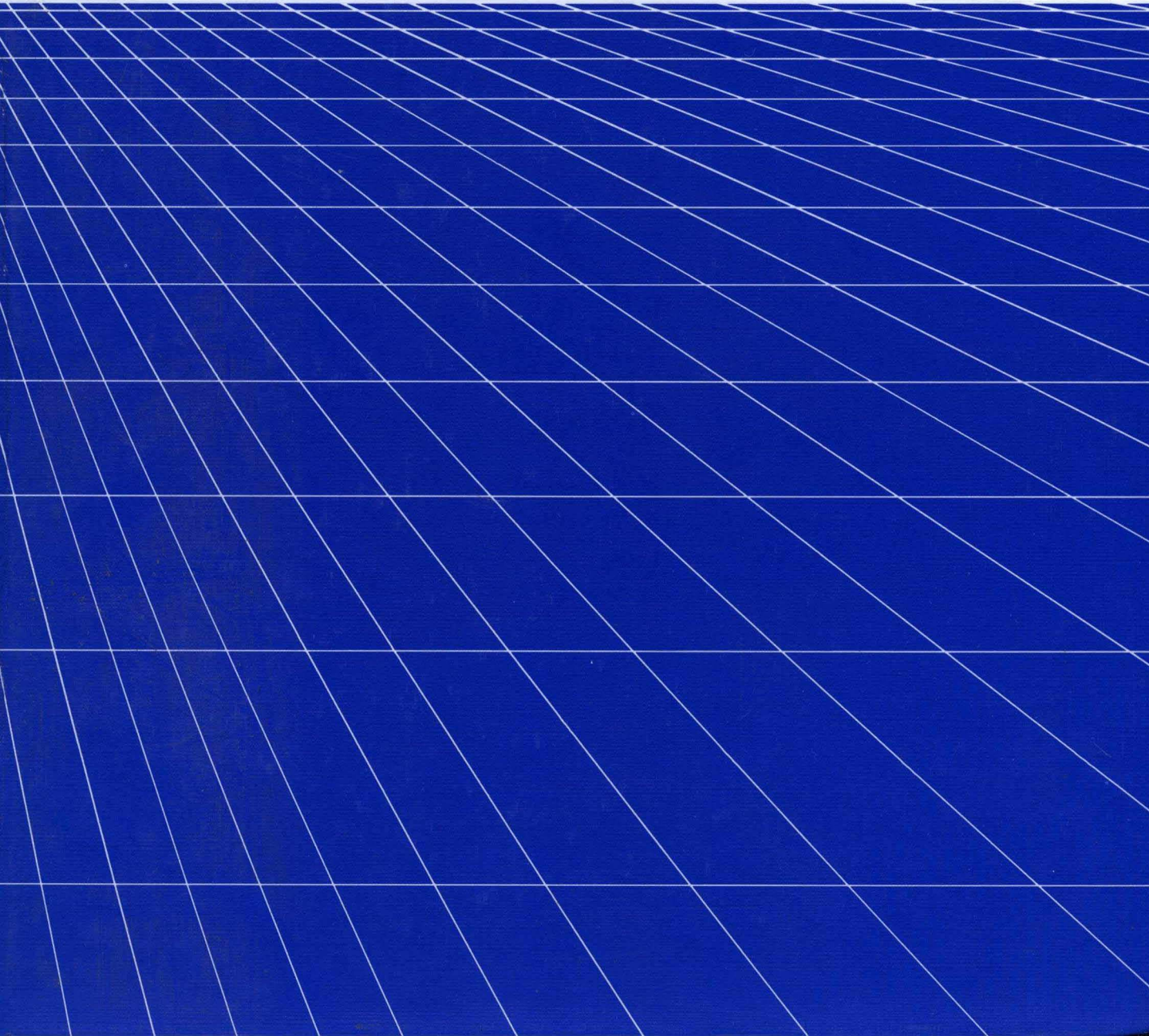
Digital Microsystems™

HINET MASTER VOLUME 1 INSTALLATION GUIDE



Digital Microsystems DSD™

HINET MASTERS
VOLUME 1
NETWORK INSTALLATION
GUIDE

Version 1.2

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FEDERAL COMMUNICATIONS COMMISSION NOTICE

15.818 Class A computing device: information to user.

WARNING--This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause interference with radio communications. This device has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart A of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user, at his or her own expense, will be required to take whatever measures may be required to correct the interference.

DIGITAL MICROSYSTEMS NOTICE

PRINTER CABLES

While the equipment covered in this manual does comply with FCC regulations, the user must purchase and use shielded cables for both the RS-232 serial and the "Centronics" type parallel printer ports. Shielded printer cables must be used to comply with FCC Class A regulations. The use of non-shielded printer cables may cause radio interference.

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2.0 HARD DISK SETUP

PREFACE

THE MANUAL

Digital Microsystems' Manuals are written with you, the user, in mind, not technicians. All the information that you need to know about your DMS computer and the HiNet Network is carefully and clearly explained. We have divided the manual into volumes: Network Installation (Volume 1) and Network Maintenance (Volume 2).

Volume 1 describes step by step procedures for installing software on the Master's Hard Disk, cabling the Network and setting up printers, especially the Spool Printer.

Volume 2 contains information for the Network Administrator(s) on maintaining the Network's ALLOC, USERS, MACHINE and PASSWORD Tables as well as managing software and data security.

The two volumes are divided into a total of sixteen sections for easier reference. A complete table of contents and an index are supplied for each volume. The manuals are organized in the following manner:

VOLUME 1

- Section 1 (Introduction to the Masters) will introduce you to the particular DMS computer that you have and explain the basic procedures for setting it up to begin work.

- Section 2 (Hard Disk Setup) describes the step by step procedures for installing Separated Boot HiNet software on the Network.

- Section 3 (Network Cabling) explains how to cable the Master to the workstations.

- Section 4 (Printers) tells how to connect a printer to the Master (and workstations) and set up the Spool Printer.

- Section 5 (Communications) contains the instructions for installing Electronic Mail and using it on the Network. If purchased, details of using a DMS Gateway to a Mainframe computer are included.

- Section 6 (Glossary) contains definitions of HiNet computer terms used in this manual.

- Section 7 (Appendix) covers miscellaneous information on jumper pins, I/O port information, cabinet disassembly and ESC/CTRL commands.

VOLUME 2

- Section 1 (Introduction) outlines the duties of the Network Administrator.

- Section 2 (Using HiNet) is intended for new computer users or those new to the HiNet system. It contains basic information about files, partitions, network commands, and other material regarding workstations and the HiNet Network.

- Section 3 (CP/M Environment) covers the CP/M operating system.

- Section 4 (Network Maintenance) is the Network Administrator's guide to maintaining the Network's Hard Disks and software.

- Section 5 (Data Storage) explains the procedures for using Floppy Disks and the related utilities.

- Section 6 (Diagnostics) details common Network error messages, bad track tables and 5HDHELP diagnostics.

- Section 7 (Customizing) describes how to use the DMS Customiz program to change keyboard layout, select character sets and program the function keys.

MANUAL CONVENTIONS

In the text of this manual, prompts and other messages that are displayed on the CRT screen by the computer will be shown in a different **typeface**, while characters and commands

that you, the user, enter through the keyboard will be both **boldfaced and underlined** in the screen typeface.

Boldfaced and/or underlined comments in the normal text typeface are used to accent important points in this manual.

Because computer programs and hardware are constantly being improved and updated, a 'version number' almost always follows the name of the product. This number (sometimes called 'revision number') is used to identify the version and capabilities of the product. Since these numbers are changed every time a product is upgraded, this manual will indicate them by the letter x in screen depictions. Thus, in **Version x.x** the 'x.x' would simply represent some number that may vary from unit to unit.

Often a version number will include a release date. In this manual these release dates are indicated by mm/dd/yy (for month/day/year).

NOTES

To bring to your attention important points that might otherwise be easily passed over, this manual will use three different 'levels' of NOTE headings.

---NOTE---

These are details that you should know in order to use the equipment. They are points that will help you to avoid problems as you use the computer.

——NOTE——

Here is a point to which you must pay close attention in order for the system to work. It should catch your eye if you are having a problem and are going back to the manual for information.

---WARNING---

WATCH IT! This indicates that something could go very wrong if you don't pay close attention. Always heed these warnings.

PART NUMBERS

If you need a specific part that is referred to in this manual, you should contact your DMS Dealer or Digital Microsystems directly. Describe what you need or use the part name given in the manual.

FEEDBACK FROM YOU

Digital Microsystems would like this manual to be as clear and informative as possible. If you encounter any problems in using this manual, or have any comments or suggestions, please let us know.

UPDATES FROM DIGITAL MICROSYSTEMS

In order to receive documentation updates, you must return the workstation's registration tag to DMS (Oakland, CA). Updates may be in the form of a simple error/update sheet or include whole sections of a manual that reflect a major change in HiNet. Only with your name and address can we keep track of the products and documentation you have. It is in your best interest to return the registration card as soon as possible.

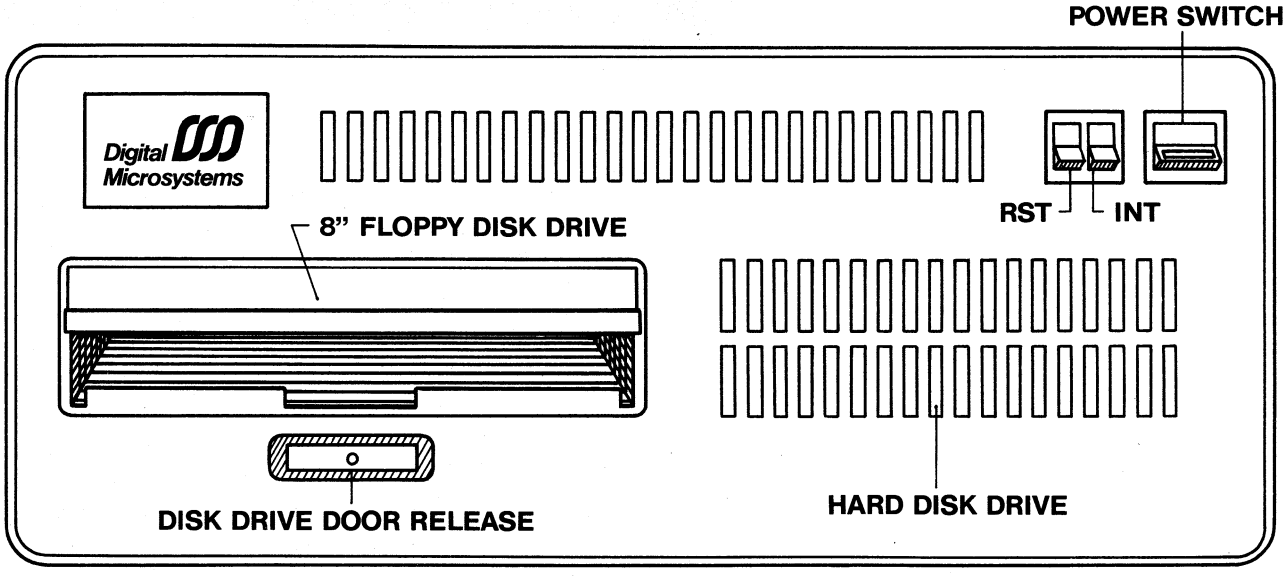

POWER SWITCH
Digital Microsystems
RST
INT
8" FLOPPY DISK DRIVE
DISK DRIVE DOOR RELEASE
HARD DISK DRIVE

DIAGRAM 1-1

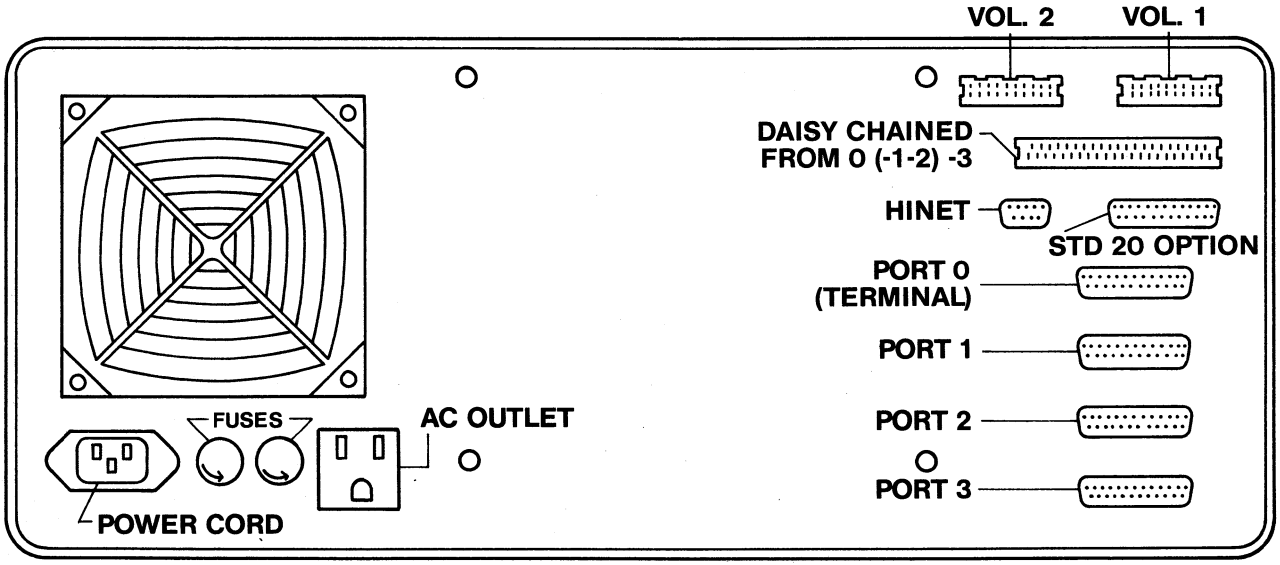

VOL. 2
VOL. 1
DAISY CHAINED
FROM 0 (-1-2) -3
HINET
STD 20 OPTION
PORT 0
(TERMINAL)
PORT 1
PORT 2
PORT 3
FUSES
AC OUTLET
POWER CORD

DIAGRAM 1-2

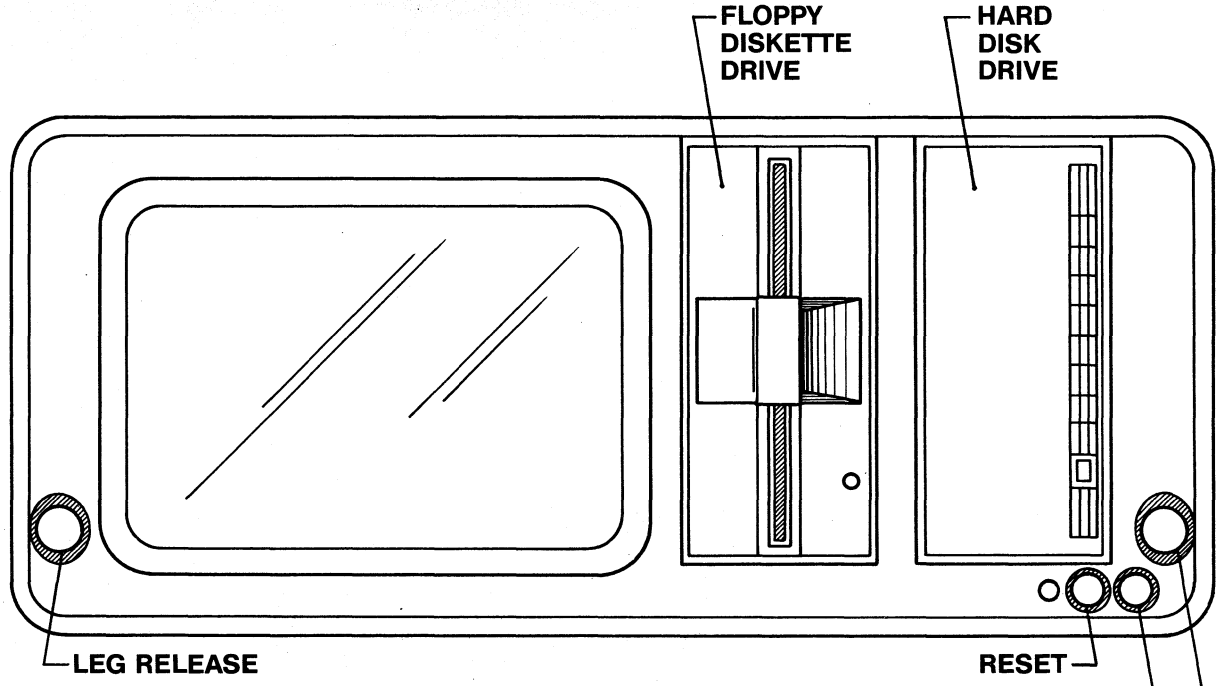

FLOPPY
DISKETTE
DRIVE
HARD
DISK
DRIVE
LEG RELEASE
RESET
INTERRUPT
LEG RELEASE

DIAGRAM 1-3

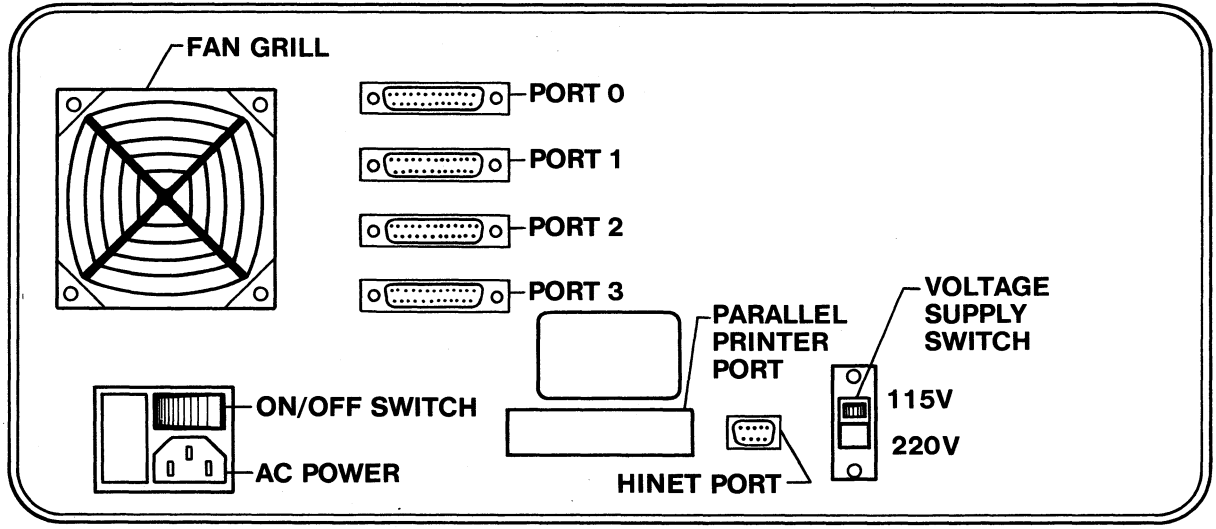

FAN GRILL
PORT 0
PORT 1
PORT 2
PORT 3
PARALLEL PRINTER PORT
VOLTAGE SUPPLY SWITCH
115V
220V
ON/OFF SWITCH
AC POWER
HINET PORT

DIAGRAM 1-4

1.0 INTRODUCTION TO HINET MASTERS

1.1 OVERVIEW

This Volume of the HiNet Master manuals is a guide to setting up a stand-alone system and a complete HiNet/HIDOS Network (including step-by-step procedures for installing the Network software on the Hard Disk--described in section 2). Many of the details about the system and its set-up procedures are not discussed in this volume so that you may get your Network running as quickly as possible with a minimum of reading. Volume 2 will explain the details more fully so that the System Administrator can understand the routines of Network Maintenance.

Section 3 of Volume 1 will tell you how to set up the cables that link your Network's workstations to the HiNet Master. Section 4 will help you to get the Network's Spool printer working and explain more about printers in general. Section 5 describes setting up the Electronic Mail program. Some terms that you may not be familiar with can be found in Section 6, the Glossary. The Section 7 Appendices contain information on ESC and CTRL codes for the DMS-3/501, Port I/O signals, and cabinet disassembly instructions.

Digital Microsystems' HiNet Masters are powerful eight-bit microcomputers with 64K

internal memory (RAM). While they are capable of operating as self-contained stand-alone computers, or as HiNet stations with local storage, the Masters are designed to run Networks of "Workstation" microcomputers. The HiNet software controls the transfer of information between the Master's Hard Disks and the Network Workstations. There are two different models of HiNet Masters, the DMS-3/4 series and the DMS-3/501.

The DMS-3/4 series of Masters form the basis of the most powerful Networks. The DMS-3/4 series is actually composed of four different computers based on two storage capacities:

Model Number	Hard Disk Storage
102	23 Mbytes
103	46 Mbytes

A "3" prefix (3/103) means that the Master has a single CPU board, a Hard Disk Controller board, a Hard Disk and 1 to 4 Floppy Disk Drives. A "4" prefix (4/102) denotes a multiple board configuration with at least one 128K memory board along with the CPU and Hard Disk Controller Board. Up to four memory boards can be added as well as other customized multibus boards. These Masters can run the MP/M and OASIS operating systems.

A Network can support up to 64 individual workstations at one time. Four 46 Mbyte Hard Disks can be linked together to supply the Network with 180 (formatted) Megabytes of information storage. Each Hard Disk is

partitioned into storage areas that can be accessed by individual or multiple users. An 8-inch Floppy Disk Drive comes with most DMS-3/4s for installing and transferring software. A high-speed Streamer Tape Drive provides secure backup for the Network's Data. A "dumb" CRT terminal with keyboard must be connected to the DMS-3/4 before it can be used.

The DMS-3/501 is equipped with a nine-inch green phosphor CRT monitor, a separate low-profile keyboard, a 5.25-inch double-density, double-sided Floppy Diskette Drive and a 5.25-inch 15 Megabyte Hard Disk. This Master is designed for smaller (5-15 User) Networks.

1.2 INITIAL SETUP AND INSTALLATION

FOR ALL MASTERS

After unpacking the HiNet Master from its shipping carton, examine the unit for damage. On the DMS-3/501, make sure that the CRT screen is not broken. (Do not touch any broken glass; the coating on the inside of the CRT screen is toxic.) If there is any visible damage, do not plug it into an electrical outlet. Contact your dealer or DMS at once for instructions. Contact the shipping company if the damage seems to have occurred during transit.

1.2.1 SETTING UP A DMS-3/4

Several steps must be followed before the DMS-3/4 is turned on.

1) To guard against damage to the Hard Disk, the Read/Write Heads are locked in place during transit. The Read/Write Heads must be unlocked before connecting the power. Follow these steps:

a) Place the Master in its permanent location where it will not be subjected to mechanical shocks or static discharges (from people passing by), and where it has good ventilation. A 3-hole grounded electrical supply should be nearby. The electrical circuit should not be overloaded with other electrical devices, especially heavy motors. If a printer will be attached to the Master, you may want the Master to be away from work areas so the noise will not disturb people. If security is a concern, access to the room should be limited.

b) Remove the cover of the cabinet by unscrewing the four screws along the two sides. Lift the top up and set it aside. All cables should be securely connected to circuit boards inside the cabinet.

c) The front cover is connected to the cabinet by wires. Remove the front cover by lifting it and rotating the bottom upward. Let it rest on top of the cabinet.

d) The Hard Disk is protected by a semi-transparent plastic cover. On top of the cover is a white lever, which should be taped down to the right. To unlock the Read/Write Heads, remove the tape, lift the lever slightly and push it to the LEFT. Note the white paper sticker on the front of the Hard Disk. It will have one of the following three numbers written

on it: 101, 102, 103. In the space provided below, fill in the indicated information.

Model Number (circle one) 101 102 103

Hard Disk Serial Number_____

Date __/__/__

This information will be needed later when you are preparing the Hard Disk with the HARDHELP utility. The serial number and date are included in case the Hard Disk is replaced at some point in the future.

e) Replace the front panel by inserting the panel's tabs into the slots in the bottom of the metal cabinet. Place the top cover back on the cabinet and align the front panel's tabs in the cover's slots. Replace the eight screws in the cabinet's sides.

2) CONNECTING A TERMINAL -- In order for you to control the Master, connect an "dumb" terminal to PORT 0 (Zero) on the back of the DMS-3/4 cabinet. Refer to Diagram 1-2 for the location of PORT 0. A standard RS-232 cable attaches the terminal to PORT 0.

3) Set the CRT Terminal's transmission characteristics. Refer to the Terminal's manual to see how to set the following parameters:

BAUD Rate = 9600
Word Length = 8 Data Bits
Parity = None (No Parity)

4) Plug the end of the Power Cord with no prongs into the socket on the rear of the cabinet and the pronged end into a three-hole grounded electrical outlet. Plug the terminal into the A.C. outlet on the back of the DMS-3/4 cabinet.

When all of the above steps are completed, press down on the bottom of the power switch to turn the Master on. The red light in the switch should glow. Turn on the terminal's power.

The Master may be set to access the Floppy Disk Drive or the Hard Disk. If a red light is glowing on the Floppy Disk Drive latch, the Master's startup program is looking for an operating system on a Floppy Disk. The way in which the Master first looks for an Operating System can be altered by changing the jumper plugs on the CPU Board; see Appendix B.

There will probably not be anything stored on a new Master's Hard Disk. The INSTALL Diskettes that came with the Master contain the programs to FORMAT, INITIALIZE, and set up the Hard Disk, plus all of the utilities to run the Network. Section 2 covers the procedures for installing the Network software.

If your dealer has already installed part or all of your Network's software, you can start the Network by following this procedure:

a) Note the two other switches next to the Power switch. The right one is the INTERRUPT switch, the left one is the RESET switch. To access the PROM Monitor:

1. Press and hold down the INTERRUPT switch,

2. Press and release the RESET switch,

3. Release the INTERRUPT switch.

The terminal's screen should display the following message:

```
PROM MONITOR x.x
:
```

This procedure lets you access the PROM Monitor. Each DMS Master and Workstation has a start-up program encoded into a Programmable Read Only Memory chip (PROM). The PROM Monitor allows you to display the contents of internal memory and direct the Master where to look for an operating system. After the colon on the screen enter the following two-letter sequences:

BF (Boot Floppy) to load an operating system from a Floppy Disk,

BH (Boot Hard) to load an operating system from the Hard Disk and start up the Network,

BN (Boot Network) to join an existing HiNet Network.

When you enter BH, the PROM initiates a small program that tells the Hard Disk Controller where to read an operating system

on the Hard Disk. If the Hard Disk is not initialized an error message wil be displayed. You will have to use the INSTALL diskettes to format the Hard Disk, initialize it and load software onto the Hard Disk. Section 2 explains these procedures.

See Section 1.4 for more information on the DMS-3/4's Input/Output Ports, Section 1.5 for details on connecting more Hard Disks to the Master, and Section 1.6 for Physical Maintenance information.

1.2.2 SETTING UP A DMS-3/501 MASTER

The DMS-3/501's shipping carton contains, along with the main computer cabinet, the keyboard, a power cord, this manual, the distribution diskettes and a screen cleaning cloth.

Diagram 1-3 indicates the various parts of the DMS-3/501. Notice the two buttons (labeled 'Leg Release' in the diagram) on either side of the front of the cabinet. The legs are spring-loaded so they will snap downward when the two buttons are pressed down (not in). Raise the front of the cabinet so that it is elevated two or three inches.

----------NOTE----------
There are ventilation slots on the bottom of the cabinet. Make sure that these slots are not obstructed when the unit is in use.

THE CRT SCREEN

The DMS-3/501's 9-inch CRT screen can display 25 lines with 80 characters per line. The screen can operate in two video modes: normal (green characters on black background) or reverse (black characters on green background). (See section 4 for information on how to select a video mode.) In certain lighting conditions you may find reverse video more comfortable for your eyes. The brightness of the screen may also be adjusted for your comfort. The Customiz program can perform these adjustments.

A non-glare nylon screen covers the CRT. To avoid scratching it you should use only the cleaning cloth supplied with the DMS-3/501 or a soft brush to clean the screen.

----------NOTE----------
Do not turn the DMS-3/501 rapidly on and off. This could cause a very bright dot to form on the middle of the screen which might damage the CRT. Make sure the power switch is OFF before plugging the unit into an electrical outlet.

KEYBOARD CORD

Plug the keyboard cord into the left side of the DMS-3/501's cabinet. The clip on the keyboard cord is shaped so that it will fit into the socket only one way. If you wish to detach the keyboard later, be sure to press the tab on the clip to release it from the cabinet.

FLOPPY DISKETTE DRIVE INSERT

Before turning on the DMS-3/501, remove the shipping insert from the Floppy Diskette Drive. The Floppy Diskette Drive is located to the right of the video screen (see Diagram 1-3). Open the door of the Drive by pulling the door's latch toward you. The door will spring open. Remove the cardboard insert. (Save it in case you wish to transport the DMS-3/501 for a long distance.) Close the Drive's door to help keep out dust.

HARD DISK DRIVE IDENTIFIER

If you received the DMS-3/501 with a blank Hard Disk, you must find out what manufacturer made the Hard Disk before you can load software onto it. (DMS uses several different manufacturers.) There is no readily visible difference between the makes of Hard Disks that DMS uses. The best way to determine which type of Hard Disk Drive you have is to check the shipping invoice. The invoice will tell you what Hard Disk Drive is installed in the DMS-3/501. If for some reason this information is not on the invoice or the invoice is lost, there is another way to determine the manufacturer of the Hard Disk.

On the back of the DMS-3/501's cabinet, near the upper-left corner, is the fan grill. The plastic cover can be pried off with a sharp tool such as a penknife or nailfile. Gently pull it off the fan cover along with the foam filter and wire grid. (This foam filter should periodically be removed and cleaned so that the cooling fan will work properly.)

In order to find out the type of Hard Disk you have, shine a light through the fan opening to look inside the DMS-3/501. Directly behind the fan you will see a white sticker. The manufacturer's name and a model number will be printed on it (for example, Computer Memories Inc.--CMI or Miniscribe).

Now that you have determined the type of Hard Disk, take the time to fill in the following information so that you may refer to

it later. (You will need to know the Hard Disk manufacturer if, for instance, you have to test the Hard Disk or if the Hard Disk has not been prepared for you.)

DMS-3/501 serial number_____

Hard Disk manufacturer
and model number_____

LINE VOLTAGE SWITCH

The DMS-3/501 can operate on either 115V or 220V. You must set the voltage supply switch for the voltage in your area. The voltage supply switch is located on the back of the cabinet near the right side. The switch moves vertically and is manipulated with a pointed object such as a ball point pen tip.

----------WARNING----------
If you are not sure of the voltage in your area, do not plug in the DMS-3/501 until you have checked with a technician. Damage may result from an incorrect voltage setting.

POWER CORD

Before plugging in the DMS-3/501, make sure that the power switch--on the lower left corner on the back of the cabinet--is pushed in on the side labelled **O** (OFF). The power cord plugs into the back of the DMS-3/501's cabinet. (See diagram 1-4.) Plug the end of the cord with no prongs

into the back of the cabinet before you plug the other end into a three-hole grounded electrical outlet.

HINET CABLE

If you are going to use the DMS-3/501 as a HiNet Master or a HiNet workstation, plug the HiNet cable into the HiNet port. The HiNet port is located near the center of the back of the cabinet (see Diagram 1-4.) The cable connector will fit into the socket only one way.

RESET AND INTERRUPT

On the lower right corner of the front of the DMS-3/501's cabinet are two small push-button switches. The left button is the RESET switch. The right button is the INTERRUPT switch. The RESET button completely resets the Central Processing Unit (CPU). This will result in the loss of any work not stored on a Disk. The INTERRUPT will end most user programs and return you to CP/M. This is useful if a program is stuck due to errors. Again, however, any work that you have done but not saved will be lost.

TURNING ON THE DMS-3/501

Turn on the DMS-3/501 by pushing the ON/OFF switch in on the side labeled **I**. The red light near the RESET button should glow.

THE DMS-3/501 AS A STAND ALONE COMPUTER

The DMS-3/501 is internally wired to 'boot' from the Hard Disk. (This may be changed by altering jumper pins on the CPU board. See Appendix C.) The CP/M operating system is automatically loaded into memory as soon as the Hard Disk reaches its correct operating speed. Normally this takes less than a minute. When the disk reaches the proper speed, the screen will display:

```
CP/M x.xx
A>
```

If this happens, then the Hard Disk is properly set up as a stand-alone computer. (If your Hard Disk is not prepared for you, the steps needed to set up the Hard Disk are fully explained in Section 2.)

If the A> prompt is displayed (or possibly another letter), then the DMS-3/501 is ready to receive commands. If you need to know more about HiNet and CP/M, read Sections 2 and 3 in Volume 2. For now, you should enter two simple commands to see what, if anything, is stored on the Hard Disk.

----------NOTE----------
Certain sections of this manual assume that the DMS-3/501 will be used in a HiNet environment. Therefore, many of the terms and examples used

relate to the HiNet Network. If you are using the DMS-3/501 as a stand-alone computer and not as a HiNet Master or HiNet workstation, then some of the principles will not apply to your work (such as sharing partitions and logging onto the Network). However, the majority of the information about files, partitions and operating programs, presented in sections 2 and 3 of Volume 2, is identical for all DMS equipment.

DIRHARD--DIRECTORY OF THE HARD DISK

To see how your Hard Disk is divided up, you can run a program called DIRHARD. After the **A>** showing on the screen, type **DIRHARD** and then press the RETURN key. The program DIRHARD will display the partition names and their sizes. The first partition name displayed may be called SYSTEM. This is where the files that are needed by most of the users on a Network, or by a single user, are kept. (See Section 2, Volume 2, for more information about partitions and files.) The screen representation below shows a typical directory of a Hard Disk.

```
A>dirhard
DIRHARD version x.x for multi-volume Hard Disks.

Partitions on Volume 0 VOL ZERO

SYSTEM    1M bytes    PSOFTWAR    1M bytes
ACCOUNT1  512k bytes  INVENT      512K bytes
```

---NOTE---
If your DMS-3/501 is set up as a HiNet Master, you will have to use the program **DIRNET** instead of DIRHARD.

You can add more partitions or change the sizes and names of the ones already on the disk. The program that will do this is called ALLOC. It is discussed in detail in Section 4, Volume 2.

DIR--DIRECTORY OF A PARTITION

Now you should see what files, if any, have been stored on the Hard Disk. Files store information and programs. The command DIR lists all of the files in a partition in alphabetical order and gives the size, in Kbytes, of each file.

To see what files are stored on the partition that is assigned to the A Drive, type **DIR** after the A> prompt and then press the **RETURN** key. The names of the files that are stored in the A partition--which is usually the SYSTEM partition--will be listed on the screen. If you are just starting to use a new DMS-3/501, there may not be any files stored on any of the partitions.

To check if there are any files stored on the partitions assigned to Drives B and C, type **DIR B: <CR>** to display the directory of the B Drive partition. Then type **DIR C: <CR>** to display the directory of the the C Drive partition. The message **NO FILE** will be displayed if the

partition is empty. If there is only one partition on the Hard Disk, the B and C drives will also be assigned to it.

The fourth Drive (D) is usually assigned to the Floppy Diskette Drive. If a Floppy Diskette is inserted into the Drive, the directory of that disk can be displayed by typing **DIR D:**. For more information on using Floppy Disks, see Volume 2, Section 5, Data Storage.

The listing that DIRHARD gave you may have included more than three partitions. The other partitions cannot be accessed unless you re-assign the CP/M logical drives A, B, C, and D to partitions other than the default ones. This can be done with the ASSIGN command. The ASSIGN command is explained in Volume 2, Section 2.11.5.

THE DMS-3/501 AS A HINET WORKSTATION

If you wish to use the DMS-3/501 as a HiNet workstation (with a lot of local storage), you must use a slightly different procedure to begin. Normally the DMS-3/501 will automatically load CP/M from the Hard Disk after it is turned on. To access the HiNet Network, push in and hold the INTERRUPT button and then press the RESET button once. Release the INTERRUPT button. At the bottom left of the screen the words **PROM Monitor x.x** will appear and, on the next line down, a colon (:). If no message appears, or if CP/M version x.xx appears followed by the A> prompt, then repeat the INTERRUPT and RESET button sequence.

When the colon is displayed on the screen, type **BN.** (BN stands for Boot Network.) If the DMS-3/501 is correctly connected to the HiNet Network and the Network is active, the login message should appear on the screen. See Section 2 for information about logging onto the Network.

THE DMS-3/501 AS A HINET MASTER

If you purchased HiNet software then you can configure the DMS-3/501 as a HiNet Master. Section 2 outlines the procedures for installing the software for the Master. Section 4, Volume 2 explains how to use the DMS-3/501 as a Master.

If the DMS-3/501 is already configured as a Master, the screen will display the line **HiNet Master Version 2.xxx** after the Hard Disk warms up or the RESET button is pressed.

----------WARNING----------
You cannot run two HiNet Masters on the same Network (unless one of them is a MIMIC Master). If there is another Master running the Network and you boot up a DMS-3/501 that is also configured as a Master, the following warning message will be displayed:

There is another Master active on the Network. Enter M <CR> to Mimic.

You cannot use a 5.25-inch Hard Disk to Mimic an 8-inch Master Hard Disk. You must Reset to the PROM Monitor and boot the Network (BN) or boot the Floppy Disk (BF).

1.3 THE KEYBOARD

As you look at the keyboard you can see that there are six groups of keys: Main Section, Numeric Pad, and four groups of four Function Keys along the top of the keyboard. Refer to Diagram 1-4.

1.3.1 NUMERIC PAD

On the right side of the keyboard unit is a numeric keypad for entering numeric data. It is similar in layout to that of most adding machines or calculators, with the digits 0-9, a decimal point, and an ENTER key. The ENTER key has the same effect as the RETURN key.

The number values for the keypad are not permanently assigned. The distribution Floppy Diskette has a cold boot command which will read a CUSTOMIZ file that loads the numeric keypad with the correct numbers. You can use the CUSTOMIZ program to assign to the function keys whatever codes or strings you wish. (For example, you may want to program a word processing program's cursor control codes into the keys to make editing easier.) If you change the keypad's key values with CUSTOMIZ, make sure you either run the CUSTOMIZ program manually or change the cold-boot command with SYSGEN. (See Section 5.3, Volume 2.) Remember that you can program three different values--unshifted, shifted and control--into each numeric keypad key (except for the Enter key).

----------NOTE----------
If the DMS-3/501 is used as a stand-alone, the Hard Disk does not have a cold boot command capability. If the DMS-3/501 is a HiNet Master, you can use the USERS program, described in Section 4, Volume 2, to create a login command--USERS version of a cold-boot command--that will load a CUSTOMIZ file.

Most people find it easier to use the numeric keypad for entering a large amount of numeric data. The numeric pad numbers 2, 4, 6, and 8 are also used in some application programs to control the cursor.

1.3.2 FUNCTION KEYS

Across the top of the keyboard are four groups of four keys each, labeled F1 through F16. These are Special Function Keys. These keys can be programmed using Digital Microsystems' Customiz program. The number keys in the numeric keypad (along with the three blank keys in the main section) can also be programmed to perform as Special Function Keys. See Section 7, Volume 2, Customizing.

FUNCTION KEY DEFAULT VALUES

If the keypad is loaded with the Customiz file PADKEYS.SF, then the function keys F1 through F16 will be assigned the following values:

F1	ASSIGN	F9	LOAD
F2	SD (SUPER DIRECTORY)	F10	SAVE
F3	PIP	F11	SETBAUD
F4	STAT	F12	SETIME <CR>
F5	TYPE	F13	TIME <CR>
F6	SUBMIT	F14	CUSTOMIZ
F7	REN (RENAME a file)	F15	DIRNET
F8	ERA (ERASE a file)	F16	WHO

Some of these functions may require additional information following the command or a RETURN. The CP/M functions are explained in section 3. DMS HiNet commands are explained throughout the manual. See the index for specific references.

Some of the function keys in the the top row have a CTRL/SHIFT value that is permanently set at the factory. These values cannot be altered with the Customiz program. The CTRL/SHIFT values are:

CTRL/SHIFT F1 Load function key from keyboard.
CTRL/SHIFT F2 Enter Local Mode.
CTRL/SHIFT F16 Trap Mode.
CTRL/SHIFT F29 Reset CRT controller ROM.
CTRL/SHIFT F30 Flush CRT controller buffer.

See Section 7, Volume 2 for more information about loading functions keys from the keyboard with the CTRL/SHIFT F1 key.

Local Mode allows you to send ESC codes directly to the CRT controller so that you may change the display. Pressing F2 will display the word LOCAL in the upper right corner of the screen. In Local Mode you can reverse the screen

display by pressing ESC and then capital T. Enter ESC T again to return the screen to normal (green characters on black background). Pressing ESC b while in Local Mode increases the screen intensity by one increment. (There are a total of 15 increments.) ESC d will decrease the screen intensity. See Appendix B for other ESC codes. Note that ESC B will turn on blinking mode; to return to normal enter ESC N.

The Trap Mode is used by programmers to see the Hexadecimal value of a character before it is processed by the computer. CTRL/SHIFT F16 toggles this mode (press it once for on, press it again for off). The Hex value is displayed in the upper left corner of the screen. Pressing another key will send the character to the CPU to be processed; the second key is ignored.

For programmers, CTRL/SHIFT F29 (upper right blank key in main section) resets the CRT controller ROM thus emptying the programmed values in the function keys. CTRL/SHIFT F30 (bottom right blank key) flushes the CRT controller buffer if the function keys are in an endless loop.

1.3.3 MAIN SECTION

For the most part, the main section of the keyboard is similar to that of a standard electric typewriter. However, some of the keys have special computer related functions and these will be discussed here.

CTRL

On the far left of the second row from the bottom is a key labled CTRL. This is the **CONTROL** key. When you hold down the CONTROL key you alter the meaning of all the other keys, changing them from letters and numbers into codes that tell the computer what to do. In other words, just as holding down the SHIFT key changes lower case to upper case, holding down the CONTROL key changes the keyboard from a typewriter keyboard to a computer command board. And just like using the SHIFT key, you hold down the CONTROL key while striking the other keys.

Control commands may or may not be displayed on the screen depending on the program involved; they will not appear in any text or numeric data you are entering into the computer. In this manual we will use the abbreviation **CTRL** to indicate when something is a Control Command. For example, **CTRL C** would mean strike the C key while holding down the CONTROL key. Manuals for applications programs may use other symbols to indicate use of the CONTROL key, but no matter what symbol is used it always operates in the same way.

RETURN

The **RETURN** key (short for Carriage Return) is on the right side of the main keyboard section, and it is used both as a computer command key and an end-of-line carriage return (like an electric typewriter). Most commands that you give to the computer through the

keyboard (or text you enter to answer its questions) will end with a carriage return. This is the signal to the computer that you have finished typing in the command (or answer) and you want the computer to proceed. This manual will use both the word **RETURN** or the symbol **<CR>** to indicate a Carriage Return in command sequences.

For example, when you turn on the Workstation and get the log-on message, the computer waits for you to type in your User Name. After you have done so, you let the computer know you have finished by hitting RETURN. (**NAME: PAT <CR>**).

----------NOTE----------
In most cases when using the workstation as a word processor you do not need to hit RETURN at the end of each line of text as you do with a typewriter. The computer takes care of fitting your words into lines of proper length and you only need to hit RETURN to indicate the end of a paragraph. See your word processor program manual for further information about how word processors use the RETURN key.

ESC

The **ESC** (for Escape) key is located at the far left of the top (number) key row. It is a special key with functions that vary from program to program. In some programs it can be used as a second Control Key (though you do not hold it down while pressing another key); in

other situations it may be used when an error has caused the computer to "hang up", becoming unable to respond to normal commands (hence the name 'Escape'). Your application program manuals will describe its uses.

----------NOTE----------
It is important to use the correct case of a letter when you use the ESC key. If the command requires an upper-case letter or a lower-case letter, you must use the specified one or the results could be totally different and, at times, disastrous.

DELETE

Located at the far right of the second row from the top, the DELETE key is used (as you might suspect) for deleting letters. In a word processing program, hitting the DELETE key causes the Cursor to move one space to the **left** and erase that character (or space).

In other programs or environments, such as CP/M (see Section 3, Volume 2), the DELETE key operates by displaying the character it has just deleted. For example, if you were in CP/M and typed the word **COMPUTRE**, and then used the DELETE Key to eliminate the last two letters, the screen would show **COMPUTREER**; but only **COMPUT** would remain in memory. (Many people find this feature confusing, so they use the BACK SPACE key to delete letters when they are in CP/M. The BACK SPACE key moves the Cursor to the left and erases whatever is there.)

When the DELETE Key is used with the SHIFT Key held down, it types out the Underline Character like this: _____.

BACK SPACE

The BACK SPACE Key (located at the far right of the bottom row) does just what you would expect; it moves the Cursor one space to the left. In most word processing programs it does so without erasing any of the characters. However, if you are in some other type of program, or CP/M, it may act as an 'Erase' key, eliminating the characters it backspaces over.

PAUSE

The PAUSE Key is located at the far left of the bottom row. In CP/M, and some programs, the computer sends lines of data or text to the screen faster than you can read them. As new lines are added to the bottom of the screen all lines scroll upward and the top lines disappear. The PAUSE Key is programmed to send a CTRL-S which is used to stop and re-start this screen scrolling. When you hit the PAUSE Key (or CTRL-S) the screen stops in place. When you hit the PAUSE Key again, the computer resumes adding lines to the bottom of the screen and everything continues scrolling upward.

ALT KEY

The ALT key is another programmable function key. Some applications programs will use this key as another CTRL type key; it will change the meaning of a character key when they are pressed down together. Check your applications programs manuals for information about the use of this function. In any case you may load it with a command or string of characters either with Customiz or by using CTRL/SHIFT F1.

ARROW KEYS

To the right of the Space Bar are four arrow keys. These keys have the same value as the Shifted Values of the arrow keys on the keypad (the numbers 2, 4, 6, and 8). If the arrow keys on the keypad are not programmed, the arrow keys nest to the space bar will not be either. The most useful way to utilize the arrow keys is to program them with the CTRL or ESC codes for your most popuolar applications programs. See Section 5 for informationon programming the function keys and saving the values in files.

CAPS LOCK

Like a typewriter, the CAPS LOCK Key makes all of the letters type out as upper case. However, unlike a typewriter, the CAPS LOCK on the DMS-3/501 only affects the letter keys. It has no effect whatsoever on the symbol and number keys.

When the CAPS LOCK is down, use of the SHIFT Key causes letters to be typed in lower case.

REPEATING KEYS

All of the keys on the DMS-3/501 (including the command keys) are repeating keys. If you hold them down they will automatically repeatttttttttt until you release them.

1.4 SERIAL AND PARALLEL PORTS

HiNet Masters have several ports for connecting the computer to various devices (printers, modems, etc). In addition to the HiNet Network Serial Port (RS-422), there are four RS-232C Serial Ports on the back of the computer's cabinet. (Refer to Diagram 1-1.) Starting from the top down, the ports are numbered PORT0, PORT1, PORT2 and PORT3.

PORT 0 is configured for a CRT. This is the port to connect a terminal to the DMS-3/4. A secondary CRT screen can be attached to this port on the DMS-3/501 for a larger display or for emergencies (if the other screen malfunctions). There is no jumper block for PORT0.

PORT 1 is not usable when the Master is operating under HiNet. Otherwise it may be configured through its jumper block to access printers, modems and other RS-232 devices.

PORT 2 is configured for an RS-232 cabled Serial Printer. A jumper block is provided to customize the output for particular printers.

PORT3 can be used for a Modem (or a printer). This port also has a jumper block.

See Section 4 for information about connecting Printers and Modems to these ports.

DMS-3/4 PARALLEL PRINTER PORT AND TAPE DRIVE

The DMS-3/4 series have A Parallel Port that is available for "Centronics" type printers and a Tape backup unit. If a Tape Drive (STD-20) is added to the system the Parallel Port must be shared between the Tape Drive and the Printer Port. A switch can be installed to select the Tape Drive (during backups) or Printer Port.

1.5 DMS-3/4 MULTIPLE HARD DISK NETWORKS

In a system with more than one Hard Disk, each disk is called a Volume. Up to four volumes can be linked together. The volumes are numbered zero to three, according to their position on the connecting cable. Thus the Master disk is called Volume Zero, but the second disk that is added to the system is called Volume Three because it will always be at the end position of the cable. The third and fourth disks that are added to the Network are called Volume One and Volume Two respectively.

----------NOTE----------
Hard Disk Controller **board versions 1.4** and later let you mix any size Hard Disk--including a 46-Mbyte--in a multi-volume system. Hard Disk Controller **board version 1.31A** works with the 46-Mbyte volume only and will NOT work with any other drive. This board supports either a single 46-Mbyte drive or four 46-Mbyte drives linked together. A 176-Mbyte capacity is available with four volumes. If you have an older Controller Board, some alterations may have to be made before updating the software and/or hardware. A test program called MODTEST is available from DMS Customer Sevice, along with appropriate instructions, if you wish to upgrade an older system (previous to CPU board version 3.2). See Appendix D for more information.

All volumes in a system must have the same version of firmware installed on them. In order to use a 46-Mbyte Hard Disk in your system you must install firmware with HARDHELP Version 3.80 or greater.

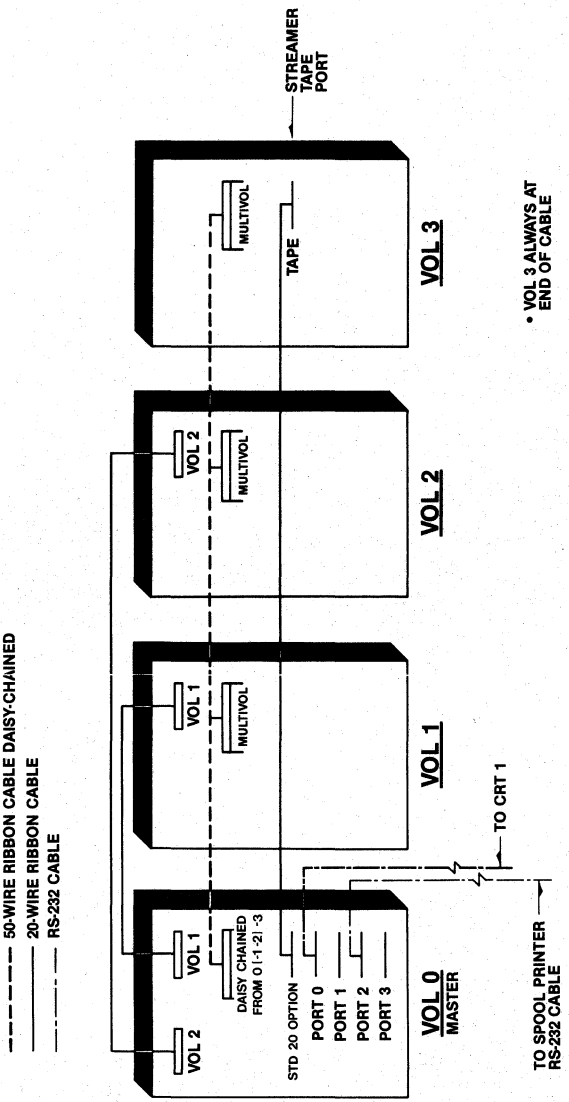
It is recommended that you make a backup file of Partition 0 on a separate floppy disk before you initialize the Hard Disk(s) that you have been using. Use READ0 or CARTBACK to make a backup file of Partition 0.

CONNECTING MULTIPLE HARD DISK DRIVES

In a system of two, three or four Hard Disk Drives, all of the units must be linked together with a 50-wire ribbon cable. The

connected disk drives must be arranged in specific order.

The Master unit has both a Hard Disk Drive (called Volume Zero for its position on the cable) and a Floppy Disk Drive. The Master is the only cabinet out of the four possible Volumes with a HiNet port. There a total of nine ports on the back of its cabinet. The top two ports are labeled VOLUME2, on the left, and VOLUME1, on the right. The larger port below them, labeled DAISY CHAIN 0-(-1-2)-3, is for Multiple Volumes. A 50-wire ribbon cable is linked between DAISY CHAIN ports. Below the DAISY CHAIN port, port J4-CPU, labeled STD 20 OPTION, is for the Streamer Tape Drive cable. To the left of this port is the HiNet port. Below the STD 20 OPTION port are four more ports labeled--from the top down--port 0, port 1, port 2 and port 3. See Diagram 1-2 for an illustration of the back of the cabinets and the port labels.



PORT LABELS AND CABLE CONNECTIONS FOR MULTI-HARD DISK SYSTEM

ADDING A SECOND DRIVE

The second Hard Disk Drive added to the Network is called Volume 3. This unit comes with an optional Streamer Tape unit for Hard Disk backup. (See CARTBACK.) Volume 3 is added to the Master by joining the MULTIVOL ports of each disk drive via a 50-wire ribbon cable. This cable has three connector plugs. Use the first and last plugs on the cable for connecting the drives; the middle plug is unused until a third Volume is added.

If Volume 3 is equipped with a Streamer Tape unit for tape backup, a 25-wire ribbon cable must be connected from the TAPE port on the Master, to the TAPE port on Volume 3. The TAPE Port on Volume 3 is in the same position as the TAPE port on the back of the Master cabinet.

ADDING A THIRD DRIVE

The third Hard Disk Drive (Volume 1) is connected twice to the Master: (1) the MULTIVOL ports are linked with a 50-wire ribbon cable (which continues to Volume 3 at the end of the cable), (2) the VOL 1 ports are joined by a 20-wire ribbon cable.

ADDING A FOURTH DRIVE

The fourth Hard Disk Drive (Volume 2) is also connected twice to the Master: (1) the MULTIVOL ports are linked with a 50-wire ribbon cable (which continues to Volume 3 at the end of

the cable), (2) the VOL 2 ports are joined via a 20-wire ribbon cable.

A four connector 50-wire ribbon cable is needed when you add a fourth volume. Such a cable is connected just as the three-connector cable was for the three-drive system. The open connector should be the third connector on the cable. This is for the fourth drive.

----------NOTE----------
The length of the cables between computer cabinets should ideally be about 2 feet or less. Never have more than 5 feet of cable between cabinets.

1.6 MAINTENANCE

HiNet Masters require simple but periodic maintenance. The CRT screen on the DMS-3/501 should be cleaned only with the soft cloth that came with the computer or a soft brush. The CRT is covered with a nylon anti-glare screen; cleaning it with coarse cloths may scratch it. Do not use liquid cleaners of any type.

FAN FILTER

The cooling fan filter must be cleaned routinely, especially in a dusty or polluted environment. If the fan filter becomes clogged with dust, the components inside the computer could overheat and be damaged. Cleaning the fan filter is easy; just follow these steps.

1. Remove any Floppy Diskettes from the disk drives and turn off the power. Dust from the filter may get on the Floppy Diskettes and possibly ruin them if you leave them in the drives while cleaning the filter.

2. On the back of the Master's cabinet is the fan grill. This can be removed with a sharp pointed tool such as a penknife or nailfile. Gently pry the plastic grill off. Behind the grill is a foam filter and wire screen.

3. Remove the foam filter and wire screen. Preferably you should take the foam filter away from the computer and wash it in some water until it is clean. Squeeze it or press it between paper towels until it is dry.

4. Replace the wire screen first and then the foam filter. Snap the plastic fan cover back into place. Turn the power on and let the fan throughly dry the filter for a few minutes before reinserting any diskettes.

READ/WRITE HEADS

The Read/Write heads in the Floppy Diskette Drives should also be periodically cleaned. The only recommended way to do this is to purchase a 5.25 or 8-inch Diskette Head Cleaning Kit from a computer store. Follow carefully the directions that come with the kit.

HARD DISK

The Hard Disk does not need any maintenance. It is sealed in its own evironmentally controlled housing. Never try to open or remove any stickers from the Hard Disk case! This would void any warranty on the Hard Disk and could possibly ruin it.

1.7 MOVING HINET MASTERS

----------WARNING----------
Moving a Master could possibly cause damage to the Hard Disk. This could result in a loss of data. Before moving a Master for a long distance (greater than office to office or floor to floor), be sure to back up all of the Hard Disk partitions onto Floppy Disks or Tape (see Section 5, Volume 2).

Before moving the a Master at any time--even across a desk or table--follow these steps:

- Always turn the computer OFF and allow the Hard Disk to come to rest before moving the unit (about one minute).

- Guard against sudden mechanical shocks to the cabinet. A sudden shock could damage the Hard Disk's surface, which could result in a loss of data. This is especially true when the Hard Disk is moving.

If you are going to move a Master for a long distance, follow these additional steps:

- Backup the Hard Disk partitions onto Floppy Disks or Tape.
- Move the locking handle on the 8-inch Hard Disks to the right before moving the cabinet.
- Re-insert the cardboard that came in the Floppy Diskette Drive.
- Pack the unit carefully with padding, preferably in its original shipping carton.

2.0 HARD DISK SETUP

2.1 INSTALLATION SUMMARIES

The following summaries are quick guides to the INSTALL procedures for setting up the DMS-3/501 as a Network Master. Additional steps are given for those who wish to upgrade their current Networks with the new Separated Boot Software. Separated Boot lets you have workstations on the Network that can select among three different operating systems: HIDOS (modified CP/M 2.2), CP/M-86 and MS-DOS.

Each step in setting up a HiNet Master is outlined in section 2.1. Detailed discussions of each utility are then presented in sections 2.2 through 2.8. If you are not familiar with DMS products or utilities, we suggest you read through the discussions before proceeding with the actual tasks.

INSTALL is a user interface program that leads you through the steps required to establish a Network Master. The INSTALL program asks you questions about your proposed Network or the degree of upgrading that you wish to accomplish. Based on the answers that you give, INSTALL calls other utility programs, such as 5HDHELP, MACHINE and SYSLIB, and aids you in configuring the Master and the Network.

----------NOTE----------
After you have answered questions asked by INSTALL, the screen on the Master may display a lot of information too fast for you to read. This is INSTALL's way of entering data into other programs which actually do the work.

Depending on which operating systems you chose to purchase, you will receive from two to six diskettes with your master. The diskettes marked INSTALL #1 through #4 have different Sections of the INSTALL program on them. By booting the MASTER from DISKETTE #1, the program begins to guide you through the procedures for setting up the Hard Disk for Separated Boot.

INSTALL #1 -- contains installation instructions, utilities and files for setting up the Master and CP/M-80 workstations. Booting the Master from this diskette starts the installation process.

INSTALL #2 -- contains instructions and some utilities for setting up CP/M-86 workstations. You will be instructed when to insert this diskette if you ordered CP/M-86 for your Network.

----------NOTE----------
If you already have CP/M-86 on your Network and wish to upgrade to Separated Boot and HIDOS, there is a special procedure to follow. Installing Separated Boot requires entering all of the operating systems in the System Directory through SYSLIB. These files must be on the INSTALL diskettes. Therefore, your old CP/M-86

files cannot be used. You must send a copy of your original serialized CP/M-86 diskette back to Digital Microsystems so the serialized 86 CCP and BDOS files can be relinked and placed on the INSTALL #2 diskette. Your dealer should make you aware of this at the time of ordering. This way you will have the most up-to-date CP/M-86 BIOS on your new Network and will not be charged for a new CP/M-86 license.

INSTALL #3 -- contains instructions, files and utilities for putting MS-DOS workstations on the Network. MS-DOS programs on the diskette must be copied to the Hard Disk with the DMS FILECOPY utility which runs on the Master under HIDOS (CP/M).

INSTALL #4 -- contains the HiNet utilities that must be used when the Master is booted from the Floppy Disk, i.e., when the Network is down. Do not transfer all of these utilities to the Master's Hard Disks; only two sets of files should be transferred.

INSTALL #5 -- contains HiNet utilities that should be PIPped to the CSYSTEM partition.

INSTALL # 6 -- contains CP/M-86 utilities that should be PIPed to the CSYSTEM (or a special CP/M-86 partition).

When you first boot up the Install #1 diskette, the INSTALL program presents you with three options, or paths, depending on the current state of your Master:

1) UPDATE -- Install HIDOS on a system that is now using HiNet software with a release number **greater** than 2.247a.

2) UPGRADE -- Install HIDOS on a system that is now using HiNet software with a release number **less than or equal to** 2.247a.

3) INITIAL -- Install HIDOS, CP/M-86 and/or MS-DOS on a new system (first-time installation).

The release number for established Networks is determined by booting the Master from its Hard Disk (press the Reset switch). The release number appears in the second line displayed on the screen (for example, HiNet Master 2.247x).

BOOTING FROM A FLOPPY DISKETTE

To boot a DMS Master from the INSTALL #1 diskette, insert the Floppy Disk in the disk drive. Hold in the Interrupt button (see Diagram 1-1) and press the Reset button once, then release the Interrupt button. A colon should appear in the lower left corner of the screen. Type **BF** after the colon.

CHECKING THE INSTALL DISKS INTEGRITY

Before installing the HiNet software, it is very important to check the INSTALL Disks to make sure that they have not been corrupted during transit. To do this, boot the Master from

the INSTALL #1 Disk. After the question "Do you wish to continue?", enter N for NO. The CP/M A> prompt should appear. Enter **DISKCHK <CR>** after the prompt. This program checks all of the sectors on the disk to see if they have changed since the disks left the factory. The screen should display the message **"Checksumming on currently logged drive"**, and then display a dot for each track tested on the Disk. If all sectors are correct, the message **"Disk suitable for use"** will be displayed. If any other message is displayed, such as "Bad Disk", do not use the INSTALL Disks. Call Digital Microsystems' Customer Service Dept or your dealer for replacement disks.

----------NOTE----------
DISKCHK can only be used before INSTALL is run. After the software is installed on the Hard Disk, the data structure on the Floppy Disks is changed. DISKCHK will interpret this change as an error and will report it as a bad disk, even though the disk is still good.

After running DISKCHK, INSTALL will lead you through the following steps. Details of these steps are given in Sections 2.2 -2.7 of this chapter.

In case of a mistake during the INSTALL #1 program, you will have to boot the Master from another INSTALL Disk, reinsert the INSTALL #1 Disk, erase the file $$$.SUB (ERA $$$.SUB) and then reboot from INSTALL #1 to begin again. If the $$$.SUB file still exists, the INSTALL

program will begin in the middle of the procedure, instead of the beginning whenever the Master warm boots (CTRL C) or exits a program.

FOR A NEW HINET MASTER --INITIAL

INSTALL #1 DISK

1. For a new MASTER, the Hard Disk must be formatted. INSTALL calls either HARDHELP or 5HDHELP. You select option 1. For the DMS-3/501 Master initialize the firmware when format is complete. INSTALL will call HARDHELP a second time to initialize the firmware; select option 2.

2. INSTALL #1 also writes default ALLOC and USERS Tables to Hard Disk Partition Zero, setting up one 2-Megabyte partition called CSYSTEM which will later hold all CP/M-80 and CP/M-86 utilities.

3. INSTALL #1 next installs the HIDOS operating system and the Master's BIOS.

4. INSTALL #1 then adds all types of 8-bit workstation BIOSs to the Network. It handles workstations with: 1) no Floppy or Hard Disks, 2) 5" Floppy Disks with no Hard Disk, 3) 5" Floppy Disk and a 5" Hard Disk, 4) 8" Floppy Disks only, 5) 8" Floppy Disk and an 8" Hard Disk.

5. INSTALL #1 finally adds BIOSs for all current DMS 16-bit workstations to Network.

INSTALL #2 -- CP/M-86 UTILITIES

6. INSTALL #1 asks if you have the INSTALL 2 diskette. If yes, you should replace INSTALL #1 diskette with INSTALL #2, which adds the CP/M-86 operating system to the Network.

INSTALL #3 -- MS-DOS UTILITIES

7. INSTALL asks if you have INSTALL #3 diskette. If yes, replace INSTALL #1 (or #2) diskette with INSTALL #3. INSTALL #3 then adds the MS-DOS operating system to the Network.

INSTALL #4 -- OFF-LINE HINET UTILITIES

8. Replace INSTALL #3 diskette with INSTALL #4.

9. Determine the PROM serial number for each workstation that will be on the Network. The procedures for this are given in Section 2.4.

10. INSTALL calls the MACHINE program. Add workstation names and PROM serial numbers to the MACHINE Table. The Master's serial number does not have to be included.

11. The new Separated Boot ALLOC program is on the INSTALL #4 diskette. You must modify or create new partitions for MS-DOS, HIDOS (and/or CP/M-86) operating systems. See Section 2.5.

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

At this point there is one 2 Megabyte partition called CSYSTEM on the Hard Disk. If you wish to alter this partition's size, do so now before

adding other partitions. See Section 2.5.1 before proceeding.

If you purchased MS-DOS, make one 1- or 2-Meg partition named MSYSTEM. The FILECOPY program is used to transfer MS-DOS files from the distribution diskette to a Hard Disk partition.

To create shared partitions, make the partitions Ownable first, save the table, boot the Master's Hard Disk and run SHRALLOC while logged to that partition. Then run ALLOC again and mark the partitionns as shared. See Section 2.5 for details.

Save the ALLOC Table modifications to the Hard Disk. Any new partitions will be formatted for the correct operating system. Exit ALLOC with the Q option; the A> prompt will return.

BOOT THE MASTER

Now is the time to bring up the Network by booting the Master from its Hard Disk. Access the PROM Monitor again (Interrupt and Reset) and type BH after the colon. The screen will show the HIDOS Master version number (2.249f as of this release) and the "Enter Date..." query. You may skip entering the date by hitting RETURN, or enter the current date in the format MM/DD/YY (e.g., 07/01/84) and then the time, HH:MM (e.g., 10:45). You must enter **two** digits for each month, day, year, hour and minute.

Finally, the login message will appear asking for a Name and Password. The Install program has created the User Name MASTER as the first (and, at this time, only) name that can log on to a new Network. Enter **MASTER <CR>** and then another **<CR>** since there is no Password at this time.

The HIDOS A> prompt will appear on the screen. This A> prompt means that you are linked to a partition of storage space on the Hard Disk. It is named CSYSTEM and is 2 Megabytes in size. The next step is to copy all of the relevant software from the INSTALL Disks to the CSYSTEM partition.

INSTALL #5 -- HINET NETWORK UTILITIES

12. PIP all of the files from INSTALL #5 to the CSYSTEM partition. Use the command:

D:PIP A:=D:*.*[VO <CR>

Since PIP is still stored only on the Floppy Disk, be sure to enter D:PIP. Drive A is assigned by default to the CSYSTEM partition.

COPY UTILITIES FROM OTHER DISKETTES

13. If you purchased CP/M-86, PIP all of the files (A>**PIP A:=D:*.*[VO**) from the INSTALL #6 (CP/M-86) diskette to the CSYSTEM partition or to a specially designated CP/M-86 partition that you created with ALLOC. The INSTALL #2 diskette contains Digital Research assembly utilities for developing stand-alone

CP/M-86 programs under CP/M-80. These files may not be of any use to you on the HiNet Network. Therefore, you may want to conserve space on the Hard Disk and not transfer these files. If you do need these files, use PIP to copy ***.A86** and ***.DEF** to the Hard Disk. The other files on INSTALL #2 are operating system files that install CP/M-86 on the Network; do not copy them to the Hard Disk.

14. PIP from the INSTALL #3 diskette the FILECOPY.COM utility (if you purchased MS-DOS) to the CSYSTEM partition.
(A>**PIP A:=D:FILECOPY.COM<CR>**)

15. PIP from INSTALL #4 diskette **CUST*.***, **PW*.***, **MACHINE*.***, **MAIL.COM** and **TRANSFER.COM** to the CSYSTEM partition (CUSTOMIZ files, PASSWORD and MACHINE utilities, E-MAIL and the PC-DOS file TRANSFER program).

16. If you have MS-DOS, use FILECOPY to transfer all of the MS-DOS utilities on the INSTALL #3 diskette to the MSYSTEM partition that you created with ALLOC. First enter:

A>**FILECOPY D:*.EXE MSYSTEM: <CR>**

to copy all of the .EXE files. Then enter:

A>**FILECOPY D:*.211 MSYSTEM:*.COM <CR>**

On the diskette, the MS-DOS command files have the extension .211 to prevent them being accidentally run under CP/M. They must be renamed with the .COM extension before they can be used.

Copy the *.SYS files to the MSYSTEM partition with the command:

A>**FILECOPY D:*.SYS MSYSTEM: <CR>**

17. Run the new USERS program to link User Names with operating systems. A>**USERS <CR>**

18. You may also wish to run the PW program at this time to protect the HiNet utilities such as ALLOC, USERS and PW from casual use. This is especially relevant if you need data security on your Network.

UPGRADING AN ESTABLISHED NETWORK MASTER

The INSTALL program will depart slightly from the new Master routine if you are upgrading an established Network to Separated Boot and adding MS-DOS.

----------WARNING----------
Do not FORMAT the Hard Disk if you have an established Network. FORMATTING the Hard Disk erases all files.

Make sure that you back up Partition Zero, before upgrading the Master.

INSTALL asks if you want to upgrade your current system. It reminds you to back up your Hard Disks before proceeding. If you have not done so, INSTALL will call the appropriate backup program.

----------NOTE----------
When upgrading DMS-3/4 systems, the INSTALL program will call READ0 to back up Partition Zero. If something should happen part way through the INSTALL, you may have to start over again. To restore the tables in Partition Zero use WRUN0 with the commands:

```
WRUN0 OLDALLOC.TAB 0 79 <CR>
WRUN0 OLDUSER.TAB 3 1 <CR>
WRUN0 OLDCONFIG.TAB 4 1 <CR>.
```

These values are for Networks with pre-Separated Boot software (BIOS 2.247 and earlier). After upgrading the Master these values change. See Section 5.6, Volume 2.

INSTALL automatically reorganizes Partition Zero in preparation for Separated Boot. The new BIOS and the Master's HIDOS (CP/M) operating system are written to the Hard Disk.

Steps 3 through 17 are the same as for a new Network Master. Make sure that you use the new ALLOC and USERS programs on the INSTALL #4 and #5 diskettes when upgrading the ALLOC and USERS Tables.

UPDATING A SEPARATED BOOT NETWORK

When you purchase new equipment from Digital Microsystems, you will receive update diskettes if necessary. These diskettes will contain new operating systems or upgraded versions of previous releases. When the Master

is booted from the UPDATE diskette, an INSTALL program will run the necessary programs to update the Network. You may be instructed to enter some information.

ADDING OPERATING SYSTEMS AFTER AN UPGRADE

After upgrading a Master to Release 6 software, you may at another time wish to add another operating system (MS-DOS, CP/M-86). When you order CP/M-86, you will receive INSTALL Disks #2 and #6. To add CP/M-86, boot the Master from the INSTALL #2 Disk, and enter:

SYSLIB <CPM86 <CR>

Insert a space between SYSLIB and the < (arrow) but not between the < and CPM86.

To install MS-DOS, boot from the INSTALL #3 Disk and enter:

SYSLIB <MSDOS <CR>

Follow the appropriate steps for transferring software to the Hard Disks as outlined at the end of this section.

A DMS MASTER AS A NETWORK WORKSTATION

To use a DMS-3/4 solely as a Network workstation you need to format the Hard Disk and initialize the firmware with HARDHELP or 5HDHELP. Use ALLOC to create HIDOS partitions. (HiNet Masters cannot run either CP/M-86 or MS-

DOS.) The HIDOS operating system and the Hard Disk drivers are loaded from the Master when you log in on the DMS-3/4 or 3/501. In order to access the Floppy and Hard Disk Drive, make sure to use a User Name that is linked to a Full Service operating system in the USER Table. (See Section 2.6 for information about the USERS Table.)

THE DMS-3/4 AS A STAND-ALONE COMPUTER

To use the DMS-3/4 as a stand-alone computer, you must order CP/M 2.2 from Digital Microsystems. You can use the DMS-3/501 as a stand-alone computer with HiNet software but the initial cost is, of course, higher.) CP/M 2.2 alone does not support the HiNet Master software or Separated Boot. CP/M 2.2 is a special order from DMS; relevant documentation will be included with the software.

TIME, DATE AND SETTIME

TIME and SETTIME are used to set and display on a workstation's or the Master's CRT screen the correct date and time. These dates and times can also be accessed by applications software (E-MAIL, for example) with provisions for recording or printing such information.

Date and time can be set when the Master is booted or by using the **SETTIME** Command. When used on the Master Station SETTIME establishes the date and time for the entire network. When a workstation logs on to the network its internal clock reads the date/time from the Master

Station and begins running. (If SETTIME is used to reset a workstation's clock, then that particular station will have a date/time different from the rest of the network.)

----------NOTE----------
Workstations running MS-DOS will always come up with a request to enter the current time and date. Entering two RETURNS will keep the time and date active on the Master. Changing the time from the workstation will not affect the Master's time setting.

SETTIME is invoked by typing **A>SETTIME<CR>** from the CP/M prompt. You will see the message: Enter date MM/DD/YY - (for Month, Day, Year) followed by Enter time HH:MM (for Hours, Minutes).

You must enter two digits for each Month, Day, and Year (e.g., July 1st, 1984 would be 07/01/84) and you must also type in the slash mark (/). After typing in the date you will see the Enter Time HH:MM- message. As with the date you must use two digits and include the colon (:).

Once the date and time are entered, HiNet will maintain an electronic clock accurate to 1/62nd of a second and display the correct date and time at any workstation whenever the command **A>TIME<CR>** is entered. HiNet uses the 24-hour clock; thus, 1 AM would be 01:00, while 1 PM would be 13:00. Every time the Master Station is turned off, or RESET, the date/clock is zeroed out (that is, all dates and times are erased and set at 00/00/00 00:00).

2.2 USING HARDHELP AND 5HDHELP

The HARDHELP and 5HDHELP programs are used to format the Hard Disk, load the controller software, maintain the Bad Track/Sector Tables and run diagnostic tests. The INSTALL program will call these utilities only if you are building a new system or have a new Hard Disk.

HARDHELP and 5HDHELP can only be used when the Network is down and the Master is booted from a Floppy Disk with the CP/M system tracks on it. Special care must be used with these programs to prevent accidental loss of data. Details on diagnostic routines are given in Section 6, Volume 2.

Specific information about the Masters (e.g., the size and the manufacturer of the Hard Disk) will be requested by the programs. The answers to the questions must be given in the form of numbered menu options. These codes are explained here and in the program's menu. In the following discussion on HARDHELP and 5HDHELP, the questions and the choices for the answers will be given. HARDHELP, the version for the DMS-3/4 series 8-inch Masters will be discussed first.

2.2.1 HARDHELP--FOR EIGHT-INCH HARD DISKS

HARDHELP is a program that will format and load the controller software onto an eight-inch Hard Disk. INSTALL will call the HARDHELP program if your system is new and has nothing on

the Hard Disk. If you have more than one Hard Disk, YOU will have to run HARDHELP the appropriate number of times. To do this, press the Interrupt button (next to the Power switch) once after you have booted the Master from the INSTALL #1 Disk. The A> prompt should appear on the screen. Enter HARDHELP <CR> and then follow the procedures given in this section.

The following information is displayed when HARDHELP is run:

```
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 -
```

If you have a new system, enter 1 to FORMAT the Hard Disk.

----------NOTE----------
Before formatting a Hard Disk that already has files on it, you must copy files with HARDBACK or PIP. If the DMS-3 is a HiNet Master, copy the USERS and ALLOC Tables with READ0.

```
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):
```

Next you must tell the HARDHELP program the size of the Hard Disk. Hard Disk sizes can be found on a metal panel on the back of the machine, on the DMS-3's packing slip and invoice, and on the Hard Disk's case:

DMS-3/101 = 11 Megabyte
DMS-3/102 = 23 Megabyte
DMS-3/103 = 46 Megabyte

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 in the following table:

SYSTEM COMPONENTS	RESPONSE
Only One Hard Disk	0
Multiple Hard Disks:	
First Volume	0
Second Volume	3
Third Volume	1
Fourth Volume	2

After your entry the program will display:

```
HARD DISK FORMAT

THIS ROUTINE DESTROYS DATA ON THE DISK.
DO YOU WISH TO CONTINUE? (Y,N OR CTRL X TO ZERO 17 SECTORS) Y
SAVING 17k INCLUDING FIRMWARE BAD SECTOR AND ALLOC TABLES
ENTER NUMBER OF TRACKS IN HEX OR <CR> FOR DEFAULT  <CR>

BUSY FORMATTING       **takes about 3 minutes**
DONE
A>
```

First HARDHELP displays a warning that FORMAT will erase any information that is on the Hard Disk; it will then ask if you wish to continue. By entering Y, the first 17K of Partition Zero will be saved and restored after formatting. You should almost always use this option unless Partition Zero is corrupted. Then you will have to format the entire Hard Disk with the CTRL X option and reenter the Bad Sectors. These sectors are listed on a sheet taped to the Hard

Disk inside the cabinet. For a NEW system enter Y to save this table.

You also have the option of formatting specific tracks for special cases. Normally do not use this option.

The message BUSY FORMATTING will be displayed for about 3 minutes while the Disk is being formatted. The CP/M A> prompt will return after the Disk is formatted.

REMEMBER!! HARDHELP FORMAT WILL ERASE ANY FILES STORED ON THE HARD DISK.

LOADING CONTROLLER FIRMWARE WITH HARDHELP

Now that the Hard Disk is formatted, the program that controls the Hard Disk's operation can be loaded onto it. This enables files to be written on the Disk and read from it. To load these programs, you will use the HARDHELP program again.

INSTALL will call HARDHELP again if you are preparing a new Master. Otherwise you may begin by typing **HARDHELP <CR>** after the A> prompt. The program will respond as it did before.

```
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 - 2
```

This time you want to INITIALIZE CONTROLLER FIRMWARE. Enter **2.** The screen will display:

```
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)-

LOADING HARD DISK CONTROLLER PROGRAM VERSION XX

ENTER VOLUME LABEL (10 CHARS MAX):
```

HARDHELP requests that you enter a specific code and name for each of the Hard Disks in your system. (The Volume number can be used for the name, e.g., VOL0, VOL1, VOL2, VOL3.) HARDHELP

exits after each initialization. Therefore, for each Volume you have in your system you will have to reenter HARDHELP, select the Volume number (0-3) and initialize the firmware.

When you finish, the program will respond: "CONTROLLER FIRMWARE LOADED SUCCESSFULLY," and return you to CP/M.

If there is a problem with the initializing process, an error message will be displayed. Initializing the Hard Disk should take only a few seconds.

2.2.2 5HDHELP--FOR 5-INCH HARD DISKS

On new DMS-3/501 Masters, INSTALL #1 calls the 5HDHELP utility to format and initialize the firmware. Once the program is called, you must control it by entering some information codes and selecting the format option. When INSTALL calls 5HDHELP the screen will show:

```
A>5HDHELP <CR>

DMS-3/501 HARD DISK UTILITY PROGRAM VER x.xx

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)
```

You must tell the 5HDHELP program the manufacturer and model number of the Hard Disk. You can determine the manufacturer by either looking at the shipping invoice that came with the DMS-3/501 or by examining the label on the back of the Hard Disk. Refer to section 1.2.2.

Notice the number code before each choice given on the screen. After the request 'ENTER VOLUME TYPE' and all the choices, a hyphen and a cursor are displayed. Enter the correct code based on which Hard Disk you have.

5HDHELP will respond to that answer with the request:

```
SELECT ONE OF THE FOLLOWING FUNCTIONS:

0 - ACCESS DIAGNOSTIC ROUTINES
    (MUST BE EXECUTED UNDER DDT OR ZDTI)
1 - FORMAT
2 - INITIALIZE FIRMWARE
3 - DISPLAY/ADD TO BAD TRACK TABLE

ENTER 0,1,2, OR 3
```

On a new Master with a blank Hard Disk, respond with the code for FORMAT, code 1.

----------NOTE----------
Before formatting a Hard Disk that already has files on it, see section 5, Volume 2. You must copy the files with 5HDBACK and Partition Zero. If you are changing partition sizes, you will have to PIP files from the partitions that will be changed to Floppy Diskettes and then PIP them back into the new partitions.

After you enter menu option 1, the screen will respond with:

```
HARD DISK FORMAT
THIS ROUTINE DESTROYS DATA ON THE DISK.
DO YOU WISH TO CONTINUE? (Y,N) Y
DO YOU WANT TO PRESERVE BAD TRACK INFORMATION? (Y,N) Y
BUSY FORMATTING...DONE   **takes about 3 minutes**
THE FORMATTING PROCESS ERASED THE FIRMWARE.
DO YOU WISH TO RE-INITIALIZE THE FIRMWARE NOW? (Y,N)Y
A>
```

5HDHELP will display a warning reminding you that FORMAT will erase any information that is on the Hard Disk and then ask if you wish to continue. If the DMS-3/501 is new and there is nothing on the Hard Disk, you can safely answer yes. Enter **Y**.

The program will also ask you if you want to save the Hard Disk's Bad Track Table. This is the information that tells the Hard Disk controller where NOT to write data. Enter **Y** to save this data. The program will preserve and restore the Bad Track Table. Unless you are going to run the Bad Track diagnostics to build another Table, you should always preserve it; answer Y for yes.

The message BUSY FORMATTING will be displayed for about 3 minutes while the Disk is being formatted. When formatting is completed, the program will ask if you want to reinitialize the firmware. Unless you are going to perform test diagnostics on the disk you must re-initialize the firmware; enter a Y for yes.

REMEMBER!! 5HDHELP FORMAT WILL ERASE ANY FILES STORED ON THE HARD DISK. ALWAYS BACK UP THE HARD DISK BEFORE FORMATTING.

2.3 SYSUP--UPGRADING PARTITION ZERO

When INSTALL calls the SYSUP utility you will not have to do anything to control it. Do not run the SYSUP program by itself. This section on SYSUP is provided for information only; you should not have to deal directly with SYSUP.

Partition Zero stores all of the software needed to control the Hard Disk, the operating systems for the Master and the workstations, the ALLOC Table, USER Table and the Bad Track Table.

In order to upgrade an established Network Master's Operating System to allow for separated boot, Partition Zero must be reorganized. The INSTALL program calls the SYSUP (System Upgrade) utility to do this for you.

----------WARNING----------
It is extremely important that you have an up-to-date backup of the Hard Disk's Partition Zero before INSTALL runs the SYSUP utility. Should something interrupt SYSUP before it is finished, the data on the Hard Disk may not be accessible. You will have to restore Partition Zero with the backup programs or WRUN0 before attempting to run INSTALL again.

2.4 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.

There are two ways to go about adding workstation PROM Serial Numbers to the MACHINE Table: 1) enter all numbers from the Master, or 2) log in each workstation and run MACHINE once for each station. The advantage to running MACHINE from a workstation is that the program will enter the PROM Serial Number automatically when you use the ADD Menu option. Only the workstation's entry can be added or modified from the station. All MACHINE Table entries can be accessed from the Master.

The first step in building the MACHINE Table is to determine the PROM serial number for each workstation in the Network. To do so use the following procedures.

Z-80 (8-BIT) WORKSTATIONS: DMS-5080, DMS-3/F, DMS-501, DMS-3/10x, DMS-3/B

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. 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-1280 PROM MONITOR

To access the PROM Monitor in the DMS-1280, turn the workstation on and press the RETURN key before the Login Message appears on the screen. A colon should appear on the screen. At that point you can follow the same procedure as for the other Z-80 based workstations.

8086 (16-BIT) WORKSTATIONS DMS-5086, DMS-86

For these workstations, the CPU serial number can be found by entering the PROM Monitor (Interrupt and Reset). The screen will display the line:

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

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.

MODIFY -- Use the M option to modify any entry in the Machine Table. Most commonly this will mean changing the default printer assignment. The default console assignment can also be changed for special applications. Normally, the console is assigned to the port that connects to the keyboard and CRT screen.

DELETE -- This option is used to erase an entry in the Machine Table. Once a workstation's PROM serial number is erased, that workstation will not be able to log in to the Network. Delete an entry only when a workstation's PROM has been changed and the old number no longer exists.

LIST -- To view the current listing of the MACHINE Table, use the LIST option.

QUIT -- 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 MACHINE Table in Partition Zero on the Hard Disk.

2.5 ALLOCATE PARTITIONS--THE ALLOC UTILITY

Now that you have chosen the operating systems for your Network, it is time to create new partitions (or modify old ones if you are updating the Network). This section will cover the most commonly used menu options in ALLOC: adding, modifying, deleting and listing the partitions on the Hard Disk.

Many considerations must be made when you are setting up your Network's partitions. In keeping with this volume's step-by-step approach, all of these details will not be discussed here. In this section, the basics of the ALLOC program will be presented so that you may change the size of the CSYSTEM partition and create one or two partitions for your immediate needs. We recommend that the more detailed principles of Network partitions--covered in Volume 2, Section 4--be read carefully before making more partitions for your Hard Disk.

In a new system, the software utilities will not have been transferred to the Hard Disk at this point. The ALLOC program must be run when the Master is running ("booted") from the Floppy Disk--as opposed to running from the Hard Disk. When the Master is booted from the Floppy Disk, the Floppy Drive will be assigned to the logical A and D drives. Insert the INSTALL #4 diskette into the disk drive and boot the Master from it. Run the ALLOC program (A>ALLOC <CR>).

ALLOC can be protected by a password. However, the first time you access the ALLOC Menu, no password is required. To protect ALLOC

and other utilities, use the PW utility. (See Section 4, Volume 2.)

When password protection is enabled, entering the Manager's password gives access to the complete ALLOC Menu where partition manipulation takes place. Here is the full ALLOC Menu.

```
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.
```

2.5.1 CHANGING THE CSYSTEM PARTITION'S SIZE

The INSTALL program established an ALLOC Table with a 2 Megabyte partition named CSYSTEM. If you wish a smaller or larger CSYSTEM partition, now is the time to change the size, before copying software onto the Hard Disk or creating more partitions.

To change the CSYSTEM partition's size the ALLOC Table can be zeroed of all entries. DO THIS ONLY IF THERE ARE NO OTHER PARTITIONS OR DATA ON THE HARD DISK. (Use the Z menu option.) The CSYSTEM partition can then be recreated in a larger or smaller size.

Another alternative to changing the default CSYSTEM partition's size is to rename the existing CSYSTEM partition and then create a new CSYSTEM partition of the desired size. The CSYSTEM partition does not have to be the first partition on the Hard Disk.

----------NOTE----------
Be very careful, when modifying the CSYSTEM partition, that you do not change its name. If the CSYSTEM's name is changed and it is still assigned to the Master's A: Drive, you will no longer be able to log in to the Master after resetting if there are no other names in the USER Table yet. This problem can be remedied by using ALLOC (booted from the floppy) and changing the name back to CSYSTEM.

2.5.2 ADDING PARTITIONS

Once you are in the ALLOC Table Main Menu, the first option is to 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   --> 0           (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       O

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. When MS-DOS is selected for a partition's operating system, the partition will be formatted for that operating system when the new ALLOC Table is saved to the Hard Disk.

The Partition type was set at O--OWNABLE. Therefore, the User who first assigns Write ownership for the partition is the only one who can write to the MSYSTEM partition. Normally no

user should be writing to this partition. The status should be changed to R/O (Read/Only) after all files have been transferred to the partition.

The backup selection was set at Yes. This tells the 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 5HDBACK.)

After entering all the choices, the partition's parameters are redisplayed for approval. If all is well, respond 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's parameters you can modify them with the M (Modify) menu option. You cannot modify a partition's size. Changing a partition's size requires deleting the partition, compressing the ALLOC Table and recreating the partition in a larger or smaller size. The operating system for a particular partition cannot be changed from CP/M to MS-DOS or back without destroying all of the data in that partition.

----------**NOTE**----------

Do NOT make partitions intended for CP/M-86 larger than 8M in size. CP/M-86 cannot access 16 or 32 Megabyte partitions. ASSIGN will not permit a link between a workstation running

CP/M-86 and a partition larger than 8 Mbytes. If a 16 or 32 Mbyte partition is set as a default assignment in the USERS Table, the drive will be left unassigned under CP/M-86.

2.5.3 HIDOS SHARED PARTITIONS

The HiNet Network now comes with the DMS-enhanced version of CP/M-80 (2.2) called HIDOS. Under HIDOS, partitions can be shared by more than one user on the Network. In order to make a HIDOS partition shared it is necessary to follow these steps.

----------NOTE----------
While making these changes everyone should be off of the Network. Any time the Master is booted from a Floppy Diskette, Users cannot log in to or access information from the Network. Any changes to the ALLOC Table should be done during periods when the Network is not expected to be operating.
---

1) Set a new or established CP/M partition to R/W in the ALLOC Table. Save the ALLOC Table and boot the Master's Hard Disk (:BH).

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.

3) Change the logged drive from A to B (A>B:<CR>). You are now logged to the partition that is to be shared.

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

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

6) Boot the Master from the Floppy Disk containing ALLOC*.* files (or from a copy of the INSTALL #4 diskette). Modify each shared partition to make the **Partition Type—> Shared.** Save the ALLOC 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.

2.5.4 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 the Modify option makes is no provision to change the partition's size.

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 requires reformatting the partition, which erases all data.

2.5.5 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 followed by an L to print out a hard copy of the ALLOC Table on a printer that is connected to the Master.)

2.5.6 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 reset (cold-booted). Any deleted partitions will no longer be accessible by users on the Network.

The remaining ALLOC menu options are used by the System Administrator for Network maintenance. These functions are covered in Section 4 of Volume 2.

2.6 THE USERS TABLE--NETWORK LOGIN NAMES

The USERS utility builds 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 are adding MS-DOS to your Network, you will have to enter new User Names and link them to the appropriate operating systems.

The USERS program can be protected by a password. This is part of the Network's security. USERS lists and can modify User Names and their passwords. If your Network requires security precautions against the unauthorized access of data, use the PW utility to set a Password to a private six-letter (or shorter) word composed of any ASCII characters. If no security is needed for your Network, the PW program can be set so it does not ask for any passwords.

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 be only one name, MASTER. This entry was created by INSTALL along with the CSYSTEM partition so that you can log in to the Master.

----------NOTE----------
On established Network Masters, the new USERS program (on the INSTALL #5 diskette) will not list any existing names unless the SYSUP program has been run. SYSUP rewrites the existing USERS Table to a different location in Partition Zero where the new USERS program expects to find it. The INSTALL program will run SYSUP for you.

Each user on the Network has these entries in the USER Table, some of which are optional:

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

USER NAMES

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

PASSWORDS

A password is optional and can be a RETURN if no security is needed. The password is limited to 6 characters in length.

OPERATING SYSTEMS

The four choices for operating systems are HIDOS, CP/M-86, and MS-DOS--with CP/M 2.2 available on special order. 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.

The DMS-816, for example, can run all four operating systems. If 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 different operating systems.

When CP/M-86 or HIDOS 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, -501 or -4 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 Hard Disks.

HIMEM means that the operating system has been pared to a minimum to increase workstation TPA (Transient Program Area--the storage in RAM where applications programs are run). In this case, a workstation with local Floppies or Hard Disks would not be able to use these devices to transfer files directly to and from the Network Master. However, large applications programs that need at least 53 Kbytes of RAM to work will require a HIMEM operating system.

----------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. Workstationswith 16-bit processors (DMS-5086, -86, -816) can have up to eight 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.)

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.

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 workstation they come with.

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.
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 @ sign will not appear on the screen.

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 will be stored in

the temporary USER Table. The entry does not become permanent until it is saved with the S (Save) command.

2.6.1 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>
```

(Screen continued on next page.)

```
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)

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.

2.6.2 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 only.

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 save the table to the Hard Disk. Use the S menu option to save the USERS Table.

2.6.3 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.

2.6.4 OTHER USER TABLE MENU OPTIONS

The USER Table has several other menu options that will be used primarily by the Network Administrator. They are covered in detail in Volume 2, section 4 (Network Maintenance). Here are brief descriptions of these options for quick referance.

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.

2.7 COPYING THE SOFTWARE UTILITIES

At this point you will probably have one or two partitions on the Hard Disk (if you have a new Network). If necessary, all of the CP/M and CP/M-86 files should be able to fit on the 2 Megabyte CSYSTEM partition. The MS-DOS files must go on a separate partition, normally called MSYSTEM. Now you can transfer the software utilities to these partitions.

2.7.1 COPYING HIDOS UTILITIES

---IMPORTANT---

If you are upgrading or updating an established Network, you must make sure that all copies of old HiNet utilities--especially ASSIGN, DIRNET, ALLOC, USERS and WHO--are replaced in ALL partitions. The pre-separated boot utilities will not work properly on the updated Network and may cause problems for unwary Users.

On a new Master, there will not be any software utilities on the Hard Disk at this point. To transfer the CP/M utilities to the CSYSTEM partition use the PIP command.

INSTALL #1 -- The files stored on the INSTALL #1 diskette need not be transferred to the Hard Disk. The files can only be used when the Master is booted from the Floppy Diskette. They may be dangerous if used by untrained personnel.

INSTALL #5 -- Insert the diskette in the Floppy Disk Drive. (ASSIGN D: M0) Enter the command: A>**D:PIP A:=D:*.*[V <CR>**. This command will copy all of the CP/M utilities from the diskette to the CSYSTEM partition assigned to the A Drive.

INSTALL #2 -- If you have purchased CP/M-86, transfer all the files on INSTALL #2 to either a separate CP/M-86 partition or to the CSYSTEM partition. (For both CP/M and CP/M-86 files and applications programs to reside on one partition, the partition will have to be 2 Megabytes in size.) Use the PIP command to transfer the CP/M-86 utilities to the Hard Disk. For example,

A>**PIP A:=D:*.*[V**

will copy all of the CP/M-86 command files to the partition assigned to the A Drive.

INSTALL #4 -- Copy the CUSTOMIZ files for Z-80 based workstations with the command:

A>**PIP A:=D:CUST*.*[VO <CR>**

Copy the HIDOS E-Mail command file from Disk #4 to the CSYSTEM partition with the command:

A>**PIP A:=D:MAIL.COM[VO <CR>**

Copy the PASSWORD utility to CSYSTEM with the command:

A>**PIP A:=D:PW*.*[VO <CR>**

Copy the MACHINE utility to CSYSTEM with the command:

A>**PIP A:=D:MACHINE*.*[VO <CR>**

For MS-DOS Networks there is an important file copying utility on INSTALL diskette #4. Copy the TRANSFER utility to the CSYSTEM partition with the command:

A>**PIP A:=D:TRANSFER.COM[VO <CR>**

INSTALL # 6 -- Copy all CP/M-86 files to either the CSYSTEM partition or to a special CP/M-86 partition. (A>**PIP A:=D:*.*[VO**)

2.7.2 COPYING MS-DOS FILES

If you are updating your Network to add MS-DOS or MS-DOS is a part of your new system, copy the files on the distribution diskette to the Hard Disk with the FILECOPY utility.

INSTALL #3 -- Assign a CP/M drive to the Floppy Disk Drive M0 (A>**ASSIGN D M0 <CR>**). Copy the .EXE files (executable files) on the MS-DOS INSTALL #3 diskette to the MSYSTEM partition with the command:

```
A>D:FILECOPY D:*.EXE MSYSTEM: <CR>
```

All of the MS-DOS command files on the INSTALL #3 diskette have the ending .211. This stands for the current Microsoft version number. In order to use the command files in MS-DOS, the filename extension must be .COM. Use FILECOPY to transfer the files to the MSYSTEM partition and rename them at the same time. Enter:

```
A>D:FILECOPY D:*.211 MSYSTEM:*.COM <CR>
```

Copy the files ending in .SYS to the MSYSTEM partition with the command:

```
A>FILECOPY D:*.SYS MSYSTEM: <CR>
```

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. A DMS-3/501 or DMS-3/F is required to read the 5.25-inch diskettes. The use of TRANSFER is covered in Section 5.5, Volume 2.

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 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).

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 from 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's files have been transferred, the station will not be able to "see" any new files in the partition until the partition is reassigned to the drive. Reassigning a partition forces the operating system to read the latest directory of the partition into the workstation's memory.

2.8 MIMIC MASTER

If it is essential that your HiNet network be operational at all times, with minimum possibility of data loss through a malfunction of the Master Computer, it is possible to connect a second Master Computer to the network and run it in Mimic Mode.

A second Master running in Mimic Mode will receive and store all of the data written to the primary Master Computer. Should something happen to the primary Master Computer, it can be disconnected and the Mimic Master re-booted as a replacement network Master with all of the data

of the original. Your network will then be operational within a few minutes of a major problem occurring on the original Master Computer.

----------NOTE----------
A Mimic Master CANNOT be used for data backup purposes because any incorrect commands sent to the Master Computer will be faithfully carried out by both Master and Mimic. For example, if someone accidentally issues an Erase Command the file will be erased in both places. Thus, a Mimic Master cannot be used as a substitute for tape or Floppy Disk data backups.

MIMIC REQUIREMENTS

To function as a Mimic Master the second computer must have Hard Disk storage equal to, or greater than, the Hard Disk storage of the primary Master.

The partition names and sizes, User Names and default settings must be identical on both computers. In other words, the Allocation, User, and Configuration Tables must be exactly the same on both the primary and the Mimic.

The data files stored in the various partitions must also be identical before running the second Master in Mimic Mode. That is, before running a second computer in Mimic Mode, it must contain an exact copy of everything stored in the first computer.

SETTING UP A MIMIC MASTER

1- Install the operating systems on the MIMIC exactly like the main Master using the INSTALL Disks. Stop the process when you reach the MACHINE program.

2a- If you have a Tape Cartridge backup, format the MIMIC Hard Disk(s) and use CARTBACK to load all partitions including partition Zero.

2b- If you don't have a TAPE backup, use the READ0 and WRUN0 to transfer the Partiton Zero ALLOC, USER, MACHINE Tables from the primary to the Mimic. On a DMS-3/501 MIMIC use 5HDBACK to load all partitions. Do not use PIP. Partitions must have files in the exact same order as on the Master.

2c. If you have only HIDOS/CP/M-86 partitions on the Master you can use COPYPART to copy partitions one at a time. COPYPART will not work on MS-DOS partitions.

Attaching the Mimic Master to the network and booting it as a workstation (**bn** from the PROM MONITOR), and then using COPYPART to copy the primary's partitions to the Mimic Station's local Hard Disk, is an efficient way to equalize the data on both Hard Disks. However, you must **be sure to send the data from the primary to the Mimic and not the reverse.**

For example, the correct way to use COPYPART from a Mimic Computer booted as a workstation is as follows:

ASSIGN B XXX<CR> -- (Assign Mimic Drive B to network partition XXX. This is the data source.)

ASSIGN C H:XXX<CR> -- (Assign Mimic Drive C to the Mimic Hard Disk partition which is also named XXX. This is the destination.)

COPYPART C=B<CR> -- (Copy network partition XXX on drive B to local Hard Disk partition XXX on drive C using the formula DESTINATION = SOURCE.)

Notice that if you were to accidentally transpose the letters in the last command from COPYPART C=B to COPYPART B=C you would be sending data from the Mimic to the primary and thus erasing current data.

To ensure against such accidental transpositions it is a good idea to prepare a CP/M Submit file with the proper series of commands rather then typing in each series by hand. See your CP/M Manuals for information on using Submit files.

BOOTING THE MIMIC MASTER

Once the Mimic Master is configured and loaded as an identical twin to the primary Master it is ready to run in Mimic Mode, but it is not ready to be written to yet:

1- Boot the primary Master and bring up the network.

2- Plug the Mimic Master into the network through its HiNet port (just as you would if it

were being used as a workstation).

3- Turn on the Mimic Master and boot it from the Hard Disk (from the PROM MONITOR: **BH**) as if it were to be a Master Station.

4- You will see the message: **Another HiNet Master is in action. Enter M for Mimic.** Type **M<CR>**. You will see a series of dots appear on the screen. This is the sign that the Mimic Master is now functioning.

If something now goes wrong with the primary Master computer the Mimic Master will beep and display a Mimic Error Message. If the primary is out of action you can then reboot the Mimic Master as a replacement primary by following the same procedures as you do for the original primary Network Master.

----------NOTE----------
When you boot a Mimic Master to replace the original Master, any Lockstrings and Spool jobs that were stored on the original Master will not be present on the new Master (in other words, they will be lost and will have to be re-entered). Also, the WHO table will list all currently logged in workstations as Unknown.

Once the Main Master is repaired, you will again have to equalize the two sets of Hard Disks. Back up the MIMIC and load its partitions onto the Main Master, or boot the Master as a workstation (with all other users off the Network) and use COPYPART to reproduce the partitions.

3.0 HINET CABLING

Proper planning and installation of HiNet cable is essential. It is recommended that the installation of HiNet cable be done by a qualified technician. However, this section will explain how to set up HiNet cable between workstations and the Master in a step-by-step manner. If you follow the directions carefully you should have no trouble linking your Network together.

Consult with your HiNet dealer before proceeding with any modifications to an existing Network.

3.1 HINET CABLE

There are two types of cable used with HiNet Networks: a flat ribbon cable (RS-422) and a round shielded twisted pair cable (Belden Type 9829). The flat nine-wire ribbon cable comes in 100-foot rolls and has a red line down one edge. The twisted pair shielded cable comes in 500-foot rolls. A demonstration cable consisting of 100 feet of flat ribbon cable and five connectors (four male and one female) is included with your HiNet Network.

The twisted pair cable is heavily insulated and is primarily used where protection from outside radio frequency is required. Some

countries may require shielded cable to isolate the Network from other sensitive equipment. If requirements for RF emissions in your country exceed U.S. FCC Class A guidelines, you may have to use shielded cable in your installation.

The ribbon cable is generally used indoors. Except in special circumstances requiring heavy insulation or shielding (such as an environment with a high level of electrical noise from large A/C motors, welders, etc.), it is easiest to use the ribbon cable and Squeeze-on Insulation Displacement connectors for plugging into the workstations and Master Computer.

----------NOTE----------
If the round shielded cable is used to connect workstations, the workstation connectors must be soldered to the cable wires. A strain relief must be used to prevent tension on the cable from pulling the soldered wires away from the connector's pins.

3.2 STRINGING CABLE

DMS supplies two types of cable straps---a white plastic tie wrap (either three and a half or six inches long), and a gray peel-and-stick wall clamp.

The white strap has a one-way loop at one end. When the other end is inserted in the loop it can be drawn tighter but not backed out. (You can only insert it in the correct direction.) You can use this strap to tie two or more wires

together, tie a cable to a pipe, or staple the strap to a wall or baseboard and then loop the strap around a HiNet cable. The gray clamp has an adhesive square suitable for sticking to a wall or baseboard. Once the clamp is in place, the cable is simply inserted in place.

If you wish to use staples to string cable, **DO NOT ALLOW THE STAPLES TO PIERCE THE CABLE ITSELF.** Since the staples of an ordinary (9/16") gun are just barely wide enough to straddle the width of the cable, great care must be taken to align the gun precisely. Since it is very difficult to be 100% accurate with a staple gun, it is recommended that only special wide-span staplers be used to fasten ribbon cable in place.

3.3 HINET CONNECTORS

HiNet uses sub-miniature nine-pin 'D' connectors to link cables to machines and to each other. Each machine is equipped with a female socket, and both male and female connectors can be attached to the HiNet cable. There are two connector styles--a 'Squeeze-on' (Insulation Displacement) style for attaching anywhere along the length of flat ribbon cable, and a 'Solder-on' style for attaching to the ends of round Belden cable. Both styles come with either male or female connectors.

SQUEEZE-ON (INSULATION DISPLACEMENT) CONNECTORS

Squeeze-on (or Insulation Displacement) connectors may be placed anywhere along the length of a Ribbon Cable, and a length of cable may have many such connectors attached to it. By stringing Squeeze-on connectors along a Ribbon Cable, many workstations can be plugged into a single unbroken cable.

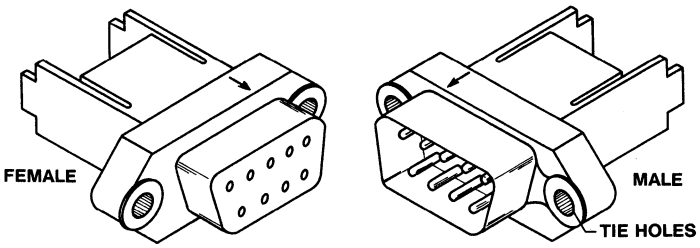
As you can see from diagram A below, there are three main parts to a Squeeze-on connector:

1- The **MAIN SECTION** which contains the pins (male) or socket holes (female) at one end, and the gold-plated **TEETH** at the other end;

2- The **SQUEEZE PLATE** which is used to push the cable down onto the teeth; and

3- The **STRAIN RELIEF** which then clamps over the Squeeze Plate and doubled-back cable.

----------NOTE----------
Squeeze-on connectors are shipped with the three main parts already assembled. To use them you will first have to take the connector apart gently.



MALE AND FEMALE CONNECTORS

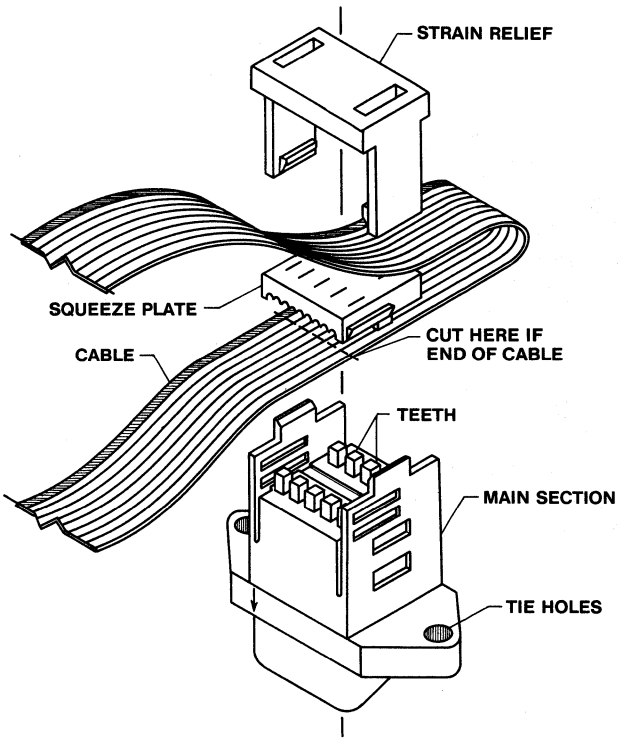


DIAGRAM A
EXPLODED VIEW OF SQUEEZE-ON CONNECTOR

ATTACHING A SQUEEZE-ON CONNECTOR.

1- Find the spot on the cable where you wish to place the connector. Place the cable over the teeth so that the cable's red line, which indicates conductor #1 in the cable, is on the same side of the connector as the connector's small black arrow which indicates pin #1 on the connector. See Diagram B on the next page.

2- As you can see, there are three slots on each side of the connector's main section, two near the teeth and a lower one near the tie-holes. The Squeeze Plate has small plastic flanges which fit into the slots. Place the Squeeze Plate against the cable (the angled side of the Squeeze Plate's flanges facing the cable) and push the plate down with your fingers so that the cable presses against the teeth. Press down until the flanges snap into the top main section slot. See Diagram B.

----------NOTE----------
Make sure that the cable is square to the connector and that the cable strands line up properly with the teeth. One of the most common errors in cable assembly is shorting together conductors by incorrectly positioning the cable before pressing down on the Squeeze Plate.

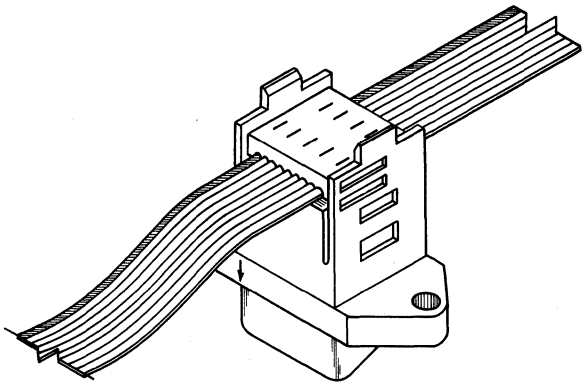


DIAGRAM B
CONNECTOR WITH CABLE SQUEEZED ON

3- If you have a crimping tool (a device for squeezing together the Squeeze Plate and the main section) use it to push the plate down harder on the cable until the flanges snap into the next (second) slot.

If you do not have a crimping tool you can use Channel Lock type pliers to squeeze together the plate and the main section until the flanges snap into the second slot. However, if using Channel Lock pliers you must protect the main section pins or socket holes from being bent or scored by the Channel Lock's teeth. This is done by plugging another connector (with strain reliever attached) into the pins or holes of the connector you are working on so that both plier jaws can push against the backs of the two connectors. Never let the jaws of a pliers push against the holes or pins. (There is a plastic

hood protecting the pins, but this hood is not adequate defense against Channel Lock pliers.)

4- Once the Squeeze Plate flanges are snug in the second slot, and the sides of the main section are not bowed out, the teeth have penetrated completely through the cable and it is time to attach the strain reliever. Before attaching the strain relief **double the cable back over the plate.** There are flanges at the ends of the strain reliever's legs that fit into the third (bottom) main section slots. With the cable doubled back over the Squeeze Plate, as shown in Diagram C, push down the strain reliever until the leg flanges snap into the lower slots. The connector is now ready to use.

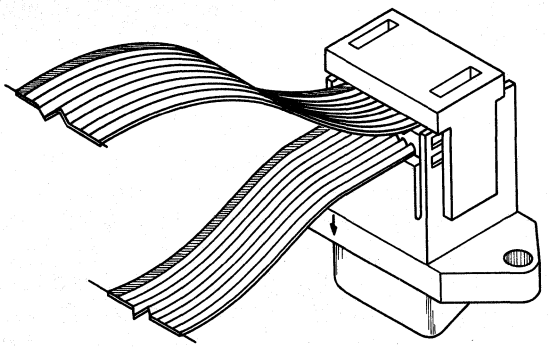


DIAGRAM C
COMPLETED CONNECTION

END OF CABLE CONNECTOR

If the Squeeze-on connector is at the end of the cable (to be used to connect the cable to another cable or to a terminator), cut off any excess cable that sticks out past the connector after the cable has been doubled over and clamped down with the Strain Relief (see diagram A).

CONNECTOR TIE HOLES

As you can see, there are two tie holes in the main section near the third slot. When two cables are connected together these tie holes are used to prevent strain on the cable from pulling the connectors apart. By poking plastic tie wraps through the two sets of holes on either side of the male and female connectors and then tightening the plastic ties, the two connectors can be prevented from pulling apart. 4-40 x 1/2" bolts and nuts may also be used.

SOLDER-ON CONNECTORS

As you can see from Diagram D below, there are nine pins on the backs of both the male and female Solder-on Connectors. To attach a Solder-on Connector to a round shielded twisted pair cable, the appropriate cable wires must be individually soldered to the correct rear pin. The rear pins correspond to the socket holes (female), or pins (male), on the other side of the connector.

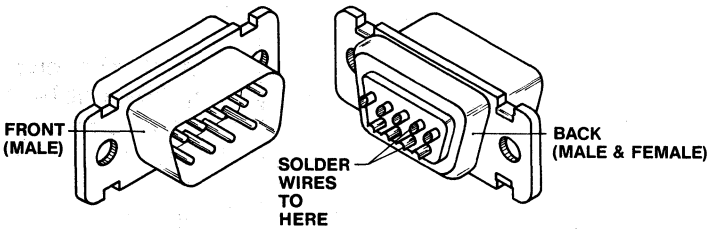


DIAGRAM D
SOLDER ON CONNECTOR

There are two twisted pairs in each round cable:

1- A **Black-White** pair which carries the data signal and is soldered to pins **9 (Black)** and **4 (White).**

2- A **Black-Red** pair which carries the clock signal and is soldered to pins 7 **(Black)** and **2 (Red).**

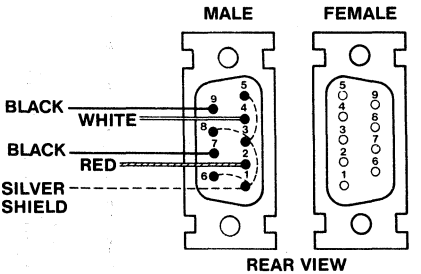


DIAGRAM E
WIRING DIAGRAM

All of the remaining pins are ground pins. A wire should be soldered from one to another and then to the silver cable shield that wraps the cable's wires. See Diagram E below.

----------WARNING----------
Be careful to avoid melting through the insulation on the inner conductors when soldering to the shield.

This type of connector must have a strain relief enclosure to protect the soldered connections. The strain relief enclosure for a soldered connector is a hood that fits over and shields the soldered connections.

----------NOTE----------
Unlike the Squeeze-on connectors, Solder-on connectors can only be attached at the end of a cable. When it is necessary for a cable to continue on after a Solder-on connector, as at a workstation, the wires of two separate cables must be soldered to each pin.

3.4 CABLE TERMINATION

For reliable operation **EACH END OF EVERY CABLE MUST BE PROPERLY TERMINATED** to prevent signal reflection.

There are only two ways to terminate the end of a cable correctly:

1- Plug the end of the cable into a HiNet End-of-Line Terminator.

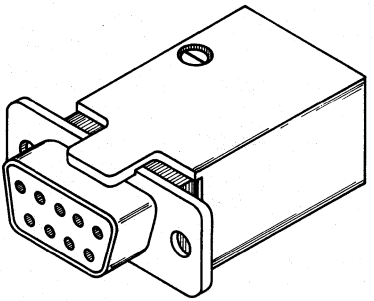


DIAGRAM F
TERMINATOR (FEMALE)

2- Plug the end of the cable into a HiNet repeater box (see description in next section) and set the appropriate termination switch to ON.

When two or more cables are connected together end-to-end without a repeater they should be considered as one long cable needing termination only at each extremity.

----------NOTE----------
Plugging the end of a cable into the last workstation on the line is not a proper method of terminating a cable. The cable must be extended past the last workstation and then ended with an End-of-line Terminator. In this respect the Master Station is just like a workstation; it does not provide cable termination,so the cable should not end at the Master, but rather extend past it and be terminated with a HiNet End-of-Line Terminator.

The Master Station need not be at the end of a cable; it can be plugged into the middle just like a workstation.

3.5 REPEATERS

If the total cable length linking your HiNet workstations to the Master Computer is longer than 1000 feet (325 meters) it is necessary to strengthen the signal with a HiNet Repeater. One repeater is needed for every 1000 feet of cable. A repeater is also used to begin branch lines.

----------WARNING----------
Before plugging the repeater into its power supply, the repeater's voltage selector must be set to match the line voltage. The voltage selector is a slide type switch next to the ON/OFF toggle switch.

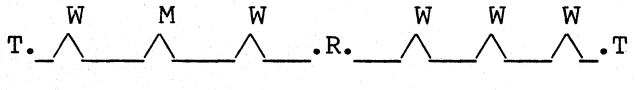
Terminator Switch

Each Repeater has two female nine-pin D connector sockets labeled HiNet-1 and HiNet-2. For each of these sockets there is an ON/OFF Terminator Switch. If the **end** of a cable is plugged into the socket, the Terminator Switch should be set to **ON.** If the repeater is plugged into the **middle** of a HiNet cable (using a mid-cable Squeeze-On connector, for example) the Terminator Switch should be set to **OFF.**

EXTENDING A LINE

When using a repeater to extend the length of a line, the cable leading back towards the Master Computer is plugged into the socket labeled **HiNet-1** and the cable leading on away from the Master is plugged into socket **HiNet-2.** In this situation (diagrammed below) **both** the HiNet-1 and the HiNet-2 Terminator Switches (labeled **TERM**) are set to **ON** because both have the end of a cable plugged into the socket.

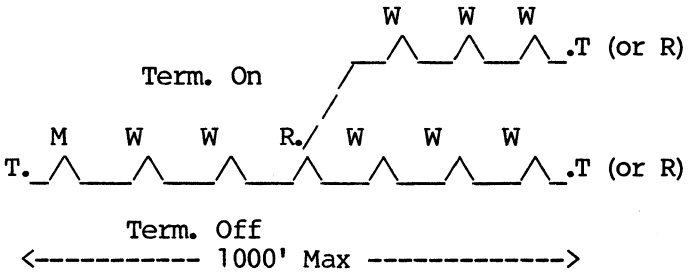
Both Terminator switches set to ON



M-Master Computer, W-Workstation, R-Repeater, T-Terminator, .-End of Cable, /\-Connector attached to middle of cable.

BRANCH LINES

A branch line is created by plugging a Repeater into a cable somewhere between the two ends (using repeater socket HiNet-1) and then plugging the end of another cable into Repeater socket HiNet-2 (see diagram below). When this is done the Terminator switch for the **HiNet-1** is set to the **OFF** position because it is not plugged into the end of the cable, and the Terminator switch for **HiNet-2** is set to the **ON** position.



3.6 PLANNING NETWORK CONFIGURATION

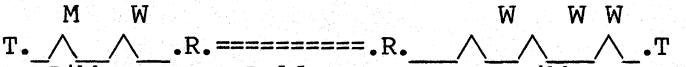
GENERAL PRINCIPLES

1- No more than 63 workstations may be operationnal at one time on a Network. (If many users are simultaneously working on the Network, you may notice a slowing of response time.)

2- No more than 20 workstations may be connected to each length of cable in a Network. A Network may consist of many lengths of cable joined by repeaters.

----------NOTE----------
A length of cable is defined as the cable between two terminators, or between a terminator and a repeater, or between two repeaters. Thus, several pieces of cable joined end-to-end by ordinary connectors are considered to be one length of cable.

3- Cables of the same type can be connected end to end with no problem. **However, you cannot use connectors to attach a Flat Ribbon Cable to a round Belden Cable** because the signals in the cable will be reflected by the joint. If you wish to connect a Belden to a Ribbon Cable (for example, a cable coming in from outdoors to a cable which is used to hook up workstations) you must place a repeater between the two types of cables.

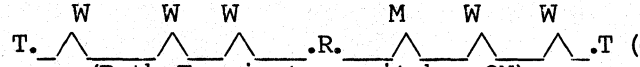


(All repeater Terminators in ON position)

M-Master Computer, W-Workstation, R-Repeater, T-Terminator, .-End of Cable, /\-Connector attached to middle of cable.

4- A repeater is needed for every 1000 feet of cable.

USE OF REPEATER TO EXTEND PAST 1000':



(Both Terminator switches ON)

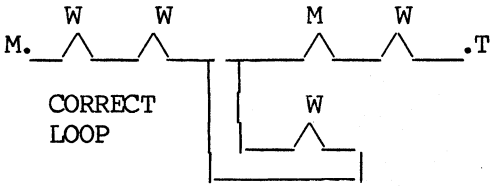
<---- 1000' Max ---> <--- 1000' Max --->

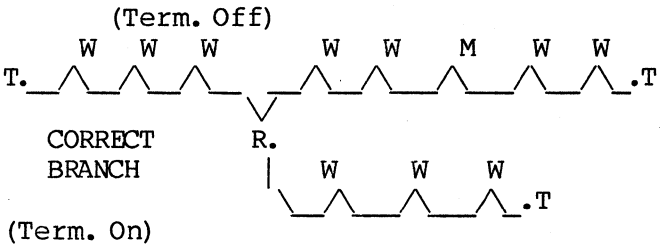
M-Master Computer, W-Workstation, R-Repeater, T-Terminator, .-End of Cable, /\-Connector attached to middle of cable.

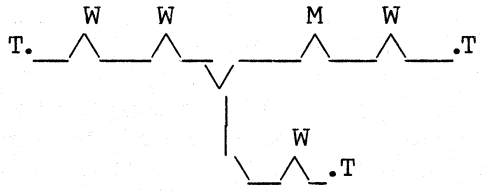
5- Every end of every cable must be properly terminated.

6- The Master may be connected to the middle of a cable. If the Master is the last unit on a line there must still be a short cable extension past the Master ending in a terminator (just like the last workstation on a line).

7- Workstations should be connected by a loop of the main cable, not a branch (unless the branch is joined to the Network with a repeater).







INCORRECT
BRANCH

M-Master Computer, W-workstation, R-Repeater, T-Terminator, .-End of Cable, /\-Connector attached to middle of cable.

8- If you lay HiNet cable next to power lines, one or the other should be protected by conduit; otherwise, the power lines may cause interference, or damage data on the Network.

SOME SUGGESTIONS

If you have a large Network covering several rooms, use a floor plan to layout the Network. As new workstations and cables are added to the Network, the floor plan should be updated to reflect these changes. This way, if problems are encountered, the cable's path can be traced throughout the building.

When planning the route for cable to take from room to room you may wish to make use of existing conduits, pipes, and wires to minimize the number of holes that must be drilled through walls and floors.

If you are planning to use a SPOOL printer you may wish to place the Master Station and

SPOOL Printer in a place where the noise of the printer will not be disturbing.

If you must lay a cable across a floor where people could trip over it, or pull it loose from a workstation, be sure to place a beveled cover over it that is designed to protect wires on the floor. These covers are available at hardware and building supply stores.

When putting in loops for workstations, be sure to leave enough slack in the loop so that people can move the equipment or change the position of their desks.

4.0 USING PRINTERS

4.1 INTRODUCTION

This section will cover installing a printer on a HiNet Master, setting up the Network SPOOLER and using the SPOOL printer from a Network workstation. A stand-alone DMS-3/4/5 can use the same configuration for printing but without the SPOOLER program. Both setups will be discussed here.

4.2 INSTALLING A PRINTER

There are two main steps to installing a printer on a Master:

First you must make the physical link with a cable between the printer and a serial port on the back of the Master's cabinet. This link may include making alterations to the cable or to a jumper block to make the signals that the Master sends out of the port agree with what the printer requires to function properly. The rate at which signals are sent to the printer must also be set with a HiNet program--SETBAUD.

A second step is necessary if you will be using the printer as the Network SPOOL Printer. Create a PRTSPOOL partition with ALLOC. The SPOOL utility sets up the spooling protocols and

controls the print jobs coming in over the Network from the workstations.

4.2.1 CONNECTING A SERIAL PRINTER

Almost all Serial Printers use a standard RS-232 cable to communicate with microcomputers. These cables may be purchased from Digital Microsystems or from computer supply stores. The ports on the back of the Masters are RS-232 compatible. Usually PORT2 (the third port from the top) is designated as the printer port. PORT0 does not have a jumper block but can be used to connect to another CRT; PORT1 cannot be used when the Masters are running under HiNet, and PORT3 is normally used as a MODEM Port. However, PORT3 can be configured for either a printer or a modem if necessary.

Depending on the printer, a cable usually has a 'male' and a 'female' connector at either end. The Master's serial ports require a male connector--that is, there must be pins protruding from the connector even though they are recessed in a socket. Plug the correct end into Serial Port 2 (third from the top). Plug the other end of the cable into the printer's port.

Most cables come with screws with which to fasten the cable to the port. It is a good idea to use these to prevent the cable from coming loose. A loose cable can cause the Master to 'hang'--become unresponsive to commands while it is waiting to print.

Now that the printer is connected, the exact communications protocol must be determined and the jumper block for Port 2 altered if necessary. Consult the printer's manual to determine the protocol it requires. The most common protocols are described in the following section.

4.2.2 INTERFACING PRINTERS

Getting a printer (particularly a Serial Printer) to work properly with a Master or a workstation is probably the most difficult part of setting up a Network. This section will describe some of the procedures needed to interface the Spool Printer with the Master Station. (The same procedures will also apply to interfacing a printer to a workstation or a stand-alone DMS-3/4/5.)

Various elements need to be coordinated to ensure proper functioning of a printer. Depending on the type of printer you are using you will have to consider one or more of the following elements:

1- Printer-Computer communications protocol.

2- Appropriate I/O Port Jumper Block or cable.

3- Correct setting of printer DIP switches (see your printer's instruction manual).

4- Correct configuration of software if necessary (see your software user's manual).

5- Assign correct port (see Section 2.11, Volume 2).

6- Set correct Baud rate (Serial Printer only)(see Section 4.5).

Communications protocol refers to the method of communication between the printer and the computer which allows the printer to handle the flow of data properly. Printer Jumper Blocks or special cables may be necessary when using Hardware Handshaking protocol with Serial Printers. For the correct setting of printer options consult your printer's instruction manual or your dealer. Some types of applications software must be configured for the particular printer you are using; again see your software manual or consult with your dealer.

Assigning a port to a printer can be done with the ASSIGN Command (see Section 2.11.5, Volume 2), or with the login command in the Users Table (see Section 4, Volume 2). With a Serial Printer you must also set the correct Baud rate (see Section 4.5).

PROTOCOLS

The communications protocol is the method by which the printer tells the computer when to transmit characters to be printed. Printers can

only print characters at a certain speed and can only store a limited number of characters; if the computer sends data faster than the printer can handle, exceeding the printer's capacity for storage, there will be an overflow error and data will be lost. Thus, the printer must have a way to regulate the flow of data; this is called the 'protocol' or 'handshaking'.

In essence, the protocol allows the printer to tell the computer when to start and stop sending data. When the printer has received as much as it can handle for the moment it commands the computer to stop. When it has finished with the first batch it tells the computer to send another batch.

Every type of printer is designed to operate with a particular type of protocol, and many printers allow the user to select the protocol to be used.

NO PROTOCOL

It is possible to operate a printer without a handshaking protocol (sometimes called 'No Flow Band Control'). To do this successfully, however, the printer must be capable of continuously handling all data without error at the computer's transmission rate. In other words, the printer must be able to print faster than the computer can transmit.

For DMS computers this is 9600 baud, or approximately 960 characters per second. Very few printers are that fast. However, if for some

reason you wished to use a No Protocol Printer, an experienced programmer familiar with CP/M and HiNet could lower the default baud rate to a speed slow enough for the printer to keep up.

HARDWARE HANDSHAKING PROTOCOL

A Hardware Handshaking protocol (sometimes called 'Out of Band Flow Control' or 'CTS/RTS') uses a particular wire in the cable to communicate between the computer and printer. In other words, there is a special 'printer busy line' which the printer uses to tell the computer when to start and stop sending data. For this to work, the appropriate line from the printer must be connected to the computer's CTS INPUT line. Since different printers use different wires in the cable for this purpose, a Jumper Block may be necessary to insure the proper connection (see Section 4.2.2).

X/ON X/OFF PROTOCOL

With the X/On X/Off protocol the printer sends a particular character to the computer to toggle on and off the sending of data. The DMS Spool Printer is able to use the X/On X/Off protocol. X/ON X/OFF can also be used with a printer directly connected to a workstation. Consult your printer's manual for any special exceptions or settings which may be necessary.

ETX/ACK PROTOCOL

At this time the HiNet Spool Printer does not support (handle) the ETX/ACK protocol (End of Text/Acknowledge). However, most DMS workstations can be configured for ETX/ACK protocol.

JUMPER BLOCKS

When a peripheral device (such as a printer or modem) is connected to a computer via an RS-232 cable, each pin in the cable's plug matches a specific wire attached to a particular socket hole. Unfortunately, there is little standardization among peripherals as to which wire should correspond to which pin. Thus, the wires may have to be switched to match the needs of a particular device.

The easiest way to alter these wiring patterns is to use a Jumper Block to change the paths of the signals through the Serial Port to match the requirements of the peripheral. The other method is to re-wire the cable by removing one of the cable's connectors and re-soldering the wires to the pins in a different pattern.

The wires going to a Serial Port are permanently embedded in a green plastic circuit board. However, near the port they all end at a Jumper Block socket and then continue from the other side of the socket. That is, the socket is an empty space disconnecting the wires. This space is bridged by a Jumper Block which plugs into the socket (like an IC chip) and has wire

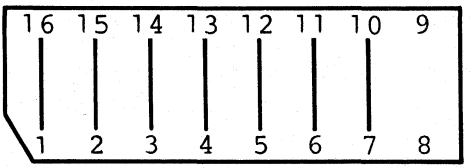
conductors arching from one side of the block to the other.

On a standard Jumper Block the conductor bridges are all parallel so that each wire connects to the one directly across the gap. However, by soldering insulated wires from one part of the block to another, and/or cutting the copper bridges, the flow of electricity can be switched into new patterns to match the wiring pattern of the peripheral.

----------NOTE----------
If there is no Jumper Block in the socket, the port will not function at all.

Jumper Blocks configured for a number of popular printers and modems are available from DMS (see below) or you can make them yourself.

MAKING JUMPER BLOCKS



Top view of standard Jumper Block

(Note---The numbers do not actually appear on the Jumper Block. They are indicated for reference only.)

When the Jumper Block is properly installed pins 1-8 are on the side of the socket leading towards the Serial Port, while pins 9-16 are on

the side of the block leading into the computer. Below is a table giving the function of pins.

JUMPER BLOCK PIN FUNCTIONS

Jumper Block Computer-Side Pins

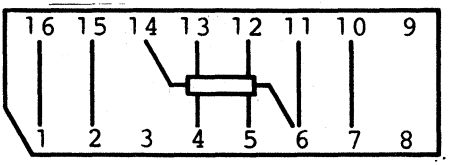
Jumper Block Pin Number	**Function**
10	Power (+12)
11	Data Carrier Detect
→ 12	Data Terminal Ready (DTR)
13	Request To Send
14	Clear To Send
15	Transmit Data
16	Receive Data

Jumper Block RS-232 I/O Port-Side Pins

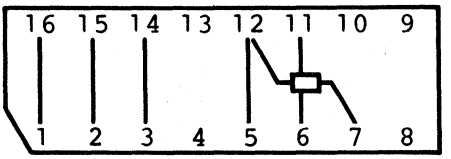
Jumper Block Pin Number	**Function**	**I/O Port Pin Number**
1	Transmit Data	2
2	Receive Data	3
3	Request to Send	4
4	Clear to Send	5
5	Data Set Ready	6
→ 6	Data Terminal Ready	20
7	Data Carrier Detect	8
8	Equalizer Mode	11
9	Secondary Transmitted Data	14

(Pin 10 is connected to power (+12v) through a 4.7K Ohm resistor.)

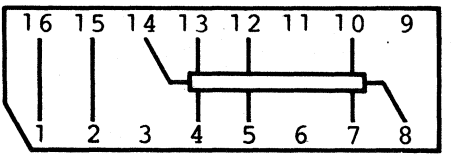
DIAGRAMS OF POPULAR JUMPER BLOCKS



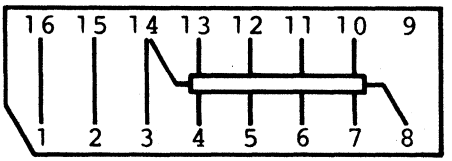
For the Texas Instruments 810 and all Qume Printers



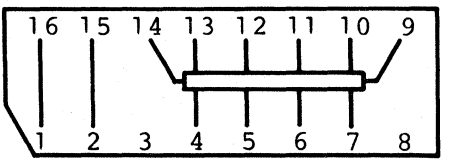
For the NEC Spinwriter



For Microline Printers



For the Diablo 630



Teletype Model 40

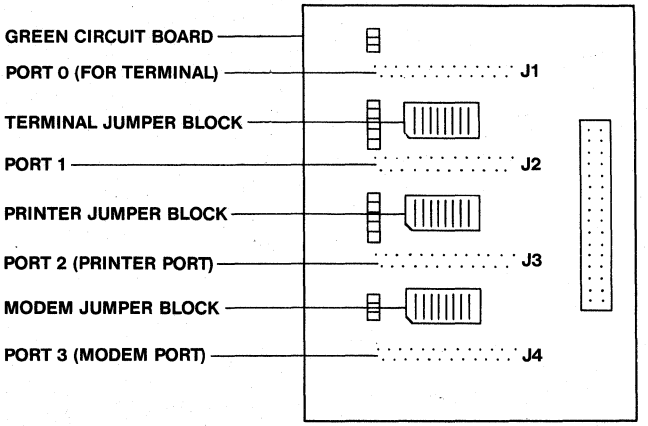
4.2.3 INSTALLING JUMPER BLOCKS

To install a new Jumper Block, remove the cover of your computer or workstation and locate the proper block. (**WARNING! The computer cabinet should only be opened by a qualified service technician.** See Appendix C.) The blocks are always part of a green Serial Port I/O circuit board which includes the port connectors (see diagrams below). The Jumper Blocks are removed and inserted just like chips. Pull out the old block and carefully plug in the new block, making sure that the pins are properly aligned and not bent.

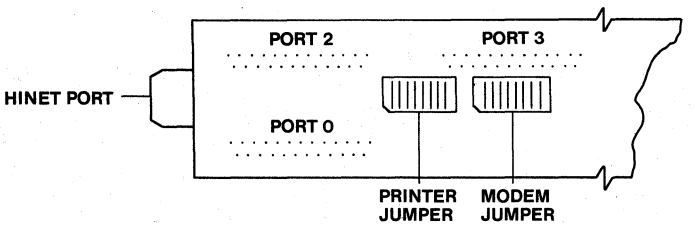
----------**NOTE**----------

One corner of the Jumper Block is slightly **shaved** away. This notched corner must **FACE DOWN** on the **DMS-3, -3/B, -3/F, -4, -86,** and **-3/501.** On the **DMS-5000** it must **FACE THE PORT.**

INSIDE VIEWS OF SERIAL PORT I/O BOARD



INSIDE VIEW OF SERIAL PORT I/O BOARDS
DMS-3, DMS-3/F, DMS-4, DMS-15



DMS-3/B, DMS-86 I/O BOARD

4.3 SETTING UP THE SPOOL PRINTER

The centralized printing process is called 'Spooling', from the acronym Simultaneous Peripherals Operating On Line (SPOOL).

The batches of text or data which are sent to the Spooler to be printed are called **'print jobs'**. Print jobs can be sent to the Spooler from the Master Station or any workstation either from a file, the CRT display, or by typing on the keyboard. The print jobs are then stored on a special Hard Disk partition named **'PRTSPOOL'**. According to the mode it is operating in, the Master Computer then prints out the various jobs on the Spool Printer.

This section will only discuss setting up and operating the Spooler system. See Section 4.4 for information on using the Spool Printer from a workstation and using the Spooler in Manual Mode.

4.3.1 PRTSPOOL PARTITION

In order to use a Spool Printer, there must be a partition on the Hard Disk named **'PRTSPOOL'**. Use the ALLOC utility to create such a partition (or rename an empty one).

----------WARNING----------

PRTSPOOL can be used only for Spooling and it does not resemble a normal CP/M partition; thus, it should never be ASSIGNED to any workstation drive (A:, B:, C:, etc.). Nor should it ever be listed as a default drive under any User Name in

the User Table. To prevent its accidental assignment to a drive, a password should be designated for the PRTSPOOL Partition when it is created with ALLOC.

The size of the PRTSPOOL Partition determines how many different print jobs can be temporarily stored until they are printed. Once the PRTSPOOL Partition is full, no additional material can be sent to the Spool Printer until some of the existing jobs are either printed or erased.

PRTSPOOL can store from one to 16 separate jobs for every partition size. However, the actual number of print jobs depends both on the size of the partition and the sizes of the individual print jobs. For example, in a 512K PRTSPOOL partition, 16 separate print jobs of 32K each or 8 print jobs of 64 K each, etc., could be stored before the partition is full. Each sixteenth division of the PRTSPOOL partition is called a Spool Block. When a print job fills up a Spool Block with still more data to go, it is automatically extended to another Block. The print job will print out under one User's Name until it is ended with the RELEASE SPOOL command or, in CP/M, a warm boot (CTRL C).

As soon as a print job has filled one Spool Block, the User's Name will appear on the Master's screen--even if the file has not finished spooling. The message "Print Job Spooled" will not appear on the User's workstation screen until the entire job has

finished spooling and he or she has released the job.

In small PRTSPOOL partitions (256K, 512K), the job divisions will fill up rapidly. If many Users are spooling jobs, all of the available PRTSPOOL job divisions may be used before a print job is completely finished. A User who is half-way through his or her job will get a SPOOL ERROR message. The User should not press CTRL C to abort the job right away. Rather, once another job has been printed and has released a PRTSPOOL job division, the User should hit the RETURN key (Retry); the interrupted print job will continue to SPOOL where it left off. If the User aborts the job half-way through, he or she will have to start from the beginning again (unless the printing program--e.g., word processor--can pick up at a certain page in the file).

PRTSPOOL partitions can range in size from 256K up to a maximum size of 4 Megabytes. A 1 Mbyte PRTSPOOL partition is a good size for the average Network.

4.3.2 PRINT JOBS

A print job (something for the Spooler to print) may contain text typed from a keyboard, the contents of a file or group of files, data from the CRT, and so forth. Once a connection to the Spooler is made by issuing some kind of 'print' command, everything sent to the PRTSPOOL Partition is stored as a single job until the connection is broken. Thus, a print job which

contains many different files will still be listed as a single job, but it will print out the separate files in the order they were sent to the Spooler.

Print Jobs are temporarily stored on the PRTSPOOL Partition under the originating workstation's User Name. In other words, all print jobs sent from a particular workstation will have the User Name that was used to log that station on to the Network. If a workstation sent one job, and then later sent another, both jobs would have identical names on the PRTSPOOL Partition except for a two digit Spool ID code in front of the Name. However, the Spool system would keep each job separate and print them independently.

----------NOTE----------
Each separate print job has a Spool I.D. code displayed along with the User Name that sent the print job. The first digit is the job ID number and the second digit is the Spool Block that the job begins in.

Once a print job is printed it is erased from the PRTSPOOL Partition. Naturally, if the material being printed was stored as a file in some other partition, PRTSPOOL's erasure would not affect those files.

4.3.3 SPOOL COMMAND

The **SPOOL Command** is used to control the Spool Printer. It can only be used at the Master

Station. Once the Spool Printer is set up and activated from the Master Station, jobs can be sent to it from any workstation on the Network. The actual printing of each job is controlled by the SPOOL utility at the the Master Station. See Section 4.4.2 for an explanation of how to use the Spool Printer from a workstation.

Typing SPOOL (**A>spool<CR>**) will display a menu of SPOOL commands.

```
A> Spool

ABORT - abort current print job.
RETRY - retry current print job.
WAKE  - activate all waiting jobs.
MODE  - set spooling mode.

MODE1 - AUTOMATIC on serial, print when done.
MODE2 - AUTOMATIC on serial, wait when done.
MODE3 - MANUAL, print when done.
MODE4 - MANUAL, wait when done.
```

Use of ABORT, RETRY, WAKE, and the actual printing of jobs is described in Section 4.4.2.

SPOOL MODE

As you can see from the menu above, there are 4 different SPOOL Modes or methods of operation, which you may choose. These modes are set by typing **Spool Mode** followed by the mode

number. For example, **A>Spool Mode4<CR>** would order the SPOOL Command to operate in Mode 4.

MODE1 - AUTOMATIC on serial port 2, print when done.

In Mode 1, as soon as a workstation finishes sending data to the Spooler (and gets the 'Spooled' message) the job will automatically, and immediately, start to print on a **Serial Printer** connected to Port 2 of the Master Station. If you are using Mode 1 make sure the printer is ready to roll at all times (paper, ribbon, on-line, etc.).

MODE2 - AUTOMATIC on serial port 2, wait when done.

In Mode 2, when a workstation finishes sending data to the Spooler (and gets the 'Spooled' message) the job is stored on the Hard Disk Spool Partition. As soon as someone issues the **Spool Wake** command at the Master Station, all jobs stored on the Spool Partition will automatically, and immediately, print on a **Serial Printer** connected to Port 2 of the Master Station. Be sure the printer is ready before entering Spool Wake. This mode allows you to check that the Spool Printer is ready before printing off all the jobs in a batch.

MODE3 - MANUAL, print when done.

When a job is sent to the Spooler under Mode 3 it is displayed by User Name on the Master Station CRT screen. By going to the

Master Station and using the 'Ready to Print' menu as explained in Section 4.4.2, you can control when the job is printed. In other words, in MANUAL MODE the printer will not begin printing until you go to the Master Station and issue a 'go' command. This mode (or Mode 4) should be used on those Networks where the individual workstation operators are responsible for printing their own jobs on the Spool Printer.

----------NOTE----------
Mode 3 is the **'Default Mode'.** Unless changed by you (with a SPOOL MODE command) the Spooler will operate in Mode 3.

MODE4 - MANUAL, wait when done.

Mode 4 is similar to Mode 3 except that the job is not displayed on the Master Station CRT screen until someone issues a **'Spool Wake'** command at the Master Station. When that is done, the jobs ready to print are displayed and may be printed using the menu as explained in Section 4.4.2.

----------NOTE----------
As a practical matter, the only difference between Modes 3 and 4 is when the job listing appears on the Master Station CRT. If you are in Mode 3 the job will be listed on the screen as soon as it is sent to the Spooler, even if someone is using the Master for something else. In other words, the job listing will show up on the screen amidst whatever else is being

displayed. This may cause confusion or irritation to the person using the Master. In Mode 4 nothing is displayed until the **'Spool Wake'** command is given. Thus, if the Master Station is frequently used for other tasks the Spooler should be set to Mode 4; if the Master is used only for controlling the Network (as is recommended) it is advantageous to keep the Spooler in Mode 3 so that anyone can easily see what jobs are waiting.

As explained in Section 2.18, Volume 2, the WHO command can be used to see what files are waiting to be printed on the PRTSPOOL Partition.

SPOOL MODE DEFAULT

Mode 3 (MANUAL Print When Done) is the default Spool mode. In other words, if you do not set the Spool Mode to something else with a SPOOL MODE command, the Spooler will operate in Mode 3. If you wish another mode to be the default you can place a SPOOL MODE command in the Login Command of the User Name used to login the Master Station (see Section 4, Volume 2). For example, **Spool Mode 1@** in the Login Command would automatically set the mode to 'MODE1 AUTOMATIC Print when done' whenever the Master was logged in.

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

The Master's printer assignment should always be SPOOL if the Network uses a SPOOL Printer. If the Master's printer is assigned directly to PORT2 a print command from the Master (e.g.,

CTRL P) will interrupt a printing SPOOL job and possibly hang the Network. It is generally best not to use the Master for any printing job since it is busy controlling the Network.

4.4 PRINTING FROM A WORKSTATION

There are two ways to link a DMS workstation to a Printer:

1--Through the HiNet Network to a central Printer connected to the Master Hard Disk (the 'Spool Printer'). See section 4.4.2.

2--Directly to a single workstation through the RS-232C Serial Ports on the back of the cabinet. Some workstations also have a Parallel Port.

The ASSIGN Command (see section 2.11.5, Volume 2) will tell you where your Printer is currently assigned and allow you to change the assignment if desired. The default assignment is determined by the entry in the MACHINE Table for each workstation. It is recommended that SPOOL be the default setting if a printer is not always connected to a workstation. This will prevent problems if a print command is accidentally given (CTRL P for example) without a local printer being active or connected. If the Network is running, the SPOOL printer will be active.

4.4.1 SENDING TEXT TO A PRINTER

There are two general methods of sending text to a Printer--through an applications program and through CP/M. These methods are described in the following sections.

PRINTING WITH AN APPLICATIONS PROGRAM

Many applications programs that you will use have their own sets of commands for sending text to a Printer. While working with one of these programs you will have to use its print commands. Consult the program manual for the necessary procedures.

----------NOTE----------
Many word processing programs require that you adapt the program to your Printer and/or to your workstation. This usually means that you must enter information about the Printer or computer into a sub-program of the word processing software package. The sub-program could, for example, allow you to specify a certain type of communications protocol required by your printer, or to set up parameters for using non-standard paper. Read your word processing manual for specific information.

PRINTING THROUGH CP/M

If you are operating in the CP/M environment (see Section 3, Volume 2), you may transmit text to the Printer by entering the command **CTRL**

P. Once you have issued a **CTRL P** command, everything that subsequently appears on your screen will be sent to the Printer until you issue another **CTRL P** or a **CTRL C** to turn off the 'Transmit-to-Printer' command. This could include directories, commands you give to the computer, the contents of files displayed with the TYPE Command, and so forth. See section 3.8, Volume 2 for more on CTRL P.

----------NOTE----------
If you are working in an applications program with its own set of print commands, **CTRL P** will not work.

When you are working in CP/M you can also use the LST: device to print out files. (LST: is CP/M's name for a 'logical device' that prints files; your Printer is such a device.) To print a file using the LST: device you must PIP the file to LST:. For example, to print the file CONTRACT.DOC that is stored in partition A, enter:

PIP LST:=A:CONTRACT.DOC

When you are using the LST: device to print a file, the file will not appear on the screen as it is being Printed, which is just the opposite of what happens with CTRL P. You can use LST: with either a direct-connect Printer or a Spool Printer. Just be sure that you have assigned the Printer to either Port 2 or Spool.

The LIST command will print a file to the assigned printer without showing the file on the

screen; much like using PIP to copy to the LST: device. LIST is a ZCPR command.

----------NOTE----------
If the document has been prepared by a word processing program and has special print commands imbedded in the text (e.g., boldfacing, underlining), then PIPping the file to the LST: device will not result in the document being printed with those special commands. You should use the word processing program's Print commands to achieve the desired results.

4.4.2 SPOOLING FROM A WORKSTATION

The HiNet system allows all users to share a Printer that is connected to the HiNet Master Computer. Text sent to the central Printer is stored on the Master Hard Disk until the Printer is activated. Sending material to be stored in a central location for later use is called 'Spooling'. As you might expect, the storage place is referred to as the 'Spooler', and the Printer connected to the Spooler is called the 'Spool Printer'.

If your Spool Printer is operating in 'Automatic Mode' it will begin Printing as soon as the first Spool Block has filled or you end the job by various methods. If the Spool Printer is operating in 'Manual Mode' you will have to go to the Master Terminal to activate it.

If your station is not assigned to the Spool Printer you can use the ASSIGN command to

do so (**A>ASSIGN P SPOOL <CR>**). Your station will respond with your current drive assignments and the message **Printer assigned to SPOOL (HiNet Spool Printer)**. See section 2.11.5, Volume 2, for more information on the ASSIGN command.

4.4.3 SENDING TEXT TO THE SPOOLER

You may send text to the Spool Printer with the PRINT commands aassociated with those applications programs that have print capabilities (see your program's manual), or from CP/M with a **CTRL P** (see 'Sending Material to a Printer', Section 4.4.3).

While a workstation is Spooling a file, you will not be able to use your workstation for any other task until all of the text is stored in the Master's PRTSPOOL partition on the Hard Disk.

The PRTSPOOL partition is divided up into sixteen "Spool Blocks"; each Block is one-sixteenth the size of the entire partition. For example, a 1 Mbyte PRTSPOOL partition can hold sixteen print jobs of up to 64 K each, 8 print jobs of 128K each or a combination of sizes. One print job file might be 120K; it would take up 2 Spool Blocks. Another job might be only 20K, but it would still require one whole 64K Spool Block (in a 1Mbyte PRTSPOOL partition).

As soon as one Spool Block fills up, your User Name will appear on the Master's screen. At that time--depending on how the spooler is set up--the file will either start

printing automatically or you can go to the Master and start it manually. This procedure is explained in section 4.4.4.

It is important to realize that if a print job is larger than a Spool Block it will continue to spool into another Block until it is finished. At that point you can end the print job entirely or start spooling another file that will print out under the same User Name but with a different Spool ID code in front of the User Name. If a print job is greater than a Spool Block in size, you must end the print job before the last Spool Block will begin to print. The spool printer will wait until you end the print job before printing ANY other files.

MULTIPLE FILES

If you are sending files to the Spooler with the print commands contained in an applications program there will be a message to let you know when the file has been sent. These messages vary from program to program (a command line might change from 'Printing' to 'Editing' for example, or 'End of File' might be displayed).

If you are using the CP/M command TYPE to display the contents of a file on the screen and send it to the Printer with a CTRL P, you will see when the end of the file is reached.

Once one file is finished spooling, you can send another file to the Spooler using the same method as the first file. Multiple files may be sent to the Spooler, one after another. The

various files you send will be listed under a single job entry and printed out one after another. In other words, everything you send to the Spooler from the time you start until the time you get the **SPOOLED** message (see below) will be listed on the Spooler under your User Name as a single job.

WHEN YOU FINISH SENDING TEXT

WHEN YOU ARE FINISHED SENDING ALL OF YOUR TEXT TO THE SPOOLER YOU MUST SIGNAL THE MASTER THAT YOUR PRINT JOB IS DONE. The SPOOLER utility has to be told to end the print job before it will print out the last Spool Block of your job. If your job is small enough to fit within one Spool Block, the spool message will not come up on the Master until the Master has been told you are done sending the print job. Since you can send multiple files to the Spooler one after another, the Spooler has no way of knowing if further text is going to be sent unless you tell it that you are done. By cueing the Spooler that you are finished sending text, you also give it the command to start printing the job (in Automatic Mode).

If you are using an application program (a word processor, for example) to send a file or files to the Spool Printer, you signal the Spooler that you have completed sending your text by **EXITING THE APPLICATION PROGRAM AND RETURNING TO CP/M.** Your application program's user manual will tell you how to do this. By returning to CP/M you tell the Spooler that the print job is finished.

If you are sending text to the Printer from the CP/M environment with a **CTRL P,** a **CTRL C** will signal the Spooler that everything has been sent. In other words, a **CTRL C** will command the Spooler to proceed with your print job. (In computer jargon a **CTRL C** is called a 'Warm Boot' and it is often used to exit programs or restart a series of operations.)

The RELEASE SPOOL command is also used to end a SPOOL print job. **This command must be used on workstations running under MS-DOS.**

When the correct signal has been sent to the Spooler your screen should show:

```
Print Job Spooled.
A>
```

This signifies that you have sent the last of your print job to the Spooler. The entire job is now ready for Printing and your workstation is ready for its next task. If your Spool Printer is operating in Automatic Mode it may have already started to print your job. If it is in Manual Mode you will have to go to the Master Terminal to activate the Spool Printer (see next section 4.4.4).

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

In Automatic Mode, your job may start printing as soon as one Spool Block is filled. It will not print out the second Spool Block until it is

filled or the job is ended. Therefore, once the Spool Printer has started on your job it will stop and wait until you signal the end of the job before continuing onto another Spool Block. No other jobs can be printed until you signal the end of yours. Be sure to end your Spool Job as soon as possible after completion.

In some cases, however, your screen may show:

```
***Spool Error
Depress <CTL-C> to abort, ESC to ignore or
<CR> to retry.
```

Do not abort the job immediately. As soon as a Spool Block becomes available--a file is printed--press <CR> to retry spooling the file; the message should go away and the file will continue printing where it left off (unless another User took the available Spool Block first). Constant reoccurence of this problem indicates that the Network needs a larger PRTSPOOL partition.

4.4.4 SPOOLER MANUAL MODE

If your Spool Printer is operating in Automatic Mode it will print your job automatically. However, if your Spool Printer is operating in Manual Mode you will have to go to the Master Terminal and activate the Spool Printer yourself. This need not be done immediately, but

because there is a limit to the number of jobs a Spooler can hold you should not let a job sit in the Spooler for too long as other people might need to use it.

The bottom portion of the WHO table will tell you how many jobs are awaiting action on the Spooler. (See section 2.15, Volume 2 for more on the WHO command.) The bottom section of the table looks like this:

User Name	Spool Time	File Length	Status
GROUCHO	8:45:01	09 records	Ready
HARPO	9:02:45	137 records	Printing
CHICO	11:33:55	1008 records	Spooling

File lengths are measured in records (1 record = 128 bytes). As a rough rule of thumb 1 record is about 20 words.

READY -- the file is ready to print.
PRINTING -- the job is being printed.
SPOOLING -- the job is being sent to the Spooler.

SPOOLER JOB LIST

When you go to the Master Terminal to print your job you must call up the 'Spool Printer Job List'. If the Job List is not already showing on the Master Terminal, you can call it up from the command prompt with the command **A>SPOOL WAKE**

<CR>. **SPOOL WAKE** will bring up the Job List, which may look something like this:

```
A>
***GROUCHO Ready to print
A <CR> = Abort
W <CR> = Wait
S <CR> = Serial
<CR>   = Next
Choice:

***CHICO  Ready to print
A <CR> = Abort
W <CR> = Wait
S <CR> = Serial
<CR>   = Next
Choice: []
```

The letters (A, W, S) represent options for your job that you may choose. These menu options are explained below.

The cursor will be flashing next to one of the entries. (In the above table [] represents the cursor.) If there is more than one entry you must place the cursor next to the job that you wish to activate. This is done by hitting <CR>, which moves the list so that the cursor is indicating another entry. If you reach the bottom of the list another <CR> will recycle you back to the top.

----------NOTE----------
Every time you signal the Spooler that you have completed sending your text (that is, each time you get the **'Spooled'** message), your User Name will be listed on the Job Ready List as a separate job. If you have sent more than one job your name will appear more than once on the Job Ready List and each such entry will have to be Printed separately.

MANUAL MODE PRINTING

Once the cursor is at the appropriate entry of the Job Ready List, type one of the three symbols followed by a <CR> to instruct the computer what to do with the job. The symbol of the option you choose will be displayed to the right of the entry.

A<CR> -- **ABORT** the job.
S<CR> -- **PRINT** the job on a **Serial** Printer.
W<CR> -- put the job in **WAIT** status.

If the Master is a DMS-3/501, the Printer connected to the Spooler must be a Serial type Printer.

----------NOTE----------
S<CR> is a 'GO' command. Once you type this, the Printer will IMMEDIATELY begin printing your job (assuming it's turned on and 'on-line', of course). Thus, before issuing the GO command you should make sure that the Printer, paper and ribbon are ready.

WAIT (the **W** menu option) is used when you wish to store a job overnight, or during a time when the Master Computer and HiNet system is turned off. As soon as someone enters the command **SPOOL WAKE** (see below) any jobs that had been put in WAIT status will be returned to the active job list.

ABORT (the **A** menu option) is the ERASE command and, as you would expect, it erases your job from the Spooler.

4.4.5 SPOOLER COMMANDS

The Spooler and Spool Printer recognize the following commands which must be entered from the Master Terminal:

SPOOL---Calls up a screen giving the various options and commands available. Issued from the Command Prompt (**A>SPOOL <CR>**).

SPOOL WAKE---Calls up the list of print jobs awaiting action. Issued from the Command Prompt (**A>SPOOL WAKE <CR>**).

SPOOL ABORT---Stops the Printer while it is printing and ERASES the entire job from the Spooler.

SPOOL RETRY---If the Spool Printer is in Manual Mode, typing **SPOOL RETRY** while the Printer is Printing will stop it and bring up the Job Ready List Menu without erasing the job from the Spooler.

----------NOTE----------
If the Spool Printer is in automatic mode **SPOOL RETRY** will cause the Spooler to IMMEDIATELY begin RE-TYPING your file from the beginning. Since the program will not pause to let you set up a clean page of paper, it is recommended that you take the Printer 'Off Line' before entering the SPOOL RETRY command (see section 4.4.6, 'Stopping the Printer').

4.4.6 STOPPING THE PRINTER

While you are Printing a job it may become necessary to stop the Printer before the job is finished. The paper may not be feeding properly, for example, or the ribbon might need changing, or you could be called away from the Printer.

If you simply turn off the Printer's power you will lose part or all of the job you are printing. Even if it resumes printing when you turn it back on, it will not pick up the job where you stopped it.

To suspend the Printer without having it lose its place in your text you must take it 'OFF-LINE'. When you take a Printer OFF-LINE, it finishes the line it was on and then stops Printing. When it is put back 'ON LINE' it will resume printing exactly where it left off . The switch that does this is given different names by different companies ('On Line', 'Ready', etc). Check your Printer's instruction manual.

You can also stop the Printer with a keyboard command (for example SPOOL ABORT from the Master Terminal for the Spool Printer) or a special Suspend print command in a word processing program. But these keyboard commands will either erase your job (like SPOOL ABORT) or pause for some time before stopping the Printer.

4.5 SETTING THE BAUD RATE

You may wish to connect a device to a workstation through one of the three serial ports at the back of the unit (a Printer, a Modem, etc.). When using these serial ports (except on a DMS-816 or DMS-1280) it is necessary to set the BAUD RATE with the SETBAUD command. The Baud Rate governs the speed at which information is transferred to and from the workstation through the port. Different devices require different Baud Rates, so you must check the instructions that come with the device for the correct rate.

4.5.1 THE SETBAUD COMMAND

The SETBAUD command is used to match your workstation's output rate with the input requirements of the Printer, Modem, or other device you are using. From the command prompt you type **SETBAUD**, the **Port Number** of the port you wish to use, and the **rate**. For example: **B>SETBAUD 3 1200** would set a Baud rate of 1200 for port number 3. Successfully setting the Baud rate will result in a screen that looks like this:

```
A> setbaud 2 9600

SETBAUD VERSION x.x
Set the serial port baud rate.

A>
```

The SETBAUD command will accept the following Baud Rates: 110, 300, 600, 1200, 1800, 2400, 4800, and 9600.

If you make an error the computer will display a full screen of information entitled **SYNTAX ERROR.** This screen provides additional instructions and examples for setting the Baud Rate.

5.0 ELECTRONIC MAIL

5.1 INSTALLING ELECTRONIC MAIL

Electronic Mail is an easy and efficient way to communicate with other Users on the Network. Your workstation essentially becomes your mailbox where other Network Users send memos, letters and reports to you. These documents can be reviewed by you at any time. They can be stored, erased or printed. You can even send an instant reply in response to an important electronic note.

This section will explain how to set up the Electronic Mail system on your Network. Briefly, these steps are:

1) Create a partition called MAIL on the Network Hard Disk with the ALLOC utility.

2) Determine the User Names that Mail will be sent to on the Network and the type of workstation the User Names are normally linked to.

3) Invoke the MAILINIT program, from the INSTALL #4 diskette, to initialize the MAIL partition.

4) Add User Names and type of workstation to the MAIL List using the MAILINIT program.

5) MAIL partition is divided into message blocks by MAILINIT.

The Mail partition is usable only by the E-Mail system. In our experience, a 256K partition serves about 10 Users adequately. Each quarter Meg provides about 2,000 primitive mail blocks (each containing about 112 bytes of message text); the average message length is no more than 4 blocks; and the storage and search methods used in E-Mail are such that a user will get confused if he saves over 50 to 100 messages for very long. So, 2000 mail blocks/(4 blocks per User x 50 messages stored per User) = about 10 Users. Increase the size of the partition appropriately for larger numbers of Users.

5.1.2 BEFORE STARTING

Before initializing the E-Mail system, send a memo to all potential E-Mail Users, asking them the questions below.

-What E-Mail name do you want?
[8-character maximum]

-What Password do you want?
[None or 6-character maximum]

-What type of workstation will you be using?

After collecting at least a few responses, you can initialize the Mail partition.

Currently, these are the compatible terminals:

ADDS-compatible	Hazeltine 1500 compatible
ADM-31 compatible	Televideo compatible

DMS-3/F, DMS-5080, DMS-5086, DMS-3/501

5.1.2 INITIALIZING THE MAIL PARTITION

A CP/M-80 program called 'MAILINIT' is on the INSTALL #4 diskette. It is advisable to keep it only on diskettes. Do not leave a copy of MAILINIT.COM in the Network partitions where anyone might chance upon it. Assign the B drive to the Mail Partition. Run the MAILINIT program. The following menu should be displayed:

```
[A]dd Users
[C]hange a User
[I]nitialize
[Q]uit
     Which? []
```

Press I to begin the process. First MAILINIT will ask for User information. Enter the names in some standard format. When E-Mail displays a User Name, it uses the version which you are now entering. When a User is typing in a name, capitalization, leading and trailing blanks will be irrelevant.

Enter the Passwords exactly as the User specified. Passwords are checked exactly. If no Password is desired, strike RETURN immediately, since spaces are significant in Passwords.

After you've given the Name and Password, you'll be prompted for the terminal type. The entry for DMS-3/F is valid for the 5000 series as well as the DMS-3/501. Other types of terminals (for those using a 3/B or 86 as a Network link) need their specific emulation entered, e.g., Adds Regent or Televideo.

If you have several different kinds of workstations on the Network, enter their names in the User Name list. For example, if you have a DMS-1280 that is emulating an ADDS and another one emulating a Televideo, enter ADDS and TV as E-Mail User Names. Now when a person who normally uses an ADDS terminal wants to use the Televideo terminal to send mail they can follow a slightly different procedure to log in to E-Mail. See section 5.2.1.

It may be a good idea to enter only a few of the User Names now if there are very many. If the initialization fails for some reason, you will have to go back and reenter all of the names again. You can go back and add more names by running MAILINIT again choosing the Add option.

When you want to quit entering User information, hit <CR> instead of giving a Name; all the Names will be stored in the file INDEX.ML on the MAIL Partition.

Use the **C** option to change entries that are obsolete or if a default workstation has changed.

In the next (and final) phase of initialization, MAILINIT ties together the entire Mail Partition into a list of message blocks.

A message will appear on the screen as each successive 100 message blocks are tied together. Do not interrupt this process, since it must run to completion for the Mail System to be able to function properly. (The E-Mail software relies on a special mark in the last block of the partition to detect when the Mail Partition is full.) If it is interrupted, due to a power failure or other problem, run MAILINIT again and do another [I]nitialize from scratch. (Again, this is the reason not to enter all of your User Names before the partition is initialized. Once the initialization process is finished, use the ADD option to complete the list of Users.)

When the closing messages appear, and MAILINIT returns to CP/M, you are done. It's time to try out E-Mail.

5.2 LOGGING IN TO E-MAIL

Before accessing the E-Mail system, make sure that your B drive is assigned to MAIL. (**ASSIGN B MAIL <CR>**) The MAIL.COM or MAIL.CMD programs may reside in any partition that you are assigned to (except the MAIL partition).

Normally they are kept on the CSYSTEM partition which is assigned to your A drive. In this case, call up the MAIL program by entering **A:MAIL** <CR> after your logged partition prompt.

If the MAIL partition is properly initialized, you will be asked for your E-Mail Name with the question:

To whom do I have the pleasure of speaking? [ ]

Type the name that was entered in the MAILINIT program as your User Name for E-Mail. It does not matter if you use upper- or lower-case letters.

Next you will be asked for a password. If you do not have one for your E-Mail Name just hit return. If a password is required, enter it exactly as it was in the MAILINIT program. For Passwords you must use lower-case letters.

To log in to E-Mail from a workstation that is different from the kind linked to your E-Mail User Name, follow this procedure:

Enter **A:MAIL** <CR>

Enter an @ sign and a RETURN the first time you are asked for a Name. Then enter the name of a person who normally uses that type of terminal. If the E-Mail User Name List contains names of emulations, use those instead. You will then be asked again for YOUR Name; enter it to get your messages. Here is how the dialogue looks on the screen:

```
To whom do I have the pleasure of speaking ? [a <CR>]

Whose terminal are you using? [ADDS<CR>]

To whom do I have the pleasure of speaking? [MARTHA <CR>]

Password [      <CR>]
```

Once the password is accepted the full E-Mail Menu is displayed on the screen. It looks like this:

```
1   Status: You have no messages.
2
3   Waiting for Mail
4
5         Review ALL old mail                [A]
6         Review CATEGORIZED mail            [C]
7         Review RESPONSE REQUIRED mail      [R]
8         Review NOTES                       [N]
9         Review UNREAD mail                 [U]
10        Send mail from FILE                [F]
11        SEND mail from keyboard            [S]
12        QUIT                               [Q]
13                                 Which?    [ ]
14
15  Waiting for Mail
```

---NOTE---
The numerals in the left column of the menu are not part of the menu as it would appear on the screen. They are presented here for reference.

As you look at the E-Mail menu, line 1 is the 'status line'. It describes either the current state of events (in the example below: 'You have no messages') or the last operation you performed. For example, if you sent a message to Jane, the status line would read 'Done sending to Jane'.

5.3 WAITING FOR MAIL MODE

If you have no unread messages, you will be in the Waiting for Mail mode (see menu above). The cursor will wait in the brackets on line 13 and an asterisk will flash off and on where the cursor is. The asterisk indicates that the Mail System is waiting for new messages to be sent to you. If you have nothing else to do at your workstation, it may be convenient to leave it in the Waiting for Mail mode.

[A] Review ALL old mail

If you enter an A, E-Mail will display all of your messages. The presentation includes any message, read or unread, that has not been deleted. It also includes all notes and all

messages of every category. The messages are presented in reverse chronological order.

----------NOTE----------
You can discontinue the reviewing mode any time through one of the Waiting for Mail mode options. See [Q]uit below.

[C] Review CATEGORIZED mail

If you enter **C**, E-Mail will let you review mail that you have previously categorized. You will see the message below on screen.

Reviewing old, categorized mail:

Which Category? [1-7] [ ]

At this point, the system waits for you to enter a number between 1 and 7 (inclusive), specifying which previously categorized message you'd like to review. Newly received messages cannot be accessed with this command. For information on catagorizing messages, see the discussion on Category [1-7] in section 10.4, Reviewing Mail.

[R] RESPONSE REQUIRED mail

If you enter **R**, E-Mail will display all old messages which you have marked 'response required'. As usual, these messages are shown in reverse chronological order and you need not go

through the entire sequence. See the [Q]uit option of section 5.4, Reviewing Mail.

[N] Review NOTES

As far as E-Mail is concerned, notes are basically messages that you've sent to yourself. These messages, however, are treated in a slightly different manner than those sent to you by others. If someone else sends you a message while you are in the Waiting for Mail mode, the screen will clear, your terminal will beep and the messages will be displayed. If you send a message to yourself, you'll be returned to the Waiting for Mail mode. E-Mail remarks that a 'Note (from you) is available' by placing that phrase on the status line.

[U] Review UNREAD mail

There is one situation in which you can have unread messages that the E-Mail system doesn't tell you about. This arises when you don't look at all your unread mail when it is first available. If you believe that this may be the case, strike **U** and you'll be able to look through any unread mail that you have.

[F] Send mail from FILE

You can use word processing programs to prepare a message and then, by striking **F**, send the prepared message to someone. When you strike F, the screen will clear and you'll see the

message, 'Send a message to whom (<CR> to cancel) ?'.

E-Mail wants to know where to send your message. If you decide at this point that you don't want to send a message, hit <CR>. The Waiting for Mail mode menu will return to the screen. If you enter a name, the screen will again clear and you'll see the message below.

```
Send Message from File Module:

Please enter the file name.
    Just hit <CR> to quit.
                    File: [              ]
```

----------NOTE----------
If you change your mind, simply strike the RETURN key, and you'll be returned to the Waiting for Mail mode.

Suppose the file you have prepared is on drive D: and is named TERRY. You would enter **D:TERRY<cr>**.

E-Mail will report that it is 'Sending file TERRY' and will display a plus sign (+) on-screen after each line of your file is sent. After the entire file has been sent, you will be returned to the Waiting for Mail mode.

[S] SEND mail from keyboard

When you strike S, the screen will clear and E-Mail will ask, 'Send a message to whom (<CR> to cancel) ?'

E-Mail wants to know where to send your message. If you change your mind, hit <CR>. The Waiting for Mail mode menu will return to the screen. If you enter an existing E-Mail Name, the screen will clear again and the message below will be displayed on the screen:

Enter message (strike CTRL-Z to send, ESC to cancel)

The cursor will be waiting in the leftmost column just below the dashed line. E-Mail will wait for you to type your message. Use the backspace key to make any corrections. However, you can backspace only along the current cursor line. If you try to backspace farther than the first column of the line you are in, nothing will happen. When you finish entering your message, hold down the **CTRL** key and tap **Z**. This signals E-Mail to send the message.

If you decide not to send the message, hit the ESC key to cancel the message.

Your messages can be as long as you like. The screen will scroll upward to make room for new lines. Keep in mind, though, that it's usually simpler to prepare a long or complicated message with a word processing program and then send it via the 'Send from File' command [F].

[ ] QUIT

Striking a Q tells E-Mail that you want to return to CP/M. It is a good practice to always exit a program before logging off the Network; just in case you forgot to save a file or send some mail. You should also release any write ownership before turning off your workstation; especially if you are going to work at another station.

5.4 REVIEWING MAIL

Mail can be reviewed through one of the five mail reviewing options or as it arrives.

When a new message arrives, E-Mail will switch to the Reviewing Mail mode, the screen will clear and the new message will be displayed.

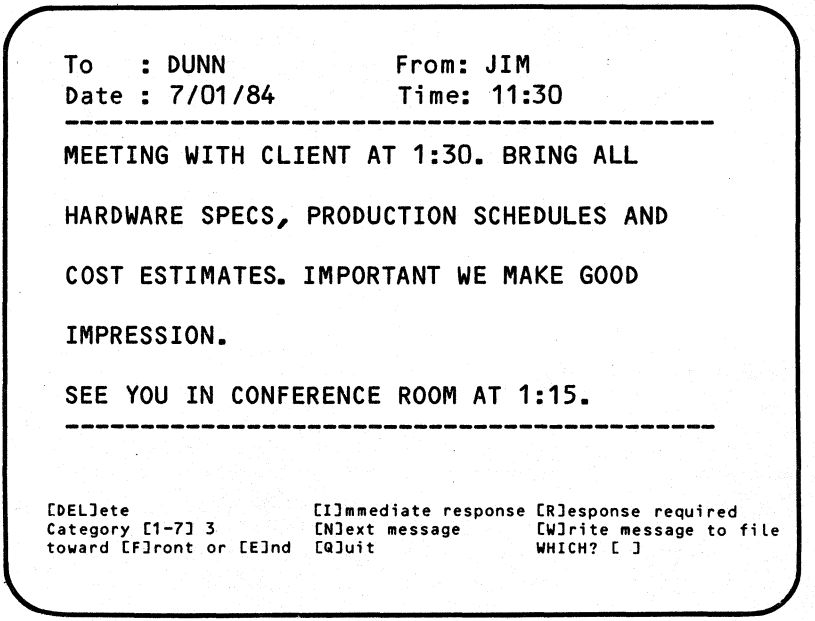
The five Review options include:

Review ALL mail,
Review CATAGORIZED mail,
Review RESPONSE REQUIRED mail,
Review NOTES,
Review UNREAD mail.

Below is an example of what it is like to receive a message.

Suppose Dunn's boss sent him his most recent response required message. After calling on the Review RESPONSE REQUIRED option, Dunn

would see something like:



We call the material at the top of the screen the **'header'**. The header tells who sent the message and when it was received. The material between the lines is known as the **'window'**. In this case the entire message is short enough to fit into one window (this isn't always the case). The information at the bottom of the screen is called the **'footer'**.

The prompt at the bottom of the screen shows you what your options are and how the message is currently classified. Your entries are denoted by the contents of the brackets ([ ]). If, for example, you wanted to

delete a message, your entry would be **DEL.**

Each of the response-required options is described below.

[DEL]ete

To delete a message that you are looking at in the Reviewing Mail mode, simply strike the DELETE key on your keyboard. After a brief delay, the message will be erased. E-Mail will continue with the Review sequence that you selected unless there are no remaining messages of the type you were reviewing. In that case, you would be returned to the Waiting for Mail mode.

----------NOTE----------
The D key will not delete messages. You have to use the DELETE key. E-Mail was programmed that way in order to make accidental erasure more difficult.

----------WARNING----------
If two people enter E-Mail as the same User and try to delete one of that User's messages at the same time, other messages may also be damaged.

Category [1-7]

If you choose to categorize a message, press any of the category numbers (1-7) while the message is under review. From then on you can

review this message, or any other message of its category, through the Review CATEGORIZED mail option in the Waiting for Mail mode.

Presumably, you will use the numbers as some kind of code. Once you've decided how you will use the seven categories, you'll probably want to make note of your categorization and keep it in a safe place.

Toward [F]ront or [E]nd

Although most messages you send and receive will probably be short, some will have more lines than the screen can accommodate. When a message is first displayed, the first screenful of it will be shown. To see the next screenful, strike **E**. The bottom two lines of the first screen will be the top two lines of the second screen, and so forth. If you want to see the beginning of a message again, strike **F**.

[I]mmediate response

If you ever feel the need to respond immediately to a message under review, enter **I** to begin the process. E-Mail would move to the Send Mail mode and prepare to send a return message to the author of the message under review. Moreover, you would not enter any name. E-Mail, knowing who sent the original message, would direct the immediate response to that person automatically.

After sending your response, you would be returned to the Reviewing Mail mode; the original message would be displayed on-screen.

[N]ext message

Strike an **N.** E-Mail will move to the next message in the category you are reviewing. When you reach the end of the messages awaiting review in any one category, you'll be returned to the Waiting for Mail mode.

[Q]uit

Strike Q and you'll be returned to the Waiting for Mail mode.

You may decide that you do not want to review all the messages at once. The [Q]uit option is the simplest way to get out of the reviewing process. However, once you begin reviewing messages the Reviewing mode assumes that you are going to review all messages; it does not know if you have quit in the middle. Thus, it may not be aware that there are unread messages; you have to remember that yourself and read those messages later under the **Review Unread Mail** option.

[R]esponse required

When a response required message is first received, the response required field [] is filled with NO. Once you look at the message,

you can change the NO to a YES or the YES to a NO by striking R. Try it a few times in a row, and you'll see that YES and NO flip back and forth, or 'toggle'.

All messages that have YES in the response-required field will be selected when you choose to review response required mail.

[W]rite message to file

You can send a copy of a message to a file or to the printer (HiNet spooler). After you strike a **W** in the Reviewing Mail mode, you will see the messages below.

```
Write Message to File Module:

Please enter the file name.
   Use   LST:   for the printer.
Just hit <CR> to quit.
                        File: [              ]
```

If at this point you strike <CR>, you will be returned to the message you were looking at. If you enter LST: and then <CR>, a copy of the message will be sent to the printer. Otherwise, enter the name of a CP/M file and <CR>. E-Mail will check the file name you have given. You will then see one of the messages below.

File exists. Write over it? [y/n] [ ]

Sorry, but you may not use the
Mail Partition for this file.

Sending message to <file name>.

The first and third messages should be clear. The second always refers to the HiNet partition that is used to store messages and User information. It cannot be used for any other purpose. In fact, if you look at it with STAT, it will always appear full.

5.5 FATAL ERRORS

A fatal error is an error which E-Mail cannot correct. When a fatal error occurs, you will see one of the messages below and you will be returned to CP/M. Following each set of error messages are descriptions of what the errors mean and what might be done about them.

1. Can't find INDEX.ML

This error could be due to: 1) the Mail partition is not assigned to the B drive or 2) some of the Mail Partition has been corrupted.

2. Can't find MSG.ML

See 1 above.

3. Confused by command line

See 1 above.

4. Disk full

This error can occur when trouble is encountered in [W]riting a message to file or to the printer. Usually it indicates that the file you wanted to write to is on a disk that is full. The HiNet spooler could be full, too.

5. Illegal Drive for Mail Partition

See 1 above.

6. **No More Room for Messages!**

Every available part of the Mail partition is filled with active messages. Go into the Mail System again and delete some of your old messages. Tell everybody you know to do the same. Someone may be using the Mail System for something other than messages.

7. Not a valid Password

If you chose a password, it must be typed exactly. The program is even sensitive to upper- and lower-case letters.

8. Read Error!

Usually means that the Mail Partition has been corrupted. This could be due to a bug in the Mail System itself. It is probably not due to a disk read error since the operating system itself will give an error before E-Mail discovers it.

9. Spool error

See 4 above.

10. Trouble Closing File

This can occur when you're [W]riting a message to a file on a diskette. It usually means that the diskette is write-protected.

11. Trouble creating file

See 4 above.

12. Trouble opening file

This error can arise when you're sending a message from a file. Look at the file from CP/M (TYPE or DUMP) or with your word processor to try to find out what's wrong with the file.

13. Trouble writing

See 4 above.

5.6 ROUTINE MAINTENANCE

Routine maintenance consists of three parts: adding new Users, changing User information, and backing up the Mail partition.

The first two, adding new Users and changing User information, are handled by running MAILINIT again and using the A and C options. A maximum of 64 Users is allowed (Version 1.4).

Follow your usual backup procedures to make copies of MSG.ML and INDEX.ML from the Mail Partition. Remember: if you want to use PIP to restore the Mail Partition after a crash you need to erase it first, since at all times, there are 0 free Kbytes according to CP/M-80 or CP/M-86.

EXTRAORDINARY MAINTENANCE

* If any User informs you that he got a 'No more room for messages' error message, it means that the Mail Partition is completely full. Get into the Mail System and delete enough messages to send a message to all E-Mail Users. Inform them of the situation and request that they delete unnecessary messages.

* Although we've never seen it happen, it is theoretically possible for a User to hit the INT switch on his workstation during the brief period when E-Mail, on his machine, had the message free list locked. This will prevent any E-Mail User from

sending or deleting messages until the workstation warm or cold boots. More to the point, a malicious User could hang up the Mail System by executing a HiNet 'lock' command to lock the Mail System free list. The symptom: all Mail System Users will find themselves hung--absolutely nothing will happen--when they try to send or delete mail. If this is happening (and other programs work normally), begin searching for the culprit.

* If a crash of one sort or another has occurred, and there is a very important message that must be recovered, take the following steps:

1. Back up the Mail Partition on floppy disk.

2. Report the problem to DMS Customer Service: (415) 261-1034.

3. Write down the User's E-Mail name and any possible information about the contents of the message.

4. Mail the diskette and your notes on the problem to us with a purchase order. We will try to extract the necessary files from the Mail partition backup.

6.0 GLOSSARY OF HINET TERMINOLOGY

ALLOC -- The DMS utility that maintains the partitions on a Hard Disk. It allows the Network Adiministrator to create, modify and delete partitions. It also sets passwords and write staus for partitions.

ASSIGN -- a DMS utility that links a 'logical drive' to: a partition on the Network's Hard Disk, a local Hard Disk partition, a local Floppy Drive, a printer port, or the Spool printer.

Bad Sector Table -- A table that keeps track of the sectors on the Network's Hard Disks that cannot be reliably written to. Data that would normally be written to this space is sent to an alternate sector instead. Applies to 8" Hard Disk systems.

Bad Track Table -- Based on the same principle as the Bad Sector Table but for the 5" Hard Disk systems. When a 'bad sector' develops on the Hard Disk the entire track is set aside as unreliable.

BAUD Rate -- The rate at which data is transmitted over a serial cable. It is actually a misnomer as the term BAUD expresses bits per second; the addition of 'Rate' has become fixed in our language.

BDOS -- Basic Disk Operating System. The part of the operating system that manages the file system and requests for programs.

Belden Cable -- a shielded twisted-pair cable made by the Belden Corporation. Recommended as HiNet Cable in areas with electrical machinery, for outside links to other buidings and in areas with Radio Frequency sensitive equipment.

BIOS -- Basic Input Output System. The hardware dependent part of the operating system. The BIOS directs the transfer of data between storage disks, the workstation's ports, CRT, keyboard, printers and other peripherals.

Boot -- see Warm Boot, Cold Boot.

Boot Floppy Disk (BF) -- A method of loading the operating system to a Master or a station from a local Floppy Disk Drive. The Floppy Disk must have the operating system stored on its system tracks (with the SYSGEN command). Entering BF after the PROM Monitor's colon prompt directs the PROM to load the operating system from the local Floppy Disk Drive.

Boot Hard Disk (BH) -- A method of loading the operating system to the Network Master or a stand-alone computer with a Hard Disk. Entering BH after the PROM Monitor's colon prompt directs the PROM to execute a cold boot and to access the local Hard Disk for the operating system.

Boot Network (BN) -- A method of loading a workstation's operating system and BIOS directly from the Network's Hard Disks. It is the most common

method of starting a Network workstation. Most DMS workstations automatically boot the Network when they are turned on while other stations may have to be booted from the PROM Monitor. Enter BN after the PROM Monitor's colon prompt to instruct the PROM to load the operating system from the Network.

Branch Line -- an extension from the middle of the main HiNet cable. Must be connected wth a Repeater and terminated at the end.

Cold Boot -- To load an operating system from scratch. (Comes from the old phrase "pull yourself up by your bootstraps".) Usually executed by resetting the computer. Also known as a Cold Start.

Command Files -- Executable programs ending in .COM in CP/M and MS-DOS; .CMD in CP/M-86 and .EXE in MS-DOS. The filename extension should not be entered when calling up a program.

Controller Firmware -- A program stored on the Hard Disk and executed by the CPU (Central Processing Unit) when the system is cold-booted. It controls the access of data on the Hard Disk. Versions may change to increase the efficiency of the Hard Disk. 5HDHELP and HARDHELP initialize the firmware and use it for Hard Disk diagnostics.

CP/M -- Control Program/Monitor. The name of Digital Research's operating system for 8-bit microcomputers. DMS masters run CP/M.

CP/M-86 -- CP/M for 16-bit microcomputers. See CP/M above.

CRT -- An abbreviation for Cathode Ray Tube, an old term for devices using a vacuum tube and phosphors to display characters and/or graphics. Sometimes are called VDT -- Video Display Tube.

CTRL C -- Under HIDOS (CP/M), holding down the CTRL key and pressing the C key executes a warm boot. This reloads the directories of the partitions logged to your drives and aborts some programs or commands you may be running. Under MS-DOS CTRL C aborts some commands such as TYPE, COPY, and Batch files.

Default Drive Assignments -- The partitions that are pre-assigned in the USERS Table to your User Name. Whenever you log in to the Network, these partitions are assigned to the first four drives.

Directory -- The area on a Hard or Floppy Disk where a listing of the files on the disk is kept. Usually the first few tracks on a Floppy Disk or in a partition on a Hard Disk.

DIRNET -- Directory of the Network. A listing of allpartitionson each volume (hard disk)onthe network master.

Drives -- Sometimes referred to as Logical Drives, these are the connections between your workstation and the partitions on the Network's Hard Disks. Originally a 'Drive' referred to the local mechanical device that stores data on a Floppy Disk. The DMS-3/501 has one Floppy Drive and four more logical drives that connect

to partitions on the Hard Disk. 16-bit workstations (e.g., DMS-5086) have 8 logical drives.

Drive Designator -- Codes for Floppy Disks that designate the density, size and location of the Drive. For example, M0 designates a double-density, double-sided 5.25" diskette drive located on the left-hand side (if there are two drives).

Escape Code -- A sequence of two characters beginning with ESC. It is is usually a special instruction for a program or to the hardware of the computer. For example, ESC T tells the DMS-3/501's CRT Controller to reverse the screen's intensity.

ETX/ACK -- an abbreviation for a communications protocol meaning End of Text/Acknowledge. Usually used to communicate with a Serial Printer.

FDHDCOPY -- Floppy Disk Hard Disk COPY, a program used to copy an entire 8" Floppy Disk. Uses a partition on the Network Hard Disk to transfer the files to and from the Floppy Disk.

FORMAT -- Before storing data on a new Floppy Disk, the disk must be formatted with the FORMAT utility. (FORMAT5 for 5-inch diskettes.) This program prepares a Floppy Disk by writing a special byte on every spot that will store data on the disk. This byte (E5 hex) tells the CP/M BDOS that it is safe to store data at that location.

Handshaking -- A required sequence of signals between the computer and another device that completes a transmission. Usually involves a reply from the receiving device before any additional data is sent.

HARDBACK -- The DMS utility for backing up 8" Hard Disk partitions onto Floppy Disks. 5HDBACK is the 5 inch version. CARTBACK uses tapes instead of Floppy Disks.

HARDHELP -- A DMS utility used to format, initialize and test 8" Hard Disks. 5HDHELP is the 5-inch version.

HIDOS -- The DMS enhanced version of CP/M-80 2.2. It allows multiple Users to work in the same Network partitions, but not with the same files. Applications Software can use record-locking features in HIDOS to allow for multiple access to files.

HiNet Port -- The nine-pin D-shaped connector on all HiNet workstations and Masters where the HiNet cable connects. It is known technically as an RS-422 Serial port.

Interrupt -- The Interrupt button on most DMS workstations sends a signal that effectively aborts any applications program and CP/M command that may be in progress. It also results in a warm boot. Any files stored in RAM will be lost.

Modem -- A device for converting digital signals to analog signals that can be transmitted over a phone line. A Modem can be connected to a serial port on a workstation or the Master. The port's

jumper block must be configured for Modem transmission.

Menu -- A list of options that a program will perform on command. Menus can be nested so that one selection leads to another menu with options in greater detail.

MS-DOS -- Microsoft-Disk Operating System. The name of Microsoft's operating system for 16-bit microcomputers, used by IBM as the standard for its PC, PCjr, Portable PC and PC/XT product lines, and therefore a de facto standard for 16-bit personal computers.

NETLOCK -- A method of warning other users on the Network that a file or partition is being altered. NETLOCK stores the name of a file in a lockstring table.

Partition -- The Hard Disk is divided into sections of varying storage capacities called partitions. Each partition has its own directory area. Partitions can be Read-Only, Ownable or shared.

Partition Zero -- The partition where all of the control programs--the BIOS, Operating Systems, Allocation and User Tables, etc.--are stored. This partition can only be accessed by special programs, not by workstation users. KEEP BACK-UPS OF PARTITION ZERO AT ALL TIMES.

Port -- A connection between the internal electronics of a computer and a cable which leads to another device (modem, printer or mouse). The port consists of an array of contacts or "pins," each carrying a specific signal from

the computer to the external device. DMS Serial Ports are RS-232. Parallel Ports are "Centronics" compatible.

PROM -- Programmable Read Only Memory. An integrated circuit chip that stores small programs. These programs often are used to start up a computer by telling certain devices, such as the Hard Disk, where to look for other instructions.

PROM I.D. Number -- Each PROM is serialized with a unique number. These numbers not only keep track of versions of software, but allow a workstation to join the Network. The PROM Serial Number must be entered in the MACHINE Table for each workstation.

READ0 -- A DMS utility for reading the data stored on Partition Zero and writing it to a file on a Floppy Disk. Used on 8-inch Hard Disk systems to backup the ALLOC, USERS and Machine Tables. 5HDBACK has a Z menu option for backing up Partition Zero.

Record Locking -- To enable two or more users to update the same file in the same partition at "the same time", the applications program must be able to lock individual records in the file.

Repeater -- To extend a Network cable past 1000 feet, a Repeater is required to boost the signal. It is a small electronic device with two ports, one for the incoming HiNet cable and one for the outgoing cable.

RS-232 -- An electronics industry standard for a type of cable and connectors used for serial

transmission of data. While the physical construction of the cables and ports are standardized, the signal arrangements are not. DMS builds jumper blocks into the ports so that signals can be rearranged to match the peripheral.

Saving -- The process of transferring files that exist in RAM to more permanent storage on a Hard or Floppy Disk. Once the computer is turned off, reset, or interrupted, the files in RAM are erased.

Screen Dump -- A method of sending everything that is displayed on the screen to a printer. The DMS-816 has a PrtScr Key for this function. The DMS-5000 series workstations use CTRL/SHIFT F8 and F9 to send the contents of the screen to a locally attached parallel printer.

Sector -- On storage disks, a sector is one part of a track. A track is a circle traced over the surface of the disk by the read/write heads of the disk drive. A sector of a track defines how much data the computer can read into memory at one time.

SETBAUD Command -- The DMS utility that sets the rate at which data (bits) are transmitted through the serial ports. The choices gernerally range from 110 bits per second to 9600 bps. Use the command format: SETBAUD <port number> <baud rate> e.g., SETBAUD 2 1200. See BAUD Rate.

SETTIME -- A DMS command that resets the time and date on the Master. Use this program from the Master to change Network time. Using it from a

workstation is not recommended as the Network time will be different from station time.

SHRALLOC -- From the words SHARED ALLOCATION, a utility that reorganizes the directory of a partition in preparation for making it shared. The partition must be marked Ownable until SHRALLOC is run in the partition, then marked shared in the ALLOC Table.

Spooler (Spool printer) -- The common Network printer that can be accessed by anyone on the Network. The Spool Printer is connected to the Master's Serial or Parallel ports. A PRTSPOOL partition must be allocated on the Hard Disk.

Submit Files -- A CP/M file with a series of one line commands can be automatically processed with the SUBMIT utility. On HiNet, SUBMIT files must not be run on shared partitions or when a common partition is assigned to the A drive.

Track -- See Sector.

Transient Program Area (TPA) -- The portion of a computer's RAM available for storing parts of applications programs and data files. The TPA requirement is an important consideration when selecting software and hardware. 8-bit workstations generally have 54K or less RAM available for applications software while 16-bit stations can have up to about 900K (with 1 Mbyte RAM). Additional devices, such as disk drives and RAM Disks can lessen the amount of TPA.

User Number (HiNet) -- Each User on the Network is assigned a User Number when they log in. This

Number tells the Master which workstation is requesting data at any given time.

Volume -- Each Hard Disk in a Network is called a Volume. Up to four 46-Mbyte Hard Disks can be used on a Network. The ALLOC, NETALLOC, and HARDHELP programs need to be told which Volume to work on. WHO -- A DMS program that displays the activity on the Network. Most often used to see who else is active on the Network and the status of Spool Jobs.

Wildcard symbols -- The * and ? symbols are often used by CP/M and MS-DOS commands to stand for any character or groups of characters in a filename. They are an aid in copying and erasing groups of files.

Write protect notch -- A notch on diskettes that protect the stored files from erasure or alteration. On 5" diskettes the notch must be covered to write-protect the files and uncovered to allow data to be written to the diskette. 8" disks must have the notch covered in order to write to the disk and uncovered to make it write-protected.

WRUN0 -- A DMS utility used to write operating system files to Partition Zero. Used primarily on 8" systems to restore backups of the ALLOC, USERS and MACHINE Tables to the Hard Disk.

ZCPR -- Z-80 Command Processor Replacement. An enhanced version of CP/M's Console Command Processor with additional commands. Comes with Release 6 HiNet software.

APPENDIX A ESC AND CTRL COMMANDS

This section contains the ESC and CTRL codes that may be necessary to know when you configure a printer or a software package for the DMS-3/501 or DMS-3/F. A command with an (L) before it means that you must access this code either from Local Mode (CTRL/SHIFT F2) or from a program.

CHARACTER SET COMMANDS

(L) ESC a Substitute alternate character set from cursor on.

(L) ESC A Substitute alternate character set for entire screen.

(L) ESC s Show the CRT driver's current character set.

(L) ESC S Set the CRT drivers character set to standard ASCII.

SCREEN BRIGHTNESS CONTROL

(L) ESC b Set the screen one increment brighter.

(L) ESC d Set the screen one increment dimmer.

SCREEN CONFIGURATION COMMANDS

(L) ESC H Set to highlight (half intensity) following character position occupied by cursor.

(L) ESC N Set screen to normal (no highlight, local reverse, underline, blinking or special character set) following position occupied by cursor.

(L) ESC B Set screen to blink following the character position occupied by cursor.

(L) ESC R Set screen to reverse video following position occupied by cursor.

(L) ESC U Set screen to underline following position occupied by cursor.

BELL COMMANDS

(L) Press ESC CTRL-G and then 6 ASCII digits to program the bell tone. The first three ASCII digits count the number of beats of the tone. This affects the duration of the tone. The second three ASCII digits shorten or lengthen the beats which raises or lowers the tone. Decreasing the number raises the tone and will shorten the duration because the number of beats per second is higher. The reverse happens if you lower the tone because the beat is slower. The default bell tone has a duration of 100 and a tone of 055.

CURSOR CONTROL COMMANDS

Key	Hex Character	Key position and Description
(L) 'blank' or CTRL-A	1h	First row, rightmost key. Home the cursor to the upper left corner.
(L) 'blank' or CTRL-F	6h	Bottom row, one from the right. Move the cursor one character to the right. At the end of the line go to the beginning of the next line down. At the bottom of the screen, scroll the screen up.
'backspace'	8h	Bottom row, rightmost key. Move the cursor one character to the left. At the beginning of the line, go to the end of the next line up. At the top of the screen, go to the bottom of the screen.
'linefeed'	0Ah	Second row, first from right. Move the cursor down one line. At the bottom of the screen, scroll the screen up.
(L) 'blank' or CTRL-Z	1Ah	First row, second from right. Move the cursor up one line. At the top of the screen, move the cursor to the bottom of the screen.

(L) CTRL-L	0Ch	Home the cursor to the upper left corner and clear the screen.
(L) CTRL-M	0Dh	Move the cursor to the left-most position of the current line.
'TAB'	9h	Tabs are set at every eighth character. At the end of the line, go to the beginning of the next line. At the bottom of the screen, scroll.

MISCELLANEOUS COMMANDS

ESC C Load 1000h bytes of code at 4000h and execute. This allows the user to reconfigure the CRT.

ESC E character
Set the available attribute.
Set the following bits high (1b) to enable the resulting screen attributes.

bit 0 - half intensity
bit 1 - blink
bit 2 - unused
bit 3 - alternate character set
bit 4 - reverse video
bit 5 - underline

ESC g function key
Get a programmed function key string. The first character returned is the length of the string, followed by the string itself.

ESC h Hide (remove) attribute character. Only 16 attribute characters are allowed per line. This provides a means of removing them.

ESC i Get the screen intensity and normal/reverse video byte returned with high bit set for normal video, or reset for reverse video. Low four bits are intensity. Intensity levels range from 0 to 15.

ESC I intensity
Set screen intensity. Byte information bits are the same as for ESC E.

ESC k Erase from cursor to end of screen

ESC K Erase to the end of the line.

ESC l key, length of buffer, characters
Load the designated key's programmable key buffer from the host computer.

ESC p Send the function key's byte as a literal. The value is set as follows: Bit 7 is set, bit 6 is set if CTRL is pressed, bit 5 is set if SHIFT is pressed and bits 4 through 0 are the function key's value. (e.g., F1=81h, CTRL-F1=C1h, SHIFT-F1=A1h, CTRL-SHIFT-F1=E1h).

ESC P Send the program string or literal for a function key in the programmable key buffer to the host. This condition is set on power-up or reset.

ESC T Toggle screen reverse video. No character position is occupied.

ESC V The version will now be returned to host rather than just displayed on the screen. Its format will be:

```
FOX  2.0aNPL
KYBD 2.0
```

The characters following the version are as follows:

a Assembly code. Changes every assembly. It should be blank in the released version.

N Normal video. Can be R to indicate reverse video.

P Production version. Would be X if experimental version release.

L For long delay on powerup. S for short delay on powerup.

ESC X 4 byte address
Display the byte addressed on the upper left of the screen.

ESC w 128 characters
Transpose keyboard characters.
Causes transposition of keyboard characters before further processing. Entire new transposition table must be sent.

ESC W 128 characters
Transpose CRT character display. Causes transposition of CRT characters before they are displayed on screen. Entire new transposition table must be sent.

ESC X hexdigit hexdigit hexdigit hexdigit
Examine the memory contents of the byte addressed. Value will be displayed on upper left of status line.

ESC Y row+20h,col+20h
Set cursor position. Displays BAD ROW message if row exceeds 24 and BAD COL message if col exceeds 80.

ESC z Zero keyboard transposition table. Each keyboard character is substituted for itself. You return to a normal keyboard. NOTE---1Eh is transposed to 30h.

ESC Z Zero display transposition table.

APPENDIX B

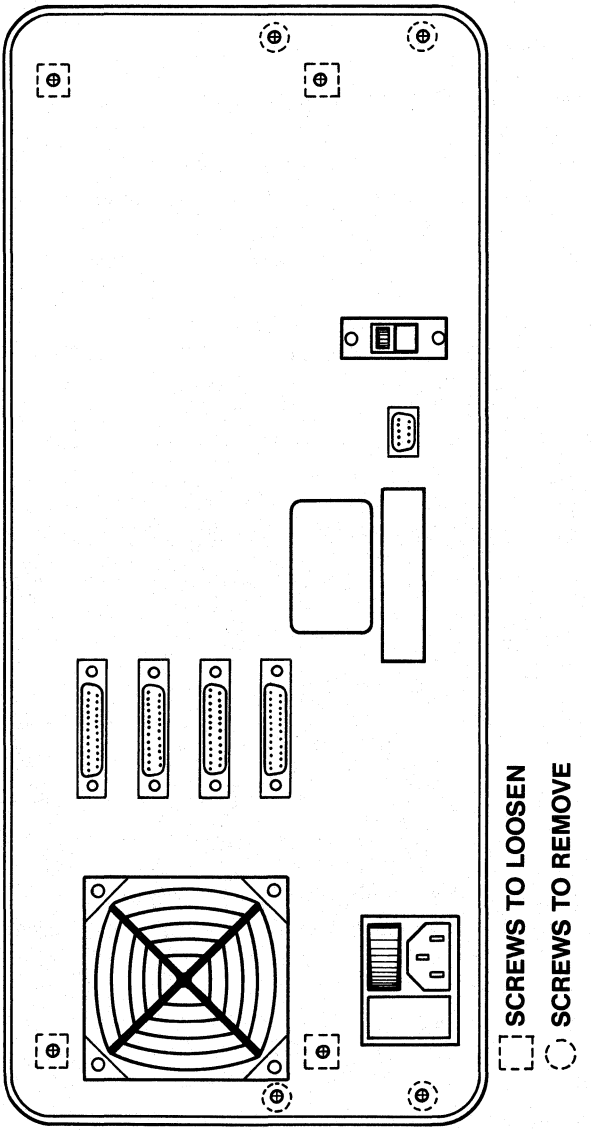
MODIFYING THE HINET MASTER'S JUMPER PINS

----------WARNING----------
The Masters' cabinets should be opened only by a qualified technician. The CRT and the Power Supply contain dangerously high voltages that are present long after the unit is turned off. The information presented in this section is for service technicians only. Service technicians should unplug the Master and wait two hours before dismantling the cabinet.

CABINET DISASSEMBLY--DMS-3/501

PREPARATION

To begin, you will need a phillips-head screwdriver (at least 6" long) and a large table top clear of anything which might damage the DMS-3/501 screen. To conduct this operation safely, make sure that there are no floppy disks in the disk drive, that the DMS-3/501 has been turned off for at least two hours and that all wires and cords at the back of the cabinet are disconnected. Now disconnect the keyboard and set it aside. The DMS-3/501 is a delicate machine; handle it carefully to avoid damaging it. The DMS-3/501's screen should be facing you.


SCREWS TO LOOSEN
SCREWS TO REMOVE

REMOVING THE UPPER AND LOWER CASINGS

THE UPPER CASING

For the sake of clarity, the metal sheet covering the top portion of the DMS-3/501 will be called the **upper casing;** the bottom portion will be called the **lower casing.** Notice that the upper and lower casings fold around the DMS-3/501 and are fastened to the machine along its sides.

A- Remove the six screws (three on each side) which connect the upper and lower casings of the DMS-3/501.

B- Rotate the DMS-3/501 gently forward, so that it rests on its face (screen down). The upper casing should now be facing you; the lower casing, facing away from you; and what we will call the back panel of the machine, distinguished by its many screws and outlets, should be facing upward.

C- At the back panel of the machine, loosen (by **six** full revolutions) the four screws marked "loosen" in the diagram. Be careful not to remove these screws.

D- Look along the sides of the DMS-3/501 where the upper and lower casings meet. Notice that these casings rest here along the black rim of the DMS-3/501's face. Placing a finger along each side of this rim, slide the upper casing away from the lower casing about 1". If you move the upper

casing back and forth along the rim, you can see the back panel (now facing upward) give where you have loosened it.

E- To remove the upper casing, slide it toward you along this rim until you feel some resistance.

F- Now, without letting the upper casing regress, pull outward at its sides so that they clear the black rim.

G- Pull the upper casing downward slowly, but firmly, until it is free. Set it aside.

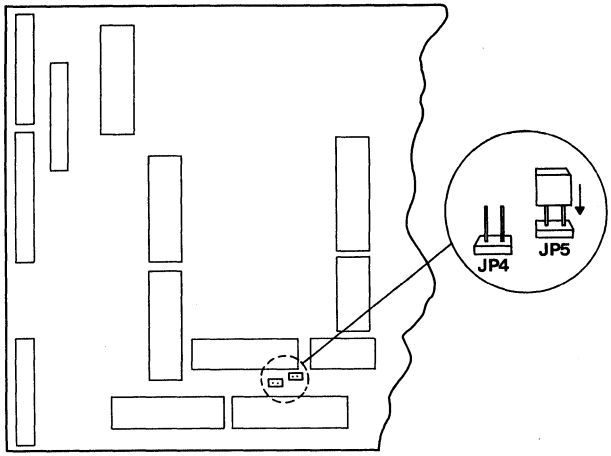
----------NOTE----------
This is all you have to do if you are only going to be changing the Serial Port's Jumper Blocks.

THE RADIATION SHIELD

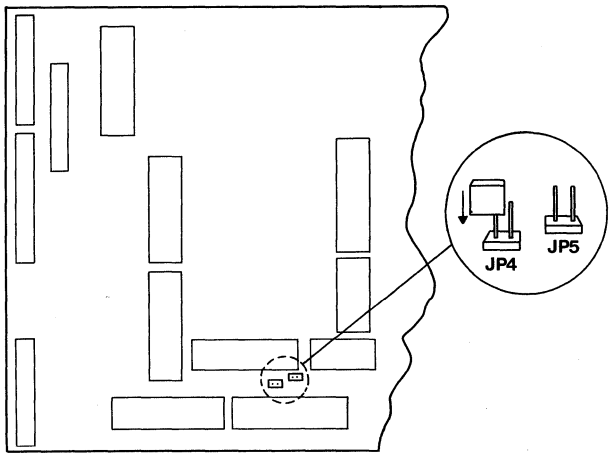
Before removing the lower casing, you must first remove the radiation shield. Notice the narrow opening on both the right and left sides of the DMS-3/501. The radiation shield is located in the opening on the left, by the keyboard cord socket. To remove it, unscrew the single screw.

THE LOWER CASING

A- At the rear casing (now facing upward), remove the four screws marked "remove" in the diagram C-1.



JUMPER PINS ON CPU BOARD
Boot Hard Disk



JUMPER PINS ON CPU BOARD
Boot Floppy Disk

B- Turn the DMS-3/501 around, on its face, 180 degrees. The lower casing, with its two legs, should now be facing you.

C- At the top of the lower casing, locate the three screws and remove them.

D- Placing your thumbs at the ends of the DMS-3/501 legs, pull the lower casing toward you to remove it. If the casing resists you at all, pull out lightly on its sides until free and set aside.

OPENING THE DMS-3/4'S CABINET

To begin, you will need a Phillips-head screwdriver (at least 6" long) and a large table top. To perform this procedure safely, make sure that there are no Floppy Disks in the Disk Drive, that the DMS-3 is turned off and that all wires and cords at the back of the cabinet are disconnected. Disconnect the CRT and keyboard and set them aside. Handle the DMS-3 carefully to avoid damaging it. The DMS-3's front panel should be facing you.

Look along the sides of the computer. Remove the four screws along each side of the machine. The computer's top panel or lid is free. Lift it straight off. Now grasp the black front panel. Notice the cords attached to the inside of this panel. They will tether the panel to the computer. Jiggle the panel free. Rotate the bottom edge of the front panel upwards. Hold it or let it rest on the edges of the computer

paneling. Turn the DMS-3 counter-clockwise 45 degrees so that its front faces towards the right.

CHANGING THE MASTER'S JUMPER PINS

THE CPU BOARD

You should now be facing a large green rectangular board, about the size of a small placemat, with flat ribbon cables running from all directions to its left edge. This is the Central Processing Unit (CPU) board. Notice that the CPU board is divided into two sections: left and right. You need not concern yourself with the right section at all in this operation. On the left section, lying horizontally near the bottom edge of the CPU board, there are two rectangular chips, each roughly two inches in length. Just above the chip on the right, two jumper points are labled JP4 and JP5 (refer to diagram). The operation takes place here.

JUMPER POINTS/JUMPER PLUGS

JP4 and JP5 are the only two Jumper Points that concern us in this operation. Above each of the labels a small brown rectangle juts out from the CPU board. From each rectangle two small metallic pins protrude. One set of these pins should be covered by a little plastic black rectangle (if this piece is missing, contact DMS or your dealer). This rectangle is called the JUMPER PLUG.

MOVING JUMPER PLUGS

The Jumper Plug can be easily removed. Clench the black Jumper Plug tightly between thumb and forefinger and pull it away from the board; examine it closely. At one end of the plug, there are two miniature shafts to accommodate Jumper Points; at the other end, there is no such accommodation. Thus, only one end of the plug fits correctly on the Jumper Points.

ARRANGEMENT OF THE JUMPER PLUGS

It is the arrangement of the JUMPER PLUG on the JUMPER POINTS which determines whether the Master will automatically boot the operating system from the Floppy Disk, the Hard Disk or the Network.

AUTOMATIC BOOT FROM FLOPPY DISK

The DMS-3/501 is normally set to boot from the Hard Disk. To boot automatically from the Floppy Disk neither pin has to be covered with the jumper plug. However, it's a good idea to store the plug on the CPU board so that it won't be lost.

A- To boot the **floppy disk** (and store the Jumper Plug safely), place the plug so that only **one** of the metallic points on JP4 is covered by a Jumper Plug shaft. This arrangement is known technically as "JP4 open."

AUTOMATIC BOOT---NETWORK

Arranging the Jumper Plug to boot the network is like plugging an electrical cord into a socket at home: in order to succeed, both metallic pins must be fit snugly into the corresponding shafts of a jumper plug.

A- To boot the **network** automatically, place the Jumper Plug so that it completely covers **both** metallic pins at JP4. This is known as "JP4 closed."

AUTOMATIC BOOT--HARD DISK

To set the Master to boot directly from the Hard Disk, the pins on **J5** must **both** be covered with a jumper plug. This arrangement is preferred when you are using the DMS-3/501 as a Network master or a stand-alone computer. You should not use this arrangement if you are using it as a network workstation.

When you are satisfied with the Jumper Plug arrangement, you are ready to reassemble the Master.

REASSEMBLY--DMS-3/501

REPLACING THE LOWER CASING

A- Grasp the lower casing near the rear edge so that your thumbs cover the openings for the legs.

B- Tilt the casing forward, fitting the fold (located just inside the top edge) under the rear panel.

C- Nudge the rear panel upward with this fold and slide your hands forward so that the lower edge of the lower casing rests along the black rim of the front panel. (You may have to pull the side of the lower casing outward slightly for a correct fitting.)

D- Replace the three screws of the lower casing (now facing you).

THE PURPOSE OF THE RADIATION SHIELD

The Radiation Shield assures that the DMS-15 does not interfere with the reception of radio waves in its immediate area. Without the shield, there is a chance that the DMS-3/501 will hinder television and radio reception in its vicinity. The Federal Communications Commission requires its installation, though the DMS-15 works without it.

REPLACING THE RADIATION SHIELD

A- Turn the DMS-3/501 around, on its face, 180 degrees (the back casing should now face away from you).

B- Align the Radiation Shield with the threaded screw housing of the lower casing and replace the screw.

REPLACING THE UPPER CASING

A- Slide the upper casing back into place. (NOTE---There are three flanged attachments on the underside of this casing. The center attachment has a lip which must fit under the fold of the rear panel, while the upper casing itself fits over the fold.)

COMPLETING REASSEMBLY

A- Be sure that all screw holes are aligned with their threaded housings. The side holes may not align exactly because the upper and lower casings are not yet tightened down. You may have to pull the lower and upper casings gently together.

B- Tighten down all screws securely.

C- Reconnect the keyboard, HiNet cable, power cord, and printer (if applicable).

D- Turn on the power and check to see that the DMS-3/501 is functioning as desired. If not, recheck the directions to see that they were followed accurately.

REASSEMBLE THE DMS-3/4 CABINET

Set the two metal lips (at the bottom edge of the front panel) into their correspondent openings in the casing. The front panel stands erect within the front edge of the beige casing. Fit the lid on top of the two lips at the top of the front panel and fasten with the eight screws.

I/O INFORMATION--SERIAL, PARALLEL PORTS

Serial port 0 (I/O board connector J1)

I/O board DB25S (J1)	I/O Board jumper block	J5 on I/O brd J1 on ZSBC3/4	ZSBC 3/4 serial ports
pin 1	no jumper blk		chassis ground
pin 2	for port 0	pin 3	U2 pin 4 RxD
pin 3		pin 5	U1 pin 6 TxD
pin 4		pin 1	no connect CTS
pin 5		pin 10	pullup RTS
pin 6		pin 6	pullup DTR
pin 7	signal ground	pin 13	logic ground
pin 8		pullup	
pin 20		pin 2	no connect DSR

Serial port 1 (I/O board connector J2)

I/O board DB25S (J2)	I/O Board jumper block	J5 on I/O brd J1 on ZSBC3/4	ZSBC 3/4 serial ports
pin 1	(for CRT)		chassis ground
pin 2	pin 1-pin 16	pin 9	U2 pin 1 RxD
pin 3	pin 2-pin 15	pin 8	U1 pin 3 TxD
pin 4	pin 3-pin 14	pin 7	no connect CTS
pin 5	pin 4-pin 13	pin 14	pullup RTS
pin 6	pin 5-pin 12	pin 16	pullup DTR
pin 7	signal ground	pin 13	logic ground
pin 8	pin 7-pin 10	pullup	
pin 11	pin 8		
pin 14	pin 9		
pin 20	pin 6-pin 11	pin 4	no connect DSR

Serial port 2 (I/O board connector J3)

I/O board DB25S (J3)	I/O Board jumper block	J5 on I/O brd J1 on ZSBC3/4	ZSBC 3/4 serial ports
pin 1	(for CRT)		chassis ground
pin 2	pin 1-pin 16	pin 17	U2 pin 13 RxD
pin 3	pin 2-pin 15	pin 24	U1 pin 8 TxD
pin 4	pin 3-pin 14	pin 12	U4 pin 4 CTS
pin 5	pin 4-pin 13	pin 18	U3 pin 3 RTS
pin 6	pin 5-pin 12	pin 15	U1 pin 11 DTR
pin 7	signal ground	pin 13	logic ground
pin 8	pin 7-pin 10	pullup	
pin 11	pin 8		
pin 14	pin 9		
pin 20	pin 6-pin 11	pin 11	U4 pin 13 DCD

Serial port 3 (I/O board connector J4)

I/O board DB25S (J4)	I/O Board jumper block	J5 on I/O brd J1 on ZSBC3/4	ZSBC 3/4 serial ports
pin 1	(for CRT)		chassis ground
pin 2	pin 1-pin 16	pin 21	U2 pin 10 RxD
pin 3	pin 2-pin 15	pin 25	U3 pin 8 TxD
pin 4	pin 3-pin 14	pin 20	U4 pin 1 CTS
pin 5	p 11 DTR		
pin 7	signal ground	pin 13	logic ground
pin 8	pin 7-pin 10	pullup	
pin 11	pin 8		
pin 14	pin 9		
pin 20	pin 6-pin 11	pin 11	U4 pin 13 DCD
pin 20	pin 6-pin 11	pin 22	U4 pin 10 DCD

PARALLEL PRINTER CABLE PIN CONNECTIONS

The following table lists the pin connections required to connect a DMS-3/F to a Printer using a Centronics-type parallel interface.

Parallel Port 1 J3 on CPU board		Centronics Connector		
Signal Name	Pin Number	Signal Name	Pin Number	In or Out of Printer
DB0	Pin 2	DATA 1	Pin 2	Output
DB1	Pin 3	DATA 2	Pin 3	Output
DB2	Pin 4	DATA 3	Pin 4	Output
DB3	Pin 5	DATA 4	Pin 5	Output
DB4	Pin 6	DATA 5	Pin 6	Output
DB5	Pin 7	DATA 6	Pin 7	Output
DB6	Pin 8	DATA 7	Pin 8	Output
DB7	Pin 9	DATA 8	Pin 9	Output
OE/	Pin 11	OUTPUT ENABLE	Pin 20	GND
OUT 00/	Pin 21	DATA STROBE	Pin 1	Input
STAT1B	Pin 17	BUSY	Pin 11	Output
GND	Pin 1	GND	Pin 19	GND
GND	Pin 10	GND	Pin 20	GND
GND	Pin 12	GND	Pin 21	GND
GND	Pin 14	GND	Pin 22	GND
GND	Pin 16	GND	Pin 23	GND
GND	Pin 18	GND	Pin 24	GND
GND	Pin 20	GND	Pin 25	GND
GND	Pin 22	GND	Pin 26	GND
GND	Pin 24	GND	Pin 29	GND
GND	Pin 26	GND	Pin 36	GND

Note that Pin 11 on J3 of the CPU board must be grounded in the cable to enable the port outputs. Also, Pin 36 on the Printer connector must be grounded when using an EPSON Printer unless the disable switch on the printer is used. The following pins of J3 on the CPU board are not connected to the Centronics connector: 13, 15, 19, 23, 25. The following pins of the printer connector are not connected and need not be attached in the cable: 9, 10, 12, 14 thru 18, 27, 28, 30 thru 35.

APPENDIX D MULTIPLE VOLUME SYSTEMS

MODTEST

If you are installing HiNet Version 2.245 or later on an already existing system, you must first check your CPU board version number(s) to see if you need the Oasis Modification. The Oasis modification is necessary on early versions of the DMS-3 and DMS-4 CPU boards to ensure that Floppy Disk storage operations work properly with the new HiNet software. DMS-3 CPU board versions prior to version 3.2 and DMS-4 CPU board versions prior to version 4.1C need the modification.

----------NOTE----------
If you are using DMS-3s or DMS-4s as workstations you will have to perform MODTEST on them as well as on the Master. Boot them from a Floppy Disk and run MODTEST just the same as with the Master.)

The MODTEST program is used to check if the CPU needs the Oasis modification. MODTEST.COM is stored on an 8-inch Floppy Disk that came woth the multplexor board kit. To run MODTEST make sure everyone is off the network and then boot the Master Computer from the Distribution Floppy Diskette. Enter after the A> prompt: (A>**Modtest<CR>**).

You will see a series of explanatory screens. As you proceed through the screens your computer will encounter an error (such as an ORUN ERROR for "overrun") if its CPU needs the

Oasis modification. If the CPU board does not need the modification, or if it has already been installed, the MODTEST program will end with an **OK** message.

If your system does not need the modification you can install the new HiNet software with the INSTALL program as described in Section 2 and/or add the Multiplexor board with additional Hard Disk Volumes. If you need the modification **DMS will install the modification free of charge.** If you wish DMS to make the modification, ship the CPU board to DMS freight prepaid and we will return the modified board to you freight collect.

HARD DISK MULTIPLEXOR BOARD

The DMS Hard Disk Multiplexor (HDM) is designed to allow the attachment of a total of four 8 inch Winchester disk drives (also referred to as "volumes") to the HDC 1.x Hard Disk Controller board. Therefore the maximum capacity of the system is 4 volumes x 46 megabytes for each volume = 184 megabytes (unformatted).

The addition of the Hard Disk multiplexor is a factory only upgrade. It requires modification or additions to:

Cabinets and power supplies
Mechanical assembly
HDC jumpers
HDC firmware

Operating system software and utilities
Disk drive jumper selections

The Hard Disk Multiplexor is a 2.8" x 8.5" printed circuit card with 4 port connectors plus the power supply. It is mounted above and at the back end of the HDC 1.x Hard Disk Controller board. Power (+5 = blue, grd = green) is supplied by a new cable connecting the power supply, Hard Disk Drive and the Floppy Disk Drive.

In a system of two, three or four Hard Disk Drives, all of the units must be daisy-chained together with a 50-wire ribbon cable. The daisy-chained disk drives must be arranged in a specific order as described in Section 1.

TERMINATORS

In a Multi-Disk system, only the Master (volume 0) and Volume 3 have their terminators installed. This makes it necessary to have the Master and Volume 3 on either end on the 50-wire daisy-chained cable, even if they are the only volumes in the system. Volume 1 and Volume 2 both have their terminators removed. They must always be connected between the Master and Volume 3.

PORT CONNECTIONS

PORT LABELS	VOLUME NUMBER	HARD DISK MULTIPLEXOR	HARD DISK CONTROLLER
MULTIVOL	Master 0	J1	
VOL 1	Master 0	J3	
VOL 2	Master 0	J4	
TAPE	Master 0		J4

NOTE---On some units the MULTIVOL port may be labeled: DAISY-CHAIN 0-(-1-2)-3. The TAPE port may be labled: STD-20 OPTION.

DRIVE SELECT SWITCHES

The drive select switches are located on the bottom of the Hard Disk. They are pre-set at the factory. There should be no need to access them.

The table below shows the jumper and cable settings for the drives used for volumes 0-3. For more information see the Fujitsu/Memorex 2301/2/3 OEM manual.

Vol	50 wire cable to HDM	20 wire cable to HDM	Drive select switch SW3 5 6 7 8	Terminator A7 in or out	Drive SW4 1-8	SW-5
0	J1	none	0 0 0 1*	in	all on	1 1 1 0
1	J2	J3	0 1 0 0	out	all off	1 1 1 0
2	J2	J4	0 0 1 0	out	all off	1 1 1 0
3	J2	none	0 0 0 1	in	all on	1 1 1 0

* 0=off, 1=on Different drives may have this switch in different orientations. Always double check the switch numbers.

The following changes are made to the Hard Disk Controller board 1.x for use with the Hard Disk Multiplexor.

Remove jumper from P1d pin 15 to 16.
This permanently selects drive 1.

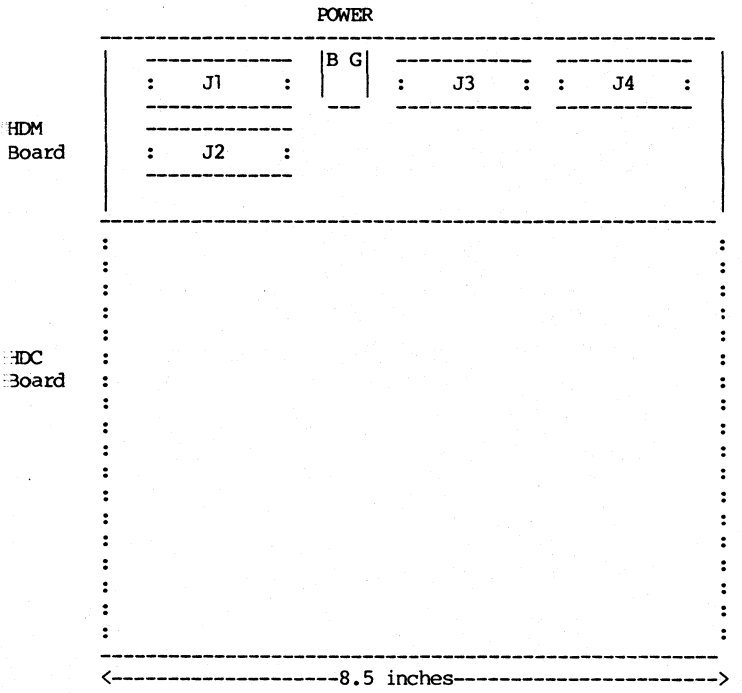
Use ROM firmware version 2.2 (or greater).

Reroute the Hard Disk drive cable to port J1 in the HDM board.

Use RAM firmware version 2.0 or later.
Use Hardhelp version 3.17 or later.

Diagram 2--Multiplexor Board Connectors

View from above of the Hard Disk Multiplexor (HDM) board and Hard Disk Controller (HDC) board. Multiplexor board is mounted on top of the Hard Disk Controller board.



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