Digital Microsystems *DSD*™

DMS-3/501 MANUAL
Version 1.2

FCC 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 instructions manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J 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 own expense will be required to take whatever measures may be required to correct the interference.

4.0 USING PRINTERS

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 DMS-3/501)
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 the
separated boot 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 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.

FLOPPY DISKETTE DRIVE

HARD DISK DRIVE

LEG RELEASE

RESET
INTERRUPT
LEG RELEASE

DIAGRAM 1-1

FAN GRILL

PORT 0

PORT 1

PORT 2

PORT 3

ON/OFF SWITCH

AC POWER

HINET PORT

VOLTAGE SUPPLY SWITCH

115V

220V
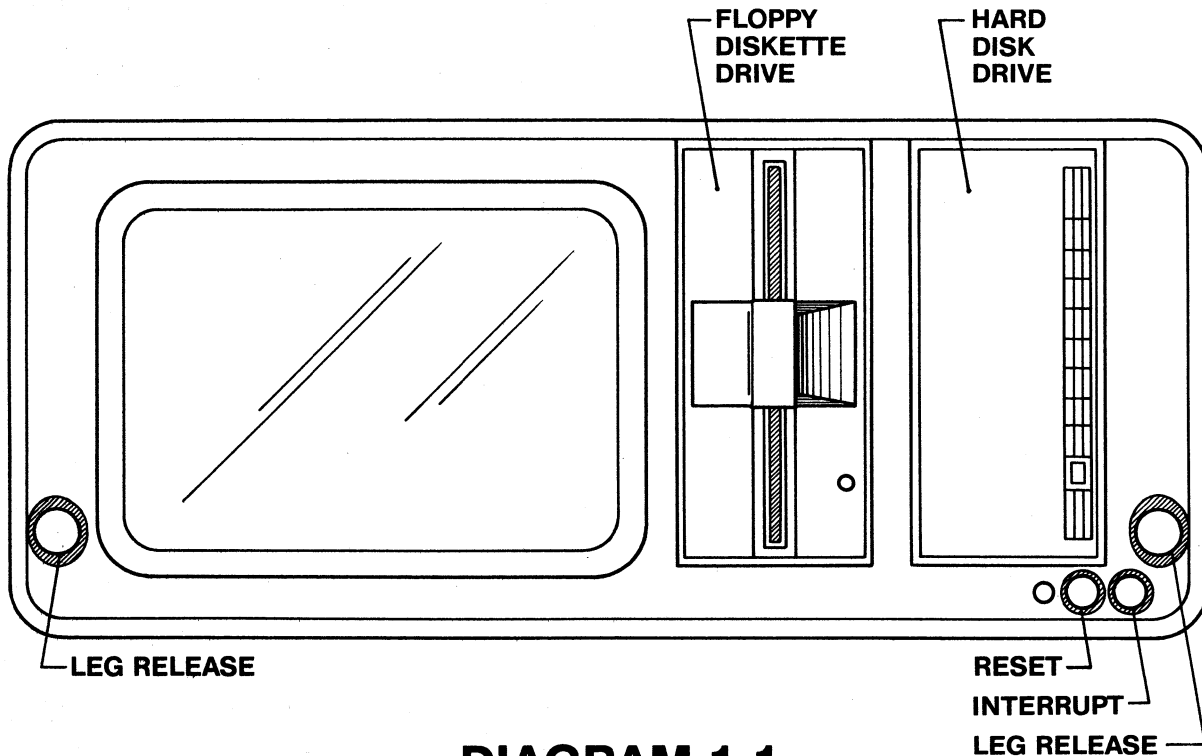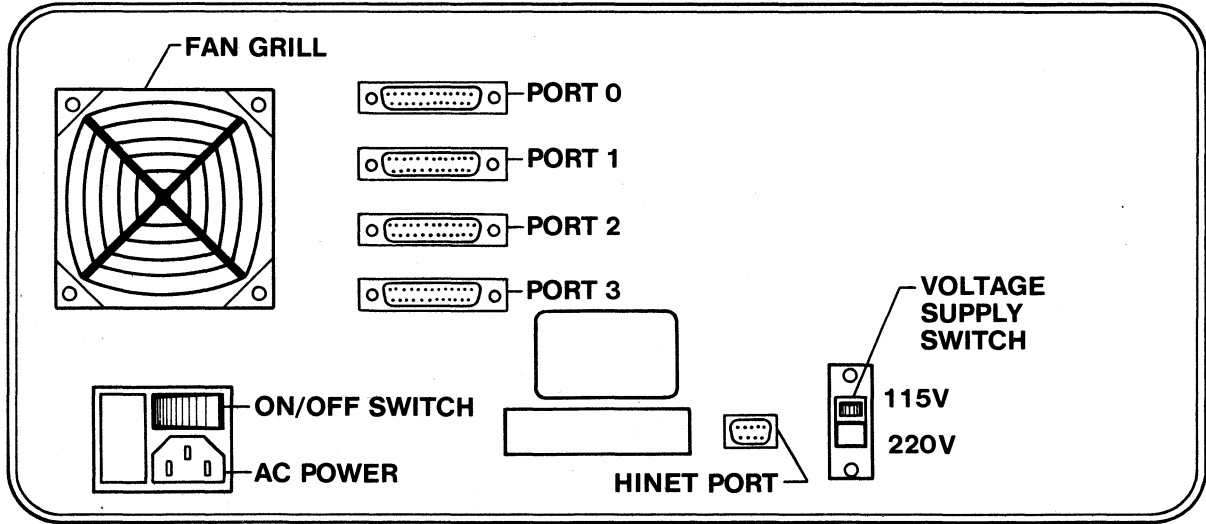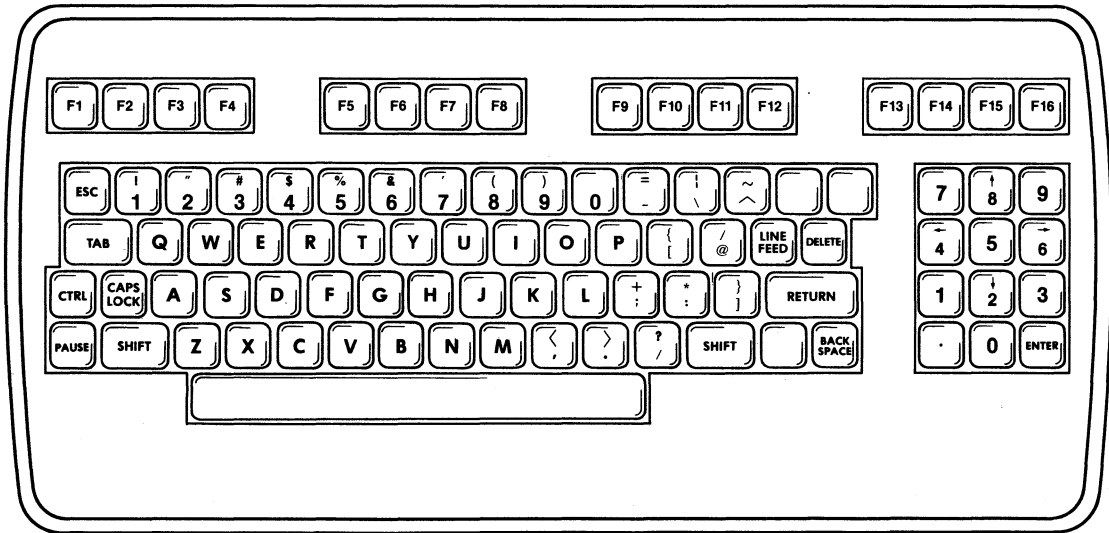
DIAGRAM 1-2

DIAGRAM 1-3

1.0   INTRODUCTION TO THE DMS-3/501

1.1   OVERVIEW

The DMS-3/501 is a powerful eight-bit micro-
computer with 64K internal memory (RAM). It is
capable of operating as a self contained stand-
alone computer, a HiNet station with local
storage or a HiNet Master for small 5-10 work-
station Networks. The DMS-3/501 is equipped with
a nine-inch green phosphor CRT monitor, a 5.25-
inch double-density, double-sided Floppy
Diskette Drive and a 5.25-inch 15 Megabyte Hard
Disk.

This Volume of the DMS-3/501 manuals is the
guide to setting up a stand-alone system and a
complete HiNet/HIDOS Network. Section 2 gives
you the step-by-step procedures for setting up
the Hard Disk for Network Master systems. Many
of the details about why you are performing
these procedures are not discussed in this
volume so that you may get your Network running
as quickly as possible with a minumum of
reading. Volume 2 will explain the details more
fully so that the System Adminis-trator 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.

Some terms that you may not be familiar
with can be found in Section 6, the Glossary.

1.2   INITIAL SETUP AND INSTALLATION

After unpacking the DMS-3/501 from its
shipping carton, examine the unit for damage.
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 to the DMS-3/501, do not plug it
into an electrical outlet. Contact your dealer
or DMS at once for instructions. You should also
contact the shipping company if the damage seems
to have occurred during transit.

You will find in the shipping carton, along
with the main computer cabinet, the keyboard, a
power cord, this manual, the distribution
diskettes and a screen cleaning cloth.

Diagram 1-1 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 1-1.)
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 manufac-
turers.) 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
1-2.) 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 1-2.) 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 any
work not stored on a Disk being lost. The
INTERRUPT will end most user programs and return
you to CP/M. This is useful if a program is
'hung' due to errors. Again, however, any work
that you have done but not saved will be lost.

1.3 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.

USING 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 operat-
ing 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, HiNet, 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 ony one
partition on the Hard Disk then 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.

USING 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
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 'up and running',
then the login message should appear on the
screen. See section 2 for information about
logging onto the Network.

USING 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).

1.4   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 1-3.

1.4.1   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 whatever
codes or strings that you wish to the function
keys. (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.

1.4.2   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.

1.4.3   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), 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.

LINE FEED

The LINE FEED Key is located on the right side of the second row from the top. In some programs and operations it is used to move the cursor down one line.

BLANK KEYS

There are three blank keys on the right side of the main section. These are extra Programmable Keys which can be programmed for a variety of functions. See Section 7, Volume 2, to learn how to program these keys along with the function keys.

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 repeattttttttttt until you release them.

1.5   DMS-3/501 PORTS

The DMS-3/501 has several ports for connecting the station to various devices (printers, modems, etc). In addition to the HiNet Network Serial Port, 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. A secondary CRT screen can be attached to this port 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 DMS-3/501 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 5 for information about connecting Printers and Modems to these ports.

1.6 **MAINTENANCE**

The DMS-3/501 requires simple but periodic maintenance. The CRT screen 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 DMS-3/501'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 DMS-3/501 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-inch Diskette Head Cleaning Kit from a
computer store. Follow the directions that come
with the kit carefully.

HARD DISK

The Hard Disk does not need any mainten-
ance. 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 THE DMS-3/501

-------------------WARNING--------------------
Moving the DMS-3/501 could possibly cause damage
to the Hard Disk. This could result in a loss of
data. Before moving the DMS-3/501 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 (see Section
5, Volume 2.).

Before moving the DMS-3/501 at any time, follow these steps:

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

● Always guard against sudden mechanical shocks to the DMS-3/501. 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 the DMS-3/501 for a long distance, follow these additional steps:

● Backup the Hard Disk partitions onto Floppy Disks.

● 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.

The following sections outline INSTALL's steps
that set up the Master's Hard Disk. ALLOC and
USERS are not handled by INSTALL. You will be
instructed to use these two utilities when
necessary.
```
--------------------------------------------------
```

     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 work-
stations. 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 liscense. (You do have the
alternate choice of purchasing a new CP/M-86
from Digital Research but it must still be
prepared by DMS.)

```
----------------------------------------------------
```

    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 these utilities to the Master's
Hard Disks.

    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-3/501 from the INSTALL #1
diskette, insert the 5.25-inch diskette in the
disk drive. Hold in the Interrupt button 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.

Here is a summary of the steps that INSTALL
will lead you through. Details of these steps
are given in the following Sections of this
chapter.

FOR A NEW HINET MASTER --INITIAL

INSTALL #1 DISK

1. For a new DMS-3/501 MASTER, the Hard Disk
must be formatted. INSTALL calls the 5HDHELP
program. You must select option 1. Initialize
the firmware when format is complete.

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 adds all types of 8-bit worksta-
tion BIOSs to the Network. It handles worksta-
tions 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 8" Hard Disk.

5. Adds BIOSs for all current DMS 16-bit
workstations to 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.
INSTALL will outline the remaining steps that
are needed to allocate disk space and link User
Names to operating systems.

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.

   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 distribu-
tion diskette to a Hard Disk partition.

   Save the ALLOC Table modifications to the
Hard Disk. Any new partitions will be formatted
for the correct operating system. Exit ALLOC and
Boot the Hard Disk.

Release program
releases write ownership

INSTALL #5 -- HINET NETWORK UTILITIES

12. Insert the INSTALL #5 disk in the Floppy
Disk Drive. Run the new USERS program to link
User Names with operating systems.

13. PIP all of the files from INSTALL #5 to the
CSYSTEM partition. (A>**D:PIP A:=D:*.*[VO <CR>**)

COPY UTILITIES FROM OTHER DISKETTES

14. 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. The INSTALL #2 diskette contains
Digital Research assembly programs 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.

15. PIP from the INSTALL #3 diskette the
FILECOPY.COM utility (if you purchased MS-DOS)
(A>**PIP A:=D:FILECOPY.COM<CR>**) PIP the file
PCPRINT.COM to the CSYSTEM partition if you
will have an HiNet Adapter Card on the Network
(in an IBM PC or COMPAQ computer).

16. PIP from INSTALL #4 diskette **CUST*.*,**
MAIL.COM and **TRANSFER.COM** to the CSYSTEM

partition. (CUSTOMIZ files, E-MAIL and PC-DOS
file transfer program.)

17. Use FILECOPY to transfer all of the MS-DOS
utilities on the INSTALL #3 diskette to the
MSYSTEM partition. 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>**

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 with 5HDHELP 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 5HDBACK program.

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.

THE DMS-3/501 AS A NETWORK WORKSTATION

To use a DMS-3/501 solely as a Network workstation you need to format the Hard Disk

and initialize the firmware with 5HDHELP. Use
ALLOC to create HIDOS partitions. (The DMS-3/501
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 login on the
DMS-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.

THE DMS-3/501 AS A STAND-ALONE COMPUTER

To use the DMS-3/501 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.

2.2 USING 5HDHELP

5HDHELP is a program that will format the
Hard Disk and load the controller software.
To do its work, it will request information
about the DMS-3/501 (e.g., the size and the
manufacturer of the Hard Disk). 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 5HDHELP, the questions and the
choices for the answers will be given.

To call up 5HDHELP, type its name after the
A> prompt and press RETURN. The program will
respond with:

```
A>5HDHELP <CR>

DMS-15 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.

     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 SECTOR TABLE

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

     If you are redoing the entire allocation
table or starting with a blank Hard Disk you
will want to 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--if the DMS-

3/501 is a HiNet Master--the USERS and ALLOC
Tables. If you are changing partitions 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.

LOADING CONTROLLER FIRMWARE--MENU OPTION 2.

    Occasionally it might be necessary to load
new Hard Disk Controller Firmware onto a DMS-
3/501's Hard Disk. The 5HDHELP menu's selection
number 3 will perform this function independent
of formatting the Hard Disk. Make sure that you
first enter the correct make and type of the
Hard Disk that is in your DMS-3/501.

2.3   SYSUP--UPGRADING PARTITION ZERO

    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 running the SYSUP utility. Should
something interrupt the program before it is
finished, most of the data on the Hard Disk may
not be accessible. You will have to restore
Partition Zero with the 5HDBACK program before
attempting to use SYSUP again.

--------------------NOTE--------------------
EXPAND is a program that increases the size of
Partition Zero from 256K to 512K. This expansion
may be necessary if all four operating systems
are required on one Network (HIDOS, CP/M-80 2.2,
CP/M-86 an MS-DOS). A Network with any three
operating systems will not need to be expanded.
EXPAND may be needed if new workstations are
added in the future. In this case, the INSTALL
program will call upon EXPAND to increase the
size of Partition Zero.

When INSTALL calls the SYSUP utility you
will not have do to anything to control it.
Do not run the SYSUP program by itself.

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,
2) login 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 ⬧X 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 tthe 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:

Station Serial Number - xxxxxxxx Product type-xx

Enter the 8 digit seri_l number into the MACHINE
Table exactly as it appears.

---------------------NOTE--------------------
All 16-bit workstations must have updated (new)
PROMS that are configured for separated boot.
Older PROMS will not boot on the new Network. (A
PROM is a Programmable Read Only Memory chip
located on the CPU board inside the
workstation.)

    DMS-4 workstations with DSC-86 CPU boards
will not be able to use the Separated Boot
Network. If you have this type of workstation
please contact Digital Microsystems for details.

8088 (16-BIT) WORKSTATIONS:
DMS-816

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

Station Serial number-XXXXXXXX Product Type-07

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

contact your dealer or Digital Microsystems for
replacement PROMs.

THE MACHINE PROGRAM MENU

        The MACHINE program can be run when the
Network is up or when the Master is booted from
a Floppy Disk. MACHINE can be password protected
(see Section 2.8). However, when installing the
new software for the first time there will be no
password. When the MACHINE program is invoked,
it will present a menu of options:


```
Choose one of the following:

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


        Be careful not to delete or alter an active
workstation's serial number, console or printer
assignments when the Network is running. It could
cause problems for the User on the affected
workstation.

ADDING A WORKSTATION TO THE MACHINE TABLE

        To ADD a workstation to the MACHINE Table
use the A option. The program will list out all

of the available DMS workstations and their
codes. The program will then ask the following
questions:

A listing of all possible DMS workstations.

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

Enter the Serial Number of the new workstation -->

Enter Serial Number again for verification:

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

After each name in the list of workstations is
an abbreviation. Enter the appropriate
abbreviation in response to the question "Which
model code of machine would you like to add to
the list?".

Next, enter the PROM Serial Number for the
workstation. Be sure to enter all eight digits
even if they are zeros or letters. (The serial
number is in Hexadecimal notation.)

Enter the console assignment in response to
the third question. Type Y to accept the default
assignment, the keyboard and CRT. Entering N for
'No' will display a list of possible
alternatives:

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

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

PARALLEL PORT 1 (BAT:) -- the default for the
DMS-5000 series workstations.

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

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

     After you have selected a console
assignment, the MACHINE program will display a
menu of possible printer assignments. Not all
workstations can use all of the available
selections. Here is a complete list:

```
Choose a printer type:

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

Enter your choice -->
```

Enter the number for your choice of printer assignment.

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

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

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

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

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

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.

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 screer.

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 table in
Partition Zero on the Hard Disk.

2.5 ALLOCATE PARTITIONS

Now that you have chosen which operating
systems will be on 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.

There are many considerations that 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 first be zeroed of all entries.
(Use the Z menu option.) As long as there are no
partitions after the default CSYSTEM partition
with data files in them, 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 can be remedied by going
back with 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 ADD a new partition. When
you select this option, the program automati-
cally checks to see if there is room on the Hard
Disk to create another partition of at least 256
Kbytes (the smallest size). If there is storage
space available on the Hard Disk the following
dialogue will be displayed as you enter the
partition's parameters:

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

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

Here is the partition that you have created:

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

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

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

The preceding ALLOC dialogue created a new partition named MSYSTEM that is 1 Megabyte in size. No password was set for accessing the partition. 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 para-
meters 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 at 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 there
is no provision to change the partition's size
in the Modify option.

The type of operating system that is linked
to a partition cannot be changed unless you are
willing to lose all of the data in the
partition. Changing the operating system
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 and then 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 <u>unless</u> 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
- Log in 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, HIDOS (or CP/M 2.2) 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. Workstations with 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. See Volume
2, Section 2.)

   When a default drive is assigned to a
partition that is OWNABLE, the USERS program
will ask whether or not the user wants the
partition write-enabled for him or her
immediately upon login if no one owns it
already.

   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 Carrige 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. It will look something like this:

```
                                          O.S.
NAME    PASSWORD    A      B      C      D      TYPE     KIND
------------------------------------------------------|------
JAKI    HELP      JAKI2  JAKI1  REPLY  MSYSTEM   MSDOS    FULL
   Log in command-->C:^MA:CUSTOMIZ FRENCH^M

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

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>

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 CP/M FILES

-----------------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 be on one
partition it 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>**

For Networks that have MS-DOS, there are
three files on diskette #4. If you do not have
MS-DOS do not bother to copy these files to the
Hard Disk. The files PC2M501.COM, PC2S501.COM
and PC2SFOX.COM can be copied to the CSYSTEM
partition with the command:

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

INSTALL # 6 -- Copy all CP/M-86 files to
either the CSYSTEM partition or to a special
CP/M-86 storage 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>**

2.7.3   COPYING PC-DOS FORMAT DISKETTES

MS-DOS (PC-DOS) software that is not purchased from Digital Microsystems and that is written for IBM-PC compatible microcomputers can be transferred to the Network's Hard Disk with the TRANSFER program.

The TRANSFER program copys every track from a PC-DOS or MS-DOS formatted diskette to the designated Hard Disk Partition. It will overwrite anything else that is in the partition. Therefore, you may want to have a special 512K MS-DOS partition (e.g., MSCRATCH) that can be used solely for this purpose. When the diskette is copied to the partition, use the MS-DOS COPY utility to recopy the files to another partition (such as MSYSTEM).

The TRANSFER program amkes an internal assignment to the MS-DOS partition that is specified in the command line. The Floppy Disk Drive does not have to be assigned to a local drive; TRANSFER assumes that the diskette is in Drive 0 (zero) on the DMS-3/F or DMS-3/501.

Follow these steps to copy PC-DOS format software to a Network partition. To begin the copying process, insert the PC-DOS diskette into the left-hand disk drive and enter the command line:

TRANSFER (MS-DOS PARTITION NAME) <CR>

where (MS-DOS PARTITION NAME) is the name of the partition you wish to transfer the software onto. The program dialogue looks similar to this:

```
A>TRANSFER MSCRATCH <CR>

IBM PC format floppy disk to DMS Network Hard
Disk copy program. Version x.xx

-It copies from MO to the requested Hard Disk Partition

-IT WILL COMPLETELY OVER-WRITE THE DESTINATION PARTITION

Insert an IBM diskette into disk drive O, then strike any key.

Data will be transfered to drive C: from a double
sided floppy with 512 bytes per sector and 9 sectors per track.

Is this what you want? yes

Beginning Transfer, DO NOT INTERRUPT!

side:x    track:xx    records:xx

-IBM PC to DMS Network copy is complete.
-Please re-assign drive C:
```

Once the transfer of data has begun, do not
interrupt the program. An incomplete transfer
may show a directory in the partition but some
or all of the files will be missing.

Remember that since the TRANSFER program
writes every track from a PC-DOS or MS-DOS 48
TPI format diskette to a Hard Disk partition,
everything else that is in the partition will be
overwritten.

will also look different to the DIR program. For
example, if the partition size is 512 Kbytes and
you copy a diskette with only 320 Kbytes of
storage, the DIR program will report that the
partition size is only 320K not 512K. Under
these circumstances, this is normal and does not
create any problems. The size reported by DIR
and CHKDSK (an MS-DOS utility) will vary
depending on the storage capacity of the PC-DOS
diskette that was copied to MSCRATCH.

IMPORTANT---Once the program diskette is copied
to the MSCRATCH partition you must access the
files from an MS-DOS workstation. If the
workstation is already assigned to MSCRATCH it
will not be able to "see" the new directory of
the MSCRATCH partition. You must reassign the
drive to MSCRATCH to update the directory in the
workstation's memory.

-----------------------NOTE---------------------
If the TRANSFER program is interrupted make sure
that you reassign drive B to a HIDOS partition
before proceeding. An accidental write from CP/M
to an MS-DOS partition can ruin the MS-DOS
directory; all of the files in the partition may
be lost.

A PC, such as an IBM PC (XT) or COMPAQ
portable computer, with a HiNet Adapter Card can
also transfer PC-DOS software to the Network.
Use the MS-DOS COPY program to copy form the
local disk drive to the Network partition. No
special program, like TRANSFER, is needed.

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 emmissions 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 always be 100% accurate with a
staple gun, it is recommended that only special
wide-span guns 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.

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 gently take the connector
apart.
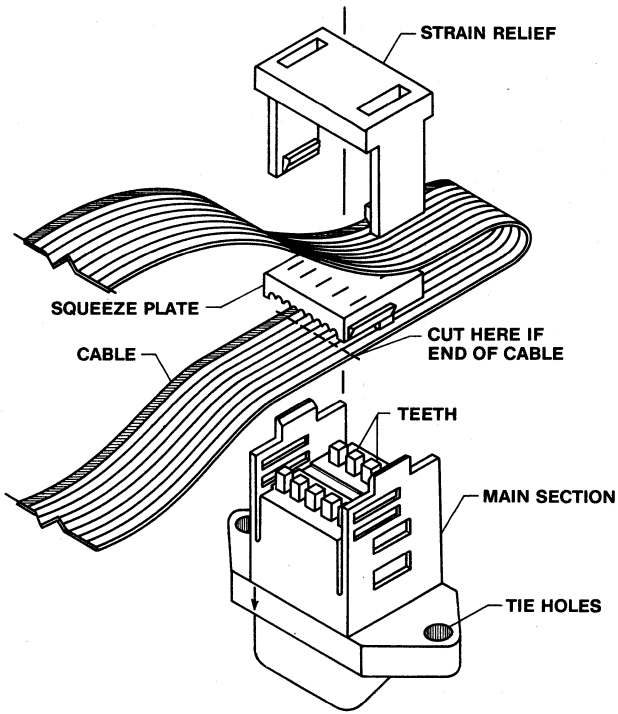--

FEMALE

MALE

TIE HOLES

MALE AND FEMALE CONNECTORS

STRAIN RELIEF

SQUEEZE PLATE

CABLE

CUT HERE IF
END OF CABLE

TEETH

MAIN SECTION

TIE HOLES
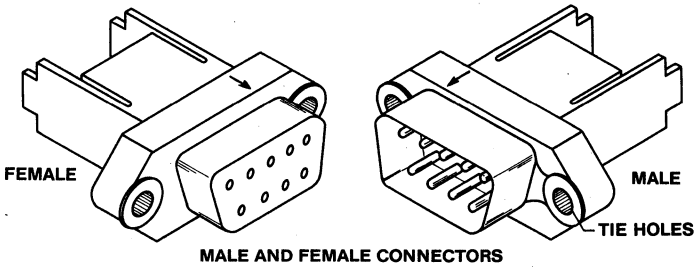
DIAGRAM A
EXPLODED VIEW OF SQUEEZE-ON CONNECTOR

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.
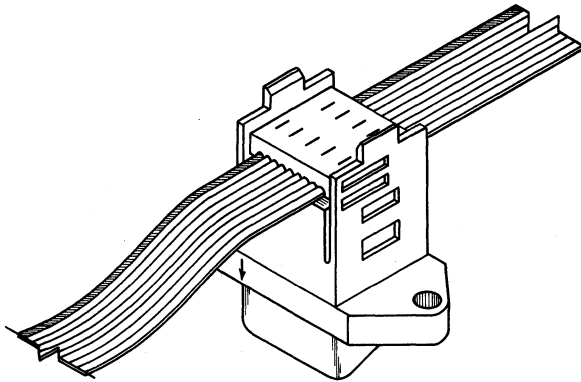
DIAGRAM B
CONNECTOR WITH CABLE SQUEEZED ON

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.
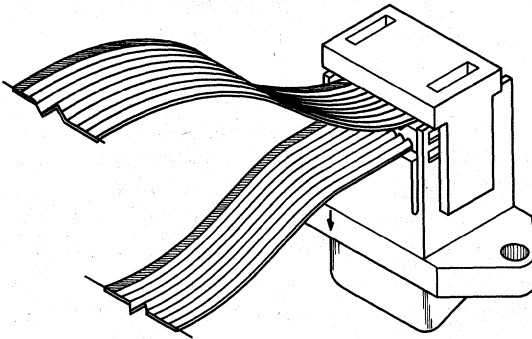
DIAGRAM C
COMPLETED CONNECTION

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.

FRONT
(MALE)

SOLDER
WIRES
TO
HERE

BACK
(MALE & FEMALE)
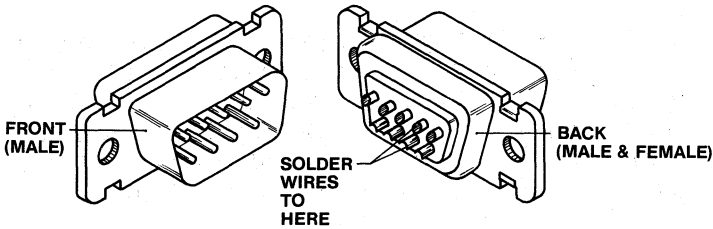
DIAGRAM D
SOLDER ON CONNECTOR

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)**.

MALE   FEMALE

BLACK
WHITE
BLACK
RED
SILVER
SHIELD

REAR VIEW
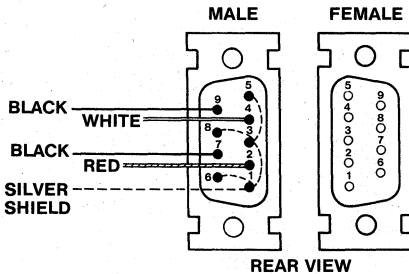
DIAGRAM E
WIRING DIAGRAM

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 insula- tion 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.
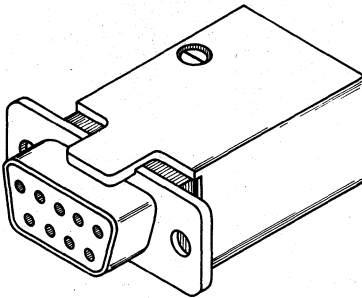
DIAGRAM F
TERMINATOR (FEMALE)

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 and 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

     W      M     W              W      W     W
 T._/\____/\____/\___.R.___/\____/\____/\_.T

  <------ 1000' Max ---> <--- 1000' Max -->
```
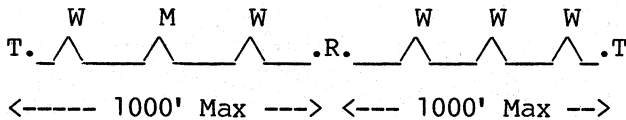
M-Master Computer, W-workstation, R-Repeater, T-Terminator, .-End of Cable,
/\-Connector attached to middle of cable.

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.

```
                              W    W    W
                              _/\__/\__/\_.T (or R)
              Term. On       /
                            /
    M    W    W    R./  W    W    W
  T._/\__/\__/\__/\__/\__/\__/\_.T (or R)

         Term. Off
    <----------- 1000' Max ------------->
```

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

3.6   PLANNING NETWORK CONFIGURATION

GENERAL PRINCIPLES

     1-   No more than 63 workstations may be
operational 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.

```
     M    W                        W    W W
T._/\___/\__.R.==========.R.___/\___/\___/\_.T
   Ribbon        Belden           Ribbon
      (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':
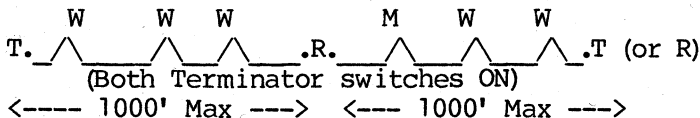
```
    W     W   W           M    W    W
 T._/\_____/\__/\____.R.___/\____/\____/\_.T (or R)
     (Both Terminator switches ON)
 <---- 1000' Max --->  <--- 1000' Max --->
```
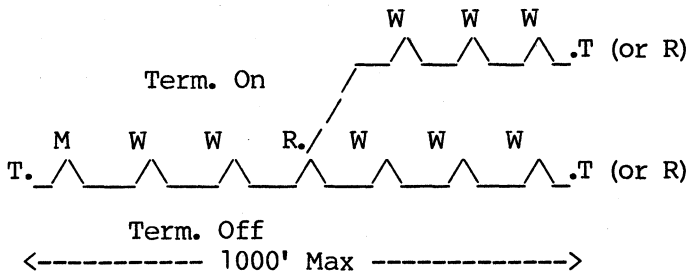
M-Master Computer, W-workstation, R-Repeater,
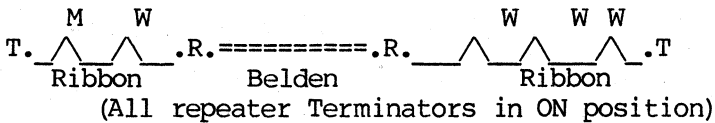T-Terminator, .-End of Cable,
/\-Connector attached to middle of cable.

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)
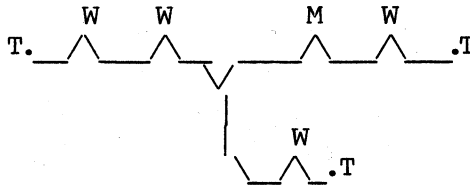
```
        W       W           M       W
   M._ /\ _ /\ _      _ /\ _ /\ _.T
        CORRECT      |  |    W
        LOOP         |  |_ /\ _|
                     |_____|
```

```
       (Term. Off)
        W    W    W        W    W    M    W    W
   T._ /\ _ /\ _ /\ _   _ /\ _ /\ _ /\ _ /\ _ /\ _.T
                      \ /
        CORRECT        R.
        BRANCH        |  W       W       W
                       \_ /\ _ /\ _ /\ _.T
   (Term. On)
```

```
              W    W         M    W
        T._/\__/\_  __/\__/\__.T
                   \/
INCORRECT           |
BRANCH              |    W
                    \_/\_.T
```
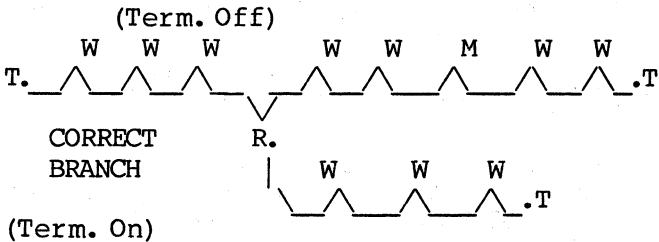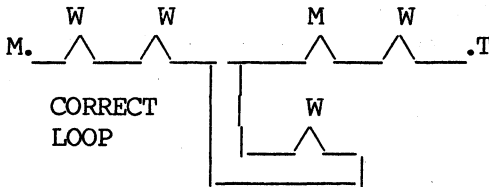
M-Master Computer, W-workstation, R-Repeater,
T-Terminator, .-End of Cable,
/\-Connector attached to middle of cable.

     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, it is best to plan the Network
using a floor plan. As new workstations and
cables are added to the Network, the floor plan
should be updated to reflect these changes.

     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 (length) in the loop
so that people can move the equipment or change
the position of their desk.

4.0   USING PRINTERS

4.1   INTRODUCTION

This section will cover installing a
printer on the DMS-3/501, setting up the SPOOLER
and using the SPOOL printer from a Network
workstation. A stand-alone DMS-3/501 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 DMS-3/501:

First you must make the physical link with
a cable between the printer and a serial port on
the back of the DMS-3/501's cabinet. This link
may include making alterations to the cable or
to a jumper block to make the signals that the
DMS-3/501 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 microcom-
puters. These cables may be purchased from
Digital Microsystems or from computer supply
stores. The ports on the back of the DMS-3/501
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 DMS-3/501 is 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 DMS-3/501'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 DMS-3/501 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 the computer or
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-3/501.)

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 applica-
tions 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 log in 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 standard-
zation 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 a 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
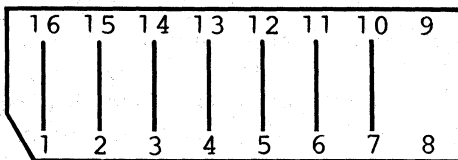
```
 _____
| 16  15  14  13  12  11  10   9 |   Top view of
|  |   |   |   |   |   |   |   |  |   standard
|  |   |   |   |   |   |   |   |  |   Jumper Block
\__|___|___|___|___|___|___|_____|
   1   2   3   4   5   6   7   8
```

(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
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

R T   C   R   D   D /2v 2ndary computer side
*   I   S   T   C   T. data*
*   R   P*

```
16  15  14  13  12  11  10   9
```

For the Texas
Instruments 810
and all Qume
Printers

```
1   2   3   4   5   6   7   8
```

T   R   R   C   D   D   D   Equalize
*   T   S   S   T   C   mode*
*   S   R   L   V*

```
16  15  14  13  12  11  10   9
```

For the NEC Spinwriter

```
1   2   3   4   5   6   7   8
```

```
16  15  14  13  12  11  10   9
```

For Microline Printers

```
1   2   3   4   5   6   7   8
```

```
16  15  14  13  12  11  10   9
```

For the Diablo 630

```
1   2   3   4   5   6   7   8
```

```
16  15  14  13  12  11  10   9
```

Teletype Model 40

```
1   2   3   4   5   6   7   8
```
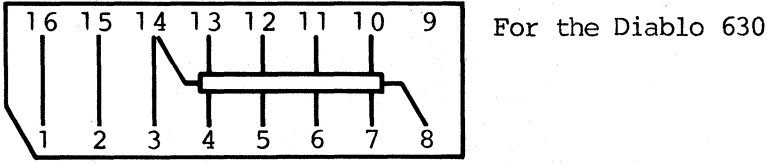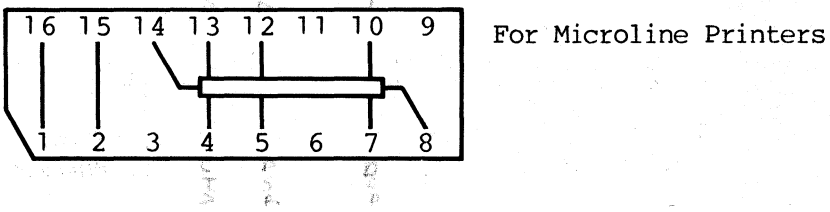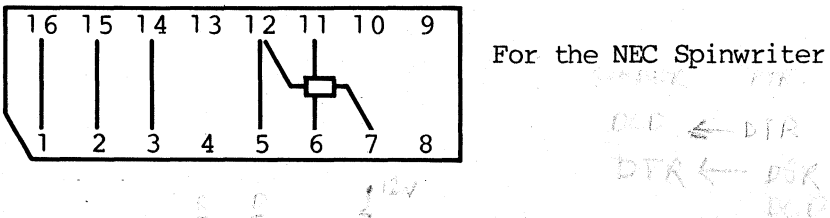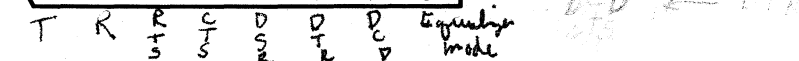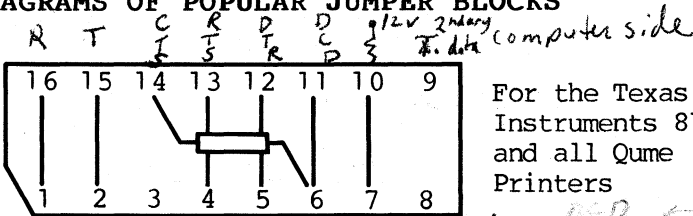
4.2.3   INSTALLING JUMPER BLOCKS

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

GREEN CIRCUIT BOARD

PORT 0 (FOR TERMINAL)   J1

PORT 1 JUMPER BLOCK

PORT 1   J2

PRINTER JUMPER BLOCK

PORT 2 (PRINTER PORT)   J3

MODEM JUMPER BLOCK

PORT 3 (MODEM PORT)   J4
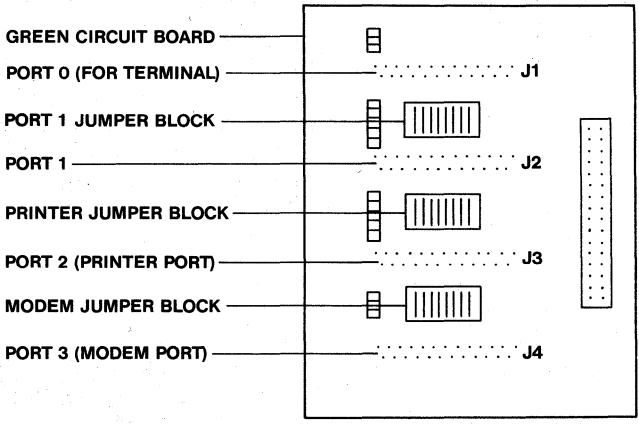
**INSIDE VIEW OF SERIAL PORT I/O BOARDS
DMS-3, DMS-3/F, DMS-4, DMS-15**

PORT 2   PORT 3

HINET PORT

PORT 0

PRINTER   MODEM
JUMPER   JUMPER
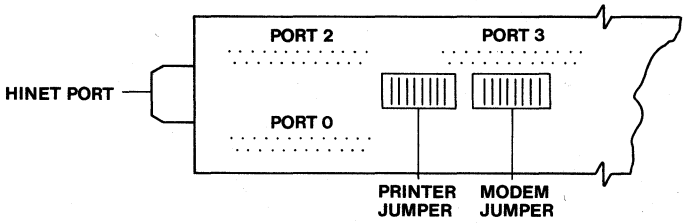
DMS-3/B, DMS-86 I/O BOARD

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 <u>empty</u> one).

--------------------WARNING--------------------
PRTSPOOL can be used <u>only</u> 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 deter-
mines 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 nad
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 worksta-
tion 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 environ-
ment (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.

-----------------------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 associated 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 applica-
tions 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 com-
puter jargon a **CTRL C** is called a 'Warm Boot'
and it is often used to exit programs or re-
start 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 automati-
cally. However, if your Spool Printer is operat-
ing 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 proc-
essing 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> <u>setbaud</u> <u>2</u> <u>9600</u>

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 U̲ 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 F̲, 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 <u>Q</u> 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

```
To   : DUNN          From: BOSS
Date : 4/01/83       Time: 11:44
------------------------------------------------

Got your ridiculous demand for a raise.

Showed it around; received uproarious

laughter. Consider yourself out of a job.

Sincerely yours. April Fool's Day, 1983.
------------------------------------------------

[DEL]ete            [I]mmediate response  [R]esponse required
Category [1-7] ɔ    [N]ext message        [W]rite message to file
toward [F]ront or [E]nd  [Q]uit           WHICH? [ ]
```

        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 screen-
ful of it will be shown. To see the next screen-
ful, 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.

Boot Network -- 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.

Boot Hard Disk -- 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 Floppy Disk -- 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.

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.

Boot -- see Warm Boot, Cold Boot.

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

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

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.

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.

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.

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.

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.

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.

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.

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.

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.

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. It is very
    important to keep backups of Partition Zero at
    all times.

Port -- A port is an 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 pin carries 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.

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.

Saving -- The process of transferrign 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.

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 -- The portion of RAM in a
   computer that is available for storing parts of
   applications programs and data files. The TPA
   requirement is an important consideration when
   selecting software and hardware. 16-bit
   workstations have more TPA available for large
   programs. 8-bit workstation 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.

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.

WRUNO -- 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.

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.

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   Sets the screen one increment brighter.

(L) ESC d   Sets 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 DMS-3/501 JUMPER PINS

WARNING!——The DMS-3/501 cabinet 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 DMS-3/501
and wait two hours before dismantling the
cabinet.

CABINET DISASSEMBLY

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
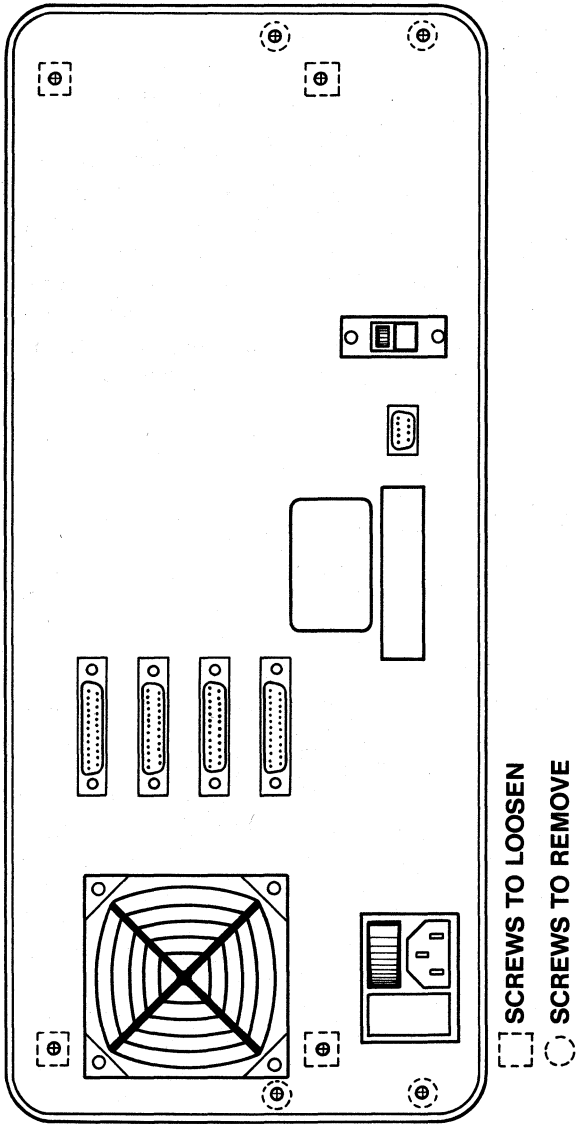
REMOVING THE UPPER AND LOWER CASINGS

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 as far as you have to go if you are only
going to be changing the I/O 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.
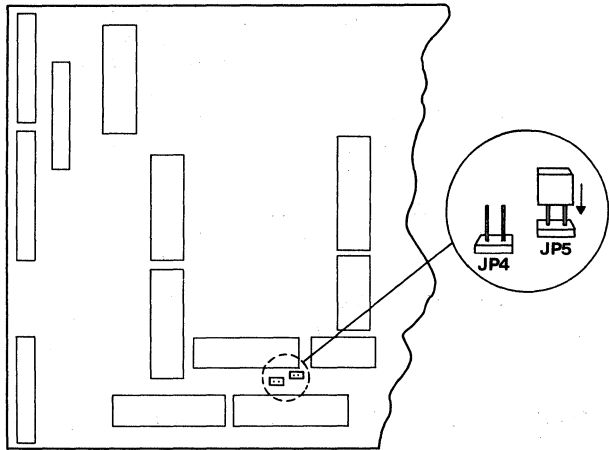
JUMPER PINS ON CPU BOARD
Boot Hard Disk
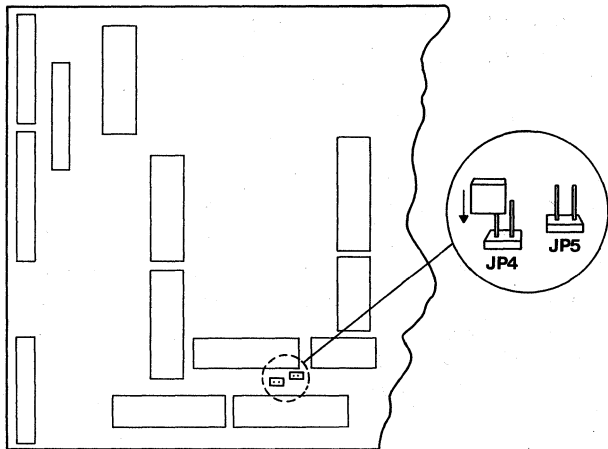
JUMPER PINS ON CPU BOARD
Boot Floppy Disk

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.

CHANGING THE DMS-3/501'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 DMS-
3/501 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 DMS-3/501 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
DMS-3/501.

REASSEMBLY

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.

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)

```
                  Serial port 2 (I/O board connector J3)
     --------------------------------------------------------------------
     : I/O board  :    I/O Board   : J5 on I/O brd :    ZSBC 3/4        :
     : DB25S (J3) :  jumper block  : J1 on ZSBC3/4 : 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  :    I/O Board   : J5 on I/O brd :    ZSBC 3/4        :
     : DB25S (J4) :  jumper block  : J1 on ZSBC3/4 : 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.

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