DIGITAL SWITCHING SYSTEMS

DMS*-100 FAMILY

DISK MAINTENANCE SUBSYSTEM
REFERENCE MANUAL

* DMS is a trademark of Northern Telecom

CONTENTS

FIGURES

TABLES

1. ABOUT THIS DOCUMENT

1.01   This practice describes the disk maintenance subsystem of
        DMS-100 Family offices.   It provides a brief overview of
the hardware components of both the 8-inch and 5.25-inch disk
drive units (DDU), discusses commands and displays available at
the Maintenance and Administration Position terminal, and gives
examples of operation procedures.

APPLICABILITY OF THIS DOCUMENT

1.02   Northern Telecom (NT) software releases are referred to as
        batch change supplements (BCS) and are identified by a
number, for example, BCS29.

1.03   This document applies to DMS-100 Family offices that have
        BCS32. Unless the document is revised, it also applies to
offices that have software releases greater than BCS32.

1.04   More than one version of this document may exist.   To
        determine which version applies to the BCS in your office,
check the release information in the Northern Telecom Publica-
tions Master Index, 297-1001-001.

REASON FOR REISSUE

1.05   This 08.01 release has been revised to include the
        5.25-inch disk drive unit (DDU).

SOFTWARE IDENTIFICATION

1.06   The Office feature record D190 lists your current BCS and
        the NT feature packages that it comprises. To view simi-
lar information on screen, enter the following command string at
a MAP terminal:

        PATCHER;INFORM LIST;LEAVE

ENTERING COMMANDS AND PARAMETERS

1.07   In this document, commands, parameters, and responses are
        represented according to the following conventions:

CAPITAL letters or special characters	show constants, commands, or keywords that the system accepts when entered as written.
lowercase letters	show a user- or system-supplied parameter. Definitions are given for each parameter.
Brackets [ ] or [ ]	enclose optional parameters. A vertical list enclosed in brackets means that one of the parameters may be selected.
Underlined parameter	is a default. If no choice is entered, the system acts as though the underlined parameter had been entered.
Underscore connecting words	means the words are to be treated as one item, for example, pm_type or #_one_two.
..	indicates repeated steps or items.

In addition, the following conventions are used.

n (lowercase n)	is a number from 0 to 9.
a (lowercase a)	is a letter from A to Z.
h (lowercase h)	is a hexadecimal integer from 0 to F.

WHERE TO FIND INFORMATION

1.08   Documents that you require to understand the content of this document or do the tasks it describes are referred to in the appropriate places in the text. These documents and others that contain related information are listed in this section.

Note: More than one version of these documents may exist. To determine which version of a document applies to the BCS in your office, check the release information in the Northern Telecom Publications Master Index, 297-1001-001.

Prerequisite References

DOCUMENT NUMBER	TITLE
297-1001-110	Maintenance and Administration Position
297-1001-513	Input/Output Devices Man-Machine Interface

Informative References

DOCUMENT NUMBER	TITLE
297-1001-001	DMS-100 Family Master Index of Practices
297-1001-310	Table Editor Reference Manual
297-1001-312	Device Independent Recording Package (DIRP) User Guide
297-1001-450	Provisioning
297-1001-451	Common Customer Data Schema
297-1001-500	Index to Switch Maintenance Performance Oriented Practice
297-1001-510	Log Report Manual
297-1001-520	Maintenance System Man-Machine Interface Description
297-1001-524	Remote Data Polling System Description and Man-Machine Interface
GS1X55	Disk Drive Controller
GS1X78	Disk Store Power Converter

2. DISK DRIVE UNIT DESCRIPTION

2.01   A disk drive unit (DDU) is a device used to store and
        retrieve digital multiplex system (DMS) information.   The
DDU is part of input/output devices (IOD) subsystem and resides
in an input/output equipment (IOE) frame. An IOE frame can have
a maximum of two DDUs.

2.02   The   storage   capacity of a single DDU is 220 Mbytes.   The
        type of information stored on a DDU includes   the   follow-
ing:

*   office image, that is, back-up

*   non-resident commands

*   automatic message accounting (AMA), that is, billing records

*   operation measurements (OM), that is, traffic reports

*   journal file (JF), that is, data modification records

*   station message detail recording (SMDR)

2.03   A DDU consists of an 8-inch or a 5.25-inch disk drive and
        a power converter (NT1X78) located on a dedicated shelf of
the IOE frame.   The power converter supplies +5 V dc and +24 V dc
to the DDU.   With each DDU is a disk drive controller card
(NT1X55) located on the input/output controller (IOC) shelf.   The
disk drive controller card is the interface between the IOC shelf
and the DDU.

DISK DRIVE UNIT HARDWARE

2.04   An 8-inch or a 5.25-inch DDU consists of the following
        hardware components:

*   one disk drive shelf (NT4X00AF), which holds a maximum of two
     8-inch or two 5.25-inch disk drive units

*   one disk drive controller card (NT1X55) for each 8-inch or
     5.25-inch disk drive unit

*   one disk drive power converter card (NT1X78) for each 8-inch
     or 5.25-inch disk drive unit

*   one to two 8-inch (model 8211D-19) disk drives or one to two
     5.25-inch (model Seagate ST4883E or model Maxtor XT4380E)
     disk drives

2.05   The disk drive consists of a spinning platter,   or disk,
        and a moveable read/write (R/W) head.   The two surfaces of
the disk are covered with a magnetic recording medium, func-

tionally similar to that used on magnetic tapes.   Figure 1   on
page 10 illustrates some concepts of disk organization.

2.06   As   the   disk   spins,   the head either reads data from, or
        writes data onto the area of recording surface that passes
under it.

2.07   Data is recorded on the disk in rings, or tracks.   These
        circular tracks begin and end at the same point. They do
not spiral towards the center, as the grooves on a phonograph
record.   The surface of the disk is therefore divided into many
tracks, at various specific distances from the center.

2.08   Different locations on the disk are accessed by moving the
        read/write head towards or away from the center, as
required.   Since the disk is spinning, an entire track can be
read once the head is positioned over it.

2.09   In order to further specify the position of data on the
        disk, the surface is also divided into pie-shaped wedges
called sectors. Each sector of each track represents a 1K (1024
byte) block of data storage capacity.   Therefore, relatively
small amounts of specific information can be rapidly accessed
because the track and sector location, or address, is known.

FILES ON DISK

2.10   Storage space on a disk is allocated on the basis of vol-
        umes and files. Before a DDU is put into service, it is
divided into volumes, in a process known as allocation. The size
of the volumes is determined by the user, and can range up to the
entire remaining capacity of the disk or 64 Mbytes, (65,535
blocks) whichever is smaller.   Once allocated in this fashion,
the required number of whole tracks and sectors of tracks are
reserved for each volume.   Because these assignments are done
sequentially, volumes cannot easily be expanded after they have
been allocated.

2.11   The many factors affecting the selection of volume sizes
        are considered during the Office Engineering process.
Refer to 297-1001-450 for further information.

2.12   When volumes have been defined, through the allocation
        process, it is no longer necessary to consider the disk as
a whole. Files are created on specific volumes, and each volume
is treated as an independent entity.

2.13   As files are created, the data is stored wherever space is
        available, within the confines of the volume.   This can
result in different pieces, or segments of a file being distrib-
uted throughout a volume. Up-to-date charts of the space utili-
zation within the volume and the contents are maintained on the
DDU. If a file is expanded after it is created, the new file
segments   are simply put where space is available, and the space

```
|<- - - - - - - - - -One Sector - - - - - - - - ->|
|                                                  |

                    ** *  *  **
              **          A          **
          **             "               **
       **               "                   **
    **          .      "        .              **
   )            .     "          .            (
**   )       .       "             .        (    **
   )  .              "                     (  <- -┐
   )                 "                     (       │
    )          .     "       .           (        │
     )           .    "       .         (   <-Tracks
      )           .    "        .      (          │
       )           .   V          .    (          │
        )                             (           │
         )                           (            │
          )                         (    <- - - - ┘
           )              .         (
            )           .      .   (
             )  .              .  (
              )                  (
   <==         )               (      <==  Rotation
      <==       )             (    <==        of
         <==     )           (   <==         Disk
                  )    . .  (
                   )  .    . (
                    )      (
                     )    (
                      )   (
                       ) (
                        ) (
                         )(
                  )  (
                    +

                                 ┌One Sector ┐
                                  * * *
                             *           *
                         *   )       (   *
                         *    )       (    *
                          *    )     (      *
                             )   (
                         *    ) (          *
                         *      +          *
                               D I S K
                         *                 *
                           *             *
                            *           *
                             *         *
                               * * *
```
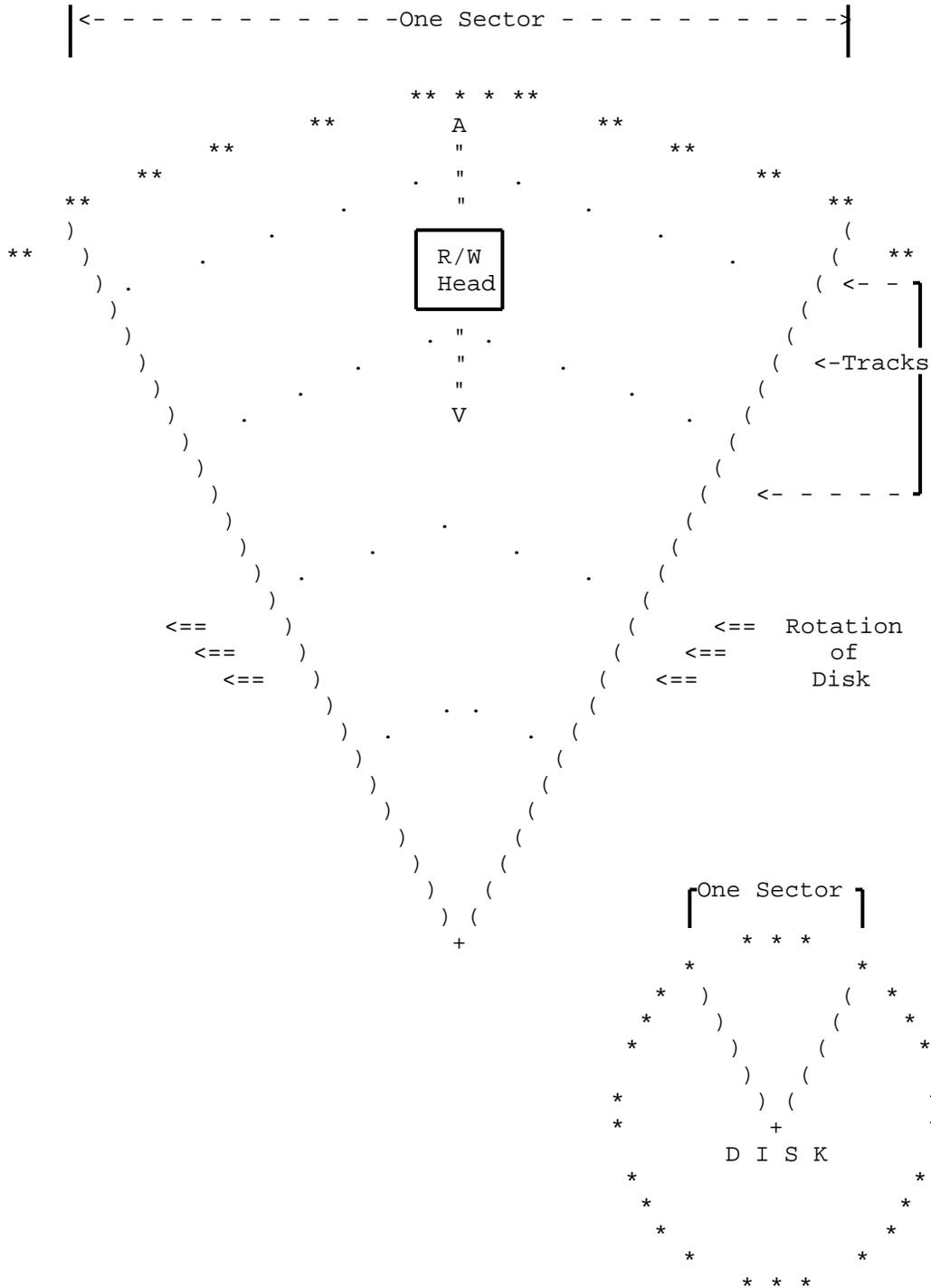
Fig. 1 - Disk Organization

charts are updated, so the information can be retrieved when
required.   When information is required from a file, the system

identifies the DDU, and the particular volume on which the infor-
mation is stored. The space charts for that volume are then
scanned, to determine where the various segments of the file are
located. The segments required can then be read, in the correct
order.

CONTROL TABLE

2.14   Disk Drive Units are datafilled, via the table editor, in
       table DDU. This table is described in 297-1001-451, sec-
tion 008, and the table editor is described in 297-1001-310.

ALARMS

2.15   There is one alarm condition associated with the DDU. It
       is the Disk Drive Unit Out of Service alarm.   When this
condition exists, the mnemonic code DDUOS, preceded by a single
digit indicating the quantity, appears at the MAP, under the IOD
maintenance subsystem header. If the DDU in question went out of
service as a result of system action, the DDUOS alarm is assigned
a severity of Major, displayed as M on line 3 of the MAP display.
If manual action resulted in the DDU being out of service, the
severity is assigned as Minor, displayed as a blank on line 3.
The DDUOS mnemonic also appears at the IOC level under the appro-
priate IOC number header.

MAINTENANCE

2.16   The maintenance requirements of the DDU are minimal.
       Since the drive mechanism and disk are sealed, no routine
cleaning or lubrication is required. Manual maintenance action
is limited to the following:

*   removing a DDU from service;
*   performing diagnostic tests on the DDU and its controller;
*   changing the controller or power converter card, as required;
*   returning the DDU to service.

2.17   Output reports (logs) generated by the Disk Maintenance
       subsystem bear the identification code DDU, followed by
three digits indicating the report number. DDU log reports are
described in detail in 297-1001-510.

SECURITY

2.18   During routine audits, the system verifies that the space
       chart for each volume can be updated and read without
error.   If difficulties are encountered, that particular volume
on the DDU is given Read Only status. This prevents further cor-
ruption and preserves the data in the files on the volume. When a
volume has been marked Read Only, either the file should be

copied to another disk or tape before reusing the in-error vol-
ume, or the drive should be disconnected and sent in for data
recovery.   Once the data has been recovered, the volume can be
reinitialized by using the disk allocation utility command
(DSKALLOC). If the discrepancy that was detected was a transient
one, the Read Only volume can be restored to Read/Write status by
making the DDU manual busy, and then returning it to service.
This causes the space chart to be verified again.

3.   COMMANDS, MENUS AND DISPLAYS

COMMAND AND MENU ORGANIZATION

3.01   Refer to Figure 2 on page 14. The disk maintenance com-
        mands are organized in four groups named IOC, DDU, DSKAL-
LOC and DSKUT, which operate as follows:

*   IOC, DDU.   These groups are part of the DMS-100 maintenance
     system, and are accessible by telescoping through the MAPCI,
     MTC and IOD levels, as described in 297-1001-520.   The com-
     mands that can be input at the IOC and DDU levels appear on
     the associated MAP display in order of their menu item num-
     bers.   The DDU level is subsidiary to the IOC level, and its
     menu is accessed via the CARD command on the IOC menu.

*   DSKALLOC, DSKUT.   These groups are individual software utili-
     ties which are not part of the maintenance system, do not
     display menus, and can be accessed directly from any level by
     entering the command DSKALLOC or DSKUT.   The commands associ-
     ated with each utility are listed alphabetically in Figure 2
     on page 14 beneath the group names.

DISPLAYS

3.02   At the MAP, three displays of status information are
        available. They are:

*   status of the IOC port to which the DDU controller is con-
     nected (IOC level);

*   status of the DDU controller card (IOC level);

*   DDU drive status (DDU level).

3.03   At the IOC level of the MAP telescoping process, illus-
        trated in Figure 3 on page 15, the display concerning the
DDU is presented as the status of the port to which the DDU is
attached. This display, fully described in 297-1001-513, appears
on lines 9 to 12 inclusive. The 'TYPE' displayed for the NT1X55
disk drive controller card is 'DDU'.   The mnemonic codes which
can appear to indicate the status of the ports are shown in
Table A on page 16.

```
                        CI
                        |
  +--------+            |
  |        |            |
  | MAPCI  |<-----------+
  |        |
  +--------+
      |
      v
  +----------+     <-->
  | MTC Menu |<------------>  +-------------+
  +----------+                |  DSKALLOC   |
                              | (Non-Menu)  |
  +----------+                +-------------+
  | IOD Menu |                |             |
  +----------+                | ADD         |
                              | DELETE      |
  +----------+                | DIRADD      |
  | 17.IOC   |                | DIRDEL      |
  +----------+                | DISPLAY     |
                              | QUIT        |
                              | REINIT      |
  +----------+                | UPDATE      |
  | IOC Menu |<-->            |             |
  +----------+                +-------------+
  | 0.  QUIT    |
  | 4.  LISTDEV |
  | 6.  TST     |
  | 7.  BSY     |
  | 8.  RTS     |             +-------------+
  | 9.  OFFL    |<-->         |   DSKUT     |
  | 14. TRNSL   |             | (Non-Menu)  |
  | 18. CARD    |             +-------------+
  +-------------+             |             |
                             | CLEARBOOT   |
                             | ERASEFL     |
  +----------+               | LISTVOL     |
  | DDU Menu |<-->           | QUIT        |
  +----------+               | RENAMEFL    |
  |            |             | SETBOOT     |
  | 0.  QUIT   |             | SHOWBOOT    |
  | 4.  LISTDEV|             | SHOWFL      |
  | 6.  TST    |             | SHOWVOL     |
  | 7.  BSY    |             |             |
  | 8.  RTS    |             +-------------+
  | 9.  OFFL   |
  | 11. START  |
  | 12. STOP   |
  | 15. STATUS |
  | 16. ALLOC  |
  | 17. FCNT   |
  | 18. CLRFCNT|
  |            |
  | (Non-Menu) |
  |  CLRBUFF   |<-->
  +------------+
```
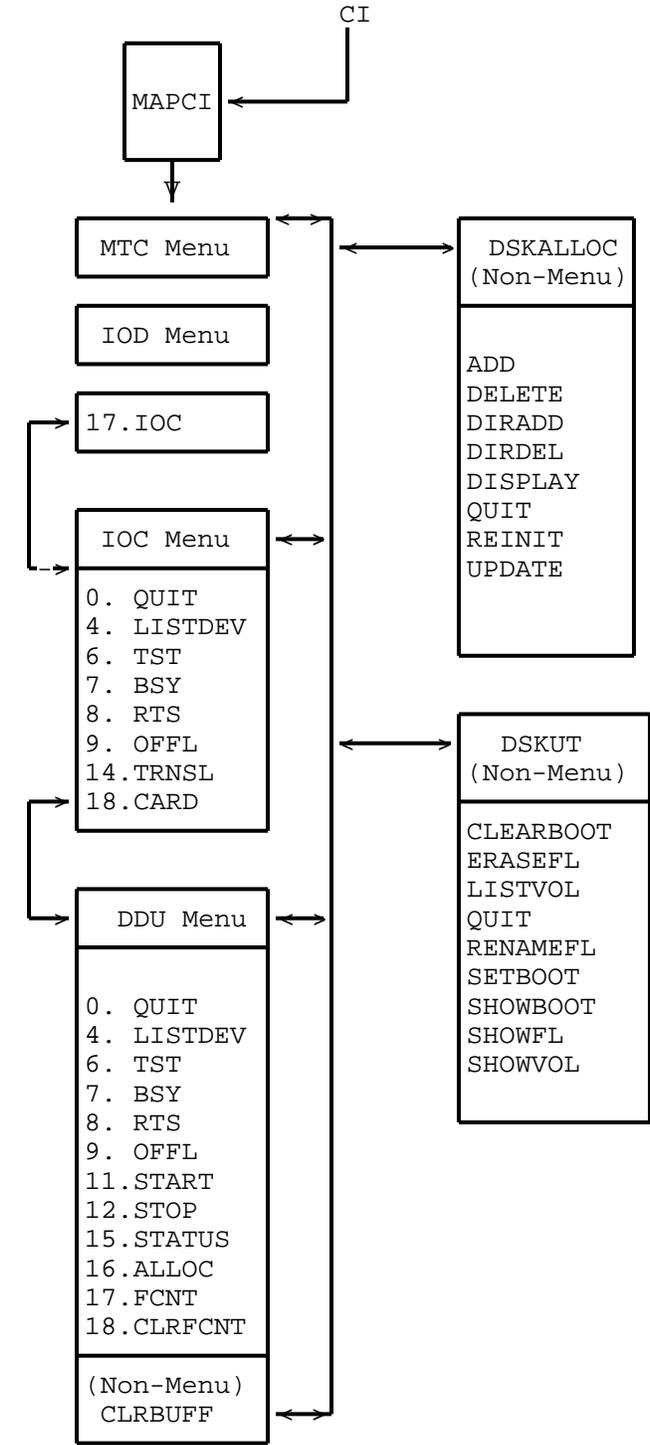
Fig. 2 - Disk Maintenance Command Organization

```
    CC       CMC       IOD      Net        PM       Lns       Trks      Ext
     *        *       1DDUOS     *         *                   *         *
                        M
IOC              IOD    IOC      0         1        2         3         4
 0 Quit    /           Stat      *       1DDUOS     *         *         *
 2         /
 3         / DIRP:      *      XFER:      *
 4 ListDev_/
 5         / IOC  Card    0     1     2     3     4     5
 6 Tst_    / 1    Port    0123  0123  0123  0123  0123  0123
 7 Bsy_    /      Stat    .---  ..SS  .---  SSSS  P---  SSSS
 8 RTS_    /      Type    MTD   Cons  DDU   Cons  DDU   Cons
 9 Offl_   /
10 _IOC    /
11 _Port_  /
12         /
13         /
14 Trnsl_  /
15         /
16         /
17         /
18 Card_   /
 User ID
    Time   hh : mm >
```

Fig. 3 - IOC Status and Menu Display

TABLE A
IOC PORT STATUS CODES

CODE   STATUS OF THE PORT

S   System Busy

M   Manual Busy

C   Central Control side (C-side) busy

P   Peripheral side (P-side) busy

O   Offline

*   OK, no faults exist

-      Unequipped

3.04   The IOC level display shows that the DDU is equipped
        through port 0 of its controller card. Therefore, the
mnemonic shown under the header for port 0 reflects on the DDU,
while ports 1,2, and 3 are always shown as unequipped (-).

3.05   The controller card for a DDU is selected for display by
        entering the command 'CARD' followed by the appropriate
card number. The DDU level menu and card status display illus-
trated in Figure 4 on page 17 appears on the screen. Read hor-
izontally, lines 15 through 17 display information concerning the
DDU. On line 15, the IOC card number (4) for the NT1X55 control-
ler card, and the number (1) of the DDU appear. On the next
line, beside the label 'User' the word SYSTEM is displayed.
Finally, on line 17, the status of the DDU controller card is
shown beside the label 'Status'. Possible system status codes
are shown in Table B on page 18. Beside the 'user' and 'status'
information fields is the field headed 'Drive_State'. Informa-
tion is read vertically (displayed beneath the header), and pos-
sible drive state codes are described in Table C on page 19.

```
  CC      CMC      IOD     Net       PM      Lns       Trks      Ext
   *       *      1DDUOS    *        *        *         *         *
                    M
 DDU        IOD   IOC       0        1        2         3         4
 0 Quit    /       Stat     *      1DDUOS     *         *         *
 2         /
 3         / DIRP       *      XFER       *
 4 ListDev_/
 5         / IOC Card  0    1    2    3    4    5
 6 Tst     / 1  Port  0123 0123 0123 0123 0123 0123
 7 Bsy     /      Stat .--- ..SS .--- SSSS P--- SSSS
 8 RTS     /      Type MTD  Cons DDU  Cons DDU  Cons
 9 Offl    /
10         /
11 Start   / Card 4   Unit            1
12 Stop    /          User           SYSTEM   Drive_State
13         /          Status         SBsy     drive_faults
14         /
15 Status  /
16 Alloc   /
17 Fcnt_   /
18 Clrfcnt_/
   User ID
Time  hh : mm >
```

Fig. 4 – Card Status and DDU Menu Display

TABLE B
DDU CONTROLLER SYSTEM STATUS CODES

CODE	MEANING
Ready	the DDU is available
Not Ready	the DDU is not available because (a) after being returned to service, the drive is not yet rotating at the proper speed, or (b) the system has not yet been able to read certain volume information control data blocks from the drive.
MBsy	Manual Busy
SBsy	System Busy
Offl	Offline
Uneq	Not equipped, indicating that the corresponding data entry for the unit in Table DDU has been deleted.
- - -	an error has occurred during a system restart procedure. This state can be cleared by busying the unit and returning it to service.

                        TABLE C
          DDU DRIVE STATE CODES, ON CARD STATUS DISPLAY

CODE	MEANING
being_allocated	volume allocation is being updated, via the DSKALLOC process.
disconnected	drive does not have power, or is incorrectly cabled to its controller.
drive_faults	drive has power but is not responding to commands from its controller.
on_line	drive is rotating, has been allocated and is in service.
spinning	drive is rotating at the proper speed, but volume allocation either has not been done, or is unknown.
spinning_up	drive is in the process of getting up to full speed.
spun_down	drive has power, but is not rotating.
unknown	drive state cannot be determined, due to a failure in the controller or the message system.
---------------	indicates 'nil' drive state, corresponding to Offline or Unequipped Controller status.

3.06   At the DDU Controller Card level of the telescoping proc-
         ess, menu item 15 is 'Status'.   Entering this   command
causes a display of controller and drive states to appear on the
screen, as illustrated in Figure 5 on page 20. Line 19 shows the
DDU number, line 20 is the controller status, one of In-Service,
Manual Busy, System Busy, or Offline, and line 21 is a message
concerning the status of the drive itself. The possible messages
and their significance are given in Table D on page 21.

```
  CC        CMC       IOD       Net       PM        Lns       Trks      Ext
   *         *       1DDUOS      *         *         *         *         *

 DDU         IOD   IOC       0         1         2         3         4
 0 Quit     /         Stat       *      1DDUOS      *         *         *
 2          /
 3          / DIRP       *       XFER       *
 4 ListDev_/
 5          / IOC Card  0    1    2    3    4    5
 6 Tst      / 1  Port 0123 0123 0123 0123 0123 0123
 7 Bsy      /      Stat .--- ..SS P--- SSSS .--- SSSS
 8 RTS      /      Type MTD  Cons DDU  Cons DDU  Cons
 9 Offl     /
10          /
11 Start    / Card 2   Unit            3
12 Stop     /          User         SYSTEM    Drive_State
13          /          Status       MBsy      spun_down
14         / Status
15 Status  / DDU 3
16 Alloc   /  is Manual Busy
17 Fcnt_   / Drive is stopped
18 Clrfcnt_/
   User ID
Time  hh : mm >
```


                  Fig. 5 - Drive Status and DDU Menu Display
_____

TABLE D
DDU DRIVE STATUS MESSAGES (FOLLOWING STATUS COMMAND)

DRIVE IS	MEANING
allocated and spun up	volumes here have been allocated on the drive and it is ready for use.
being allocated	the allocation process is currently being performed on the DDU.
added but not allocated	the drive is identified in Table DDU but no volumes have been defined on it, or since the unit has not yet been put into service, the allocation chart has not been read by the system.
not OK has drive faults	there are faults in the drive.
stopped	drive is not rotating.
disconnected	drive is physically disconnected, or the power converter requires reset-ting.

DDU MENU

3.07   The DDU level of the MAP telescoping process is accessed
       via the IOC level by inputting the telescoping command
Card_, and specifying the number of a DDU controller card from
IOC display. The IOC level menu is illustrated in Figure 3 on
page 15 and is described in 297-1001-513. The DDU level menu is
illustrated in Figure 4 on page 17.

3.08   There are two items on the DDU menu which are not
       described in this document. They appear as items 0 and 4
on the menu display. Item 0 is the QUIT command, which is common
to all MAP menus, and is described in 297-1001-520.   Item 4 is
the LISTDEV command.   LISTDEV is an IOC level command, and is
described in 297-1001-513.

3.09   The division of the MAP screen into various application
       areas is described in 297-1001-520.

3.10   Commands and parameters can be entered at the MAP keyboard
       in either of two ways.

*   The item itself can be entered, character by character,
     regardless of uppercase and lowercase form.

*   The number associated with the menu item can be entered
     instead of the item.

PRESENTATION OF COMMANDS

3.11   DDU level commands are listed in alphabetical order. Com-
     mands associated with DSKALLOC and DSKUT will be covered
in subsequent sections.

ALLOC	

Displays information concerning the allocation of recording vol-
umes on the drive.

<u>Responses:</u>
Information is displayed under the following headings as shown in
Figure 6 on page 25.

VOLID

          <u>Explanation:</u> The number assigned to the volume.

VOL_NAME

          <u>Explanation:</u> The name assigned to the volume when it
          was allocated.

SERIAL_NO

          <u>Explanation:</u> A system-assigned identifier, the last
          digit of which is the same as the VOLID.

BLOCKS

          <u>Explanation:</u> The total number of 1K blocks of storage
          allocated to the volume.

ADDR

          <u>Explanation:</u> The letter D followed by three digits,
          identifying the DDU on which the volume is located.

TYPE

          <u>Explanation:</u> An integer from 0-4, indicating the type
          of error encountered when opening the volume, the error
          values are as follows:

0 - Indicates that no error was found

1 - Disk hardware cannot identify the volume; volume allocation map is probably in error. See Note 1.

2 - An error was found while reading the volume label; indicating probable label corruption. See Note 2.

3 - An error was found while processing the volume table-of-contents; table-of-contents is probably unknown or is corrupted. See Note 3.

4 - An error was found while opening the space file; space file is corrupted or unknown. See Note 4.

R/O

<u>Explanation:</u> YES or NO, indicating whether the volume has been given Read Only status by the system following detection of an Input/Output (I/O) error.

FILES_OPEN

<u>Explanation:</u> the count of the number of files currently open on the volume.

<u>Notes:</u>

1. The disk drive cannot identify volumes marked as "unallocated". The volume status is "closed", it is not added to the directory ROOTDIR, it cannot be used for processing, and all information is lost. To correct the situation use the commands MBSY and RTS, if this fails reallocate the volume on the disk by means of the DSKALLOC utility program.

2. The system cannot read the volume label, or the label information is corrupt. The volume status is "closed", it is not added to the directory ROOTDIR, and it cannot be accessed by the system, however its contents can be accessed using the XDISK utility. Volume recovery is accomplished using commands DIRRADD and UPDATE of the DSKALLOC utility, if successful no files are lost.

3. The volume table-of-contents cannot be found. The status of the volume is "closed", the volume is not added to the directory ROOTDIR, and cannot be accessed by the system, however its contents can be accessed by means of XDISK utility program. Volume recovery is accomplished using commands REINIT and UPDATE of the DSKALLOC utility.

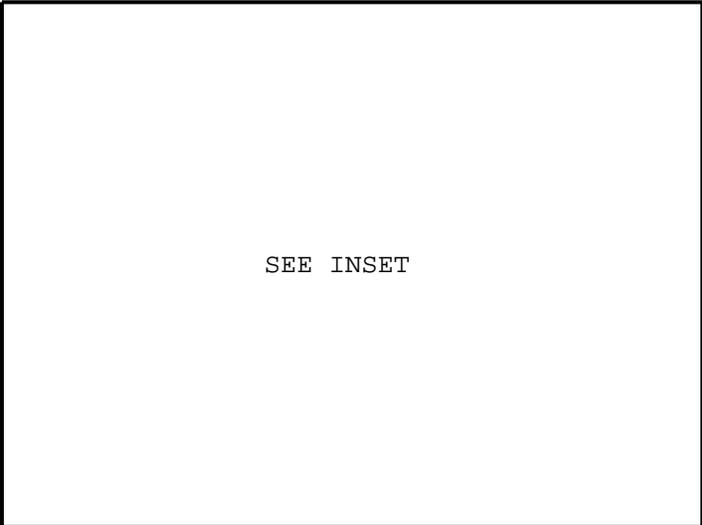<u>Note:</u> Volume files are lost following use of the REINIT command.

4.   The system cannot process the space file. The volume status
     is "open" and "read-only"; the volume is added to the direc-
     tory ROOTDIR. Volume recovery is accomplished using commands
     REINIT and UPDATE of the DSKALLOC utility.

     Note: Volume files are lost following use of the REINIT com-
     mand.

```
   CC       CMC      IOD      Net      PM      Lns      Trks      Ext
    *        *      1DDUOS     *       *                 *         *
                      M
DDU
 0 Quit      /     ┌─────────────────────────────────────────┐
 2           /     │                                         │
 3           /     │                                         │
 4 ListDev_/      │                                         │
 5           /     │                                         │
 6 Tst       /     │                                         │
 7 Bsy       /     │                                         │
 8 RTS       /     │                                         │
 9 Offl      /     │                                         │
10           /     │            SEE INSET                    │
11 Start     /     │                                         │
12 Stop      /     │                                         │
13           /     │                                         │
14           /     │                                         │
15 Status    /     │                                         │
16 Alloc     /     │                                         │
17 Fcnt_     /     │                                         │
18 Clrfcnt_/      │                                         │
 User ID          └─────────────────────────────────────────┘
Time  hh : mm >
```

INSET

```
┌─────────────────────────────────────────────────────────────┐
│IOD    IOC       0       1       2       3       4           │
│       Stat      *     1DDUOS    *       *       *           │
│                                                             │
│DIRP      *      XFER:     *                                 │
│                                                             │
│IOC   Card    0    1    2    3    4    5                     │
│ 1    Port   0123 0123 0123 0123 0123 0123                  │
│      Stat   .--- ..SS .--- SSSS .--- SSSS                  │
│      Type   MTD  Cons DDU  Cons DDU  Cons                  │
│                                                             │
│                                                             │
│Card 4    Unit        1                                      │
│          User      SYSTEM    Drive_State                    │
│          Status    Ready     on_line                        │
│alloc                                                        │
│                                                             │
│VOLID VOL_NAME SERIAL_NO BLOCKS ADDR TYPE R/O FILES_OPEN    │
│   0   IMAGE      A000    12288 D010   0   NO      0         │
│   1   VOL1       A001     3000 D010   0   NO      0         │
│   2   Unallocd   A002    15004 D010   1   NO      0         │
└─────────────────────────────────────────────────────────────┘
```

Fig. 6 - Response to the ALLOC Command

BSY	

Attempts to change the state of the disk controller to Manual Busy if no files are open.

Responses: If the request is successful, the IOC display is updated to show 'P' as the status for the port serving the DDU. Otherwise, an appropriate message is displayed.

Notes:

1.   The request to make the state of the controller Manual busy will only be successful if the controller was In Service (*), System Busy (S), C-side Busy (C) or Offline (O).

2.   The controller cannot be made Manual Busy by use of the BSY command if the disk has files open on it. All files must first be closed, then the BSY command issued.

CLRBUFF	

Corrects a software error condition.

Notes:

1.   This command should be used in response to the following sys- tem message:

     FAILED TO CLAIM MTCE BUFFER

2.   It should only be used under the direction of the Technical Support Group.

3.   The CLRBUFF command should not be used unless the DDU is out of service, and it is certain that there are no other mainte- nance requests pending.

4.   This command does not appear on the DDU menu, but is avail- able by entering CLRBUFF when the DDU menu is displayed.

CLRFCNT	cntr_num ALL

Resets the values of the specified disk controller firmware coun-
ters to zero.

<u>Where:</u>

cntr_num is an integer, from 1 to 25, representing the number of
          the firmware counter whose value is to be reset. See
          Table E on page 28.

ALL   results in the values of all the firmware counters
          being reset.

<u>Responses:</u> If the firmware counter is specified by number, the
value of that particular counter is reset to zero. If the param-
eter ALL is used, the values of all 25 counters are reset to
zero.   The names of the various firmware counters are given in
Table E on page 28.

<u>Note:</u> The CLRFCNT command is normally used as an aid to isolat-
ing difficulties in the disk system during debugging procedures.
It is not routinely used during maintenance activities.

TABLE E
DDU CONTROLLER FIRMWARE COUNTER TITLES

COUNTER NUMBER	TITLE OF COUNTER

1	# ERROR MESSAGES SENT TO CC (INCLUDING CMDINVAL)
2	# NACKS ON INGOING MESSAGES
3	# OF READ_BLOCK OPERATIONS UNDERTAKEN
4	# OF WRITE_BLOCK OPERATIONS UNDERTAKEN
5	# OF WRITE_BLOCK VERIFY OPERATIONS UNDERTAKEN
6	UNUSED
7	# TIMES DISK VARIABLES REQUIRED CORRECTION OR RELEARN
8	# TIMES CONFIGURATION MAP REQUIRED CORRECTION
9	# SOFT PREAMBLE ERRORS
10	# HARD PREAMBLE ERRORS
11	# SOFT DATA ERRORS
12	# HARD DATA ERRORS
13	# RE-READS DURING RECOVERY PROCEDURES
14	# TIMES BEP TRIED FOR RECOVERY
15	# BUSY TIMEOUTS
16	# TIMES DISK SYNC NOT ATTAINED
17	# SECTOR WAIT FAILURES
18	# DISK CLOCK FAILURES
19	# RE-SEEKS DURING RECOVERY PROCEDURES
20	# SEEK FAULTS
21	# DRIVE FAULTS
22	# HEAD SWITCHES DURING RECOVERY PROCEDURES
23	# COMMANDS REJECTED BY DISK
24	# TIMES BEP FAILED TO RECOVER DATA
25	# SECTOR PULSE DROPOUTS

| FCNT | cntr_num |
| | ALL |

Display the current values of the specified disk controller firm-
ware counters.

Where:

cntr_num is an integer, from 1 to 25, representing the number of
          the firmware counter whose value is to be displayed.
          See Table E.

ALL   results in the values of all the firmware counters
          being displayed.

<u>Responses:</u> If the firmware counter is specified by number, the
number and name of the counter is displayed, followed by up to 8
digits representing its current value. If the parameter ALL is
used, all 25 counters are shown simultaneously, with only the
identification number and current value of each being displayed.
The names of the various firmware counters are given in Table E
on page 28.

<u>Note:</u> The FCNT command is normally used as an aid to isolating
difficulties in the disk system, during debugging procedures. It
is not routinely used during maintenance activities.

```
┌──────┬──────────────────────────────────────────────────┐
│ OFFL │                                                  │
└──────┴──────────────────────────────────────────────────┘
```

Attempts to change the status of the disk controller to Offline.

<u>Responses:</u> If the attempt succeeds, the IOC display for the disk
controller card is updated to show P-side busy (P). If not, an
appropriate message is displayed.

<u>Note:</u> The controller must be in the Manual Busy state and the
drive must be stopped before the DDU can be put Offline.

```
┌──────┬──────────────────────────────────────────────────┐
│ RTS  │                                                  │
└──────┴──────────────────────────────────────────────────┘
```

Tests the disk controller, and attempts to return it to service.

<u>Responses:</u> The   command causes a full diagnostic test, as
described under the TST command, to be performed.   Appropriate
messages are displayed on completion of the tests. If the tests
are passed, the controller is returned to service and the IOC
display is updated to show In Service (*).

<u>Note:</u>   The disk must be either System Busy or Manual Busy before
the RTS command can be successful.

```
┌───────┬─────────────────────────────────────────────────┐
│ START │                                                 │
└───────┴─────────────────────────────────────────────────┘
```

Begins spinning the disk drive, and then monitors its status.

Responses: The system attempts to spin the drive up to normal
speed.   The success or failure of the attempt is reported on the
MAP screen within one minute.

Note: The DDU must be in the Manual Busy state before this com-
mand is issued.

STATUS	

Displays information concerning the controller and disk drives.

Responses: A status display appears on the MAP screen.   It shows
the DDU number, the controller status and drive state.   The dis-
play is illustrated in Figure 5 on page 20.

Note: The display generated by this command is not dynamically
updated if changes occur. It reflects the statuses at the time
that the command was issued. The most recent status is obtained
by issuing the STATUS command again.

STOP	

Stops the rotation of the disk drive.

Responses: When the command is issued, the controller stops the
rotation of the disk. The drive status is set to 'stopped'.

Note: The DDU must be Manual Busy before the STOP command is
issued.

TST	

Initiates a test of the Disk Controller and the associated Disk
Drive.

Responses: The results of the tests performed are displayed at
the MAP.   If the DDU fails the test, a suitable message is dis-
played, the DDU is made System Busy, and an Output Report (Log)
is produced (see 297-1001-510).

Notes:

1. The TST command can be used when the DDU is either in or out
    of service. The scope of the test performed depends on the
    state of the DDU.

2. If the DDU is in service (controller status READY) the fol-
    lowing in-service tests are initiated by this command: Reset
    Controller Sequence Test, which checks the Random Access Mem-
    ory store of the controller; Loopback Message Test, which
    involves sending a message to, and receiving a reply from the
    controller; and Drive Status Test which determines the cur-
    rent status of the Disk Drive.

3. If the DDU is either System Busy (SBsy) or Manual Busy
    (MBsy), the tests described in Note 2 are supplemented by the
    out-of-service tests: an attempt to spin the drive up to
    speed if the status is 'stopped'; a Read Only Test, wherein a
    particular location on each volume is read; and a Write Only
    test, during which an attempt is made to write information in
    a single reserved area on the DDU.

4. DISK UTILITY COMMANDS (DSKUT)

4.01   The   DSKUT   set   of commands does not have a menu display,
        but responses appear on the MAP   after   the   commands   are
entered.   Before any of the following commands can be used, the
command DSKUT must be entered.   DSKUT can be   used   at   any   MAP
level.   The DSKUT commands are used to list, erase, or rename the
files in a volume; to assign or remove Current Image File status;
and to display miscellaneous information about the files and vol-
umes.

4.02   Instructions   on   the   use   of DSKUT   commands during the
        image-taking and   bootstrap-loading   procedures   are   con-
tained   in   the Switch Maintenance Performance Oriented Practices
(POP) 297-1001-500.   When the DSKUT command   sessions   are   com-
pleted,   enter QUIT and the MAP returns to whatever level that it
was in before DSKUT was entered.

CLEARBOOT	vol_name

Removes the Boot Flag indication (previously assigned by SETBOOT)
from the file that has Current Image File status   on   the   volume
specified by LISTVOL.

Where:

vol_name   is   the name of the disk volume for which the Boot Flag
           indication is to be reset.

Responses: As a result of this command, there   is   no   longer   a
file on the volume that is labelled as Current Image File.

Note: This command is commonly used to ensure that a particular
image file, previously considered as the Current Image File on   a
particular   DDU,   is not loaded by the system if a bootstrap load
is required.

DSKUT	

Provides access to the Disk Utility commands.

Responses:

DSKUT

> Explanation: indicates that the Disk Utility commands
> are ready for use.

Notes:

1. The commands which are made available are: CLEARBOOT, ERA-
    SEFL, LISTVOL, RENAME, SETBOOT, SHOWBOOT, SHOWFL, SHOWVOL.

2. The MAP is returned to its previous level by using the QUIT
    command.

ERASEFL	filename

Erases a specified file from a disk volume.

Where:

filename is the name of the file to be erased.

Responses:

DONE

> Explanation: The specified filename has been erased.
> If the filename which was specified is the Current
> Image File, assigned by SETBOOT, the system requests
> verification before proceeding to erase the file.

Note: Before a file can be erased, it must be made accessible to
the user, by completing the LISTVOL procedure.

LISTVOL	vol_name [ALL] [ownerid]

Makes the files on a disk volume accessible to the user. See
Note.

Where:

vol_name is the name of the disk volume to be made accessible.

ALL   makes all the files on the volume available, regardless
          of ownership.

ownerid   is a user's system identification, and results in only
           those files that are marked as belonging to that user
           being made available.

Responses:

Displays a list of all file names found.

        Explanation: The specified volume has been scanned and
        the names of all files on the volume are made accessi-
        ble to the user. The filenames are recorded internally
        in the system in a list known as the user's directory.

OLDER DUPLICATE FOUND

        Explanation: Indicates that a second, older version of
        a file bearing a particular name has been found on the
        specified volume. Only the most recent version of each
        such file is made available.

Note: If neither optional parameter is specified, the default is
the system identification of the logged-on user who issued the
command, and only that user's files are made available.

┌────────────┬──┐
│ RENAMEFL   │   filename   newname   │
└────────────┴──┘

Changes the name of an existing file to a new name.

Where:

filename   the existing name of the disk file.

newname   the new name to be applied to the specified filename.

Responses:

DONE

        Explanation: indicates that the specified file has
        been renamed.

Note: To check that file has been rename, enter the SHOWFL com-
mand using the new name as the filename parameter.

SETBOOT	filename

Assigns Current Image File status, via the Boot Flag, to a file on the volume specified by LISTVOL.

<u>Where:</u>

filename is the name of the disk file to which Current Image File status is to be assigned.

<u>Responses:</u>

DONE

> <u>Explanation:</u> indicates that the specified file is now defined as the Current Image File. Otherwise an appropriate error message appears.

<u>Note:</u> The volume for which the Boot Flag is to be set must first have been listed using the LISTVOL command.

SHOWBOOT	vol_name

Displays information concerning the Current Image File on the specified volume.

<u>Where:</u>

vol_name is the name of the disk volume for which Current Image File information is to be displayed.

<u>Responses:</u>

CURRENT IMAGE FILE IS filename id_no date

> <u>Explanation:</u> identifies the Current Image File by file name, identification number, and creation date of the file. Otherwise an appropriate error message appears.

SHOWFL	filename [ALL]

Displays miscellaneous information about a specified file name.

<u>Where:</u>

filename the name of the file whose information is to be dis-
          played.

ALL   provides a display with complete information about the
          specified filename.   If ALL is not entered, a short
          display appears.

<u>Responses:</u>

Information is displayed under the following headings:

NUMBER OF RECORD length of filename in terms of records.

LAST MODIFIED date and time of latest modification.

FILE ID   identity as recognized by the DMS Support Operat-
              ing System (SOS).

FILE OWNER   name of the DMS subsystem or user terminal that
              originally created the file.

FILE ATTRIBUTE record type: fixed or variable-length.

<u>Note:</u>   The complete display appears when the parameter ALL is
included. If ALL is not entered, only NUMBER OF RECORDS and LAST
MODIFIED appear.


```
  SHOWVOL  │   vol_name [ALL]
```

Displays miscellaneous information about a specified volume name.

<u>Where:</u>

vol_name the name of the volume whose information is to be dis-
          played.

ALL   provides display with complete information about the
          specified vol_name.   If ALL is not entered, a short
          display appears.

<u>Responses:</u>

Information appears under the following headings:

VOLUME NAME   specified vol_name.

VOLUME SIZE   total number of blocks in vol_name.

FREE SPACE   number of unused blocks in vol_name.

NUMBER OF FILES   total number of files in vol_name.

VOLUME ID   the identity of vol_name recognized by
                            SOS.

DISK UNIT NUMBER   the identification number of the DDU on
                            which vol_name is recorded.

VOLUME NUMBER   the sequence number of vol_name within
                            the DDU.

IOC nn, CARD nn, PORT nn identifies the IOC, DDU controller card,
                            and port to which the DDU containing
                            vol-name is connected.

Note: complete display appears when SHOWVOL vol_name ALL is
entered. If ALL is not entered, only the first four lines of the
display appear.

5. DISK ALLOCATION UTILITY COMMANDS

5.01 As discussed in Part 2 under 'FILES ON DISK', before a DDU
      is put into service, the storage space on the disk is
allotted to different volumes, by performing the Allocation proc-
ess.   This process is accomplished by using the Disk Allocation
Utility commands. These commands do not appear on a menu, but
are available after using the DSKALLOC command, at any MAP level,
to access the Disk Allocation Utility.

5.02 The process consists of preparing a pending list of space
      allocation for the DDU, editing and correcting the list,
and then implementing the allocation and changes on the disk.
The DMS-100 system must also be made aware of volumes being added
or deleted, and this is done by updating an internal list, or
directory. A sample Disk Allocation session appears in Part 6 of
this document.

5.03 The Allocation process can only be performed on a DDU
      after it has been made Manual Busy (by the BSY command on
the DDU-level menu).

```
┌──────┬─────────────────────────────────────────────────────────┐
│ ADD  │   vol_name   num_blks                                    │
└──────┴─────────────────────────────────────────────────────────┘
```

Include a volume of a particular size on the list of space to be
allocated on the disk.

Where:

vol_name is the name, by which the volume will be known on its
          DDU, and is limited to a maximum of 8 alphanumeric
          characters.

num_blks is an integer from 50 to 32767, indicating the number
          of blocks of data storage space to be allotted for this
          volume.

Responses:

ADDITION DONE

          Explanation: This list of pending space allocations
          for the DDU has been updated internally to include an
          entry for the specified volume If ADD is unsuccessful,
          an appropriate error message appears.

Notes:

1. ADD does not result in the creation of a volume. All volumes
    are created when the UPDATE command is issued, at the com-

pletion of the Allocation process, after all volumes have
been identified via the ADD command.

2. ADD does not result in an updated allocation list appearing
    on the screen. An up-to-date list is obtained by issuing the
    command DISPLAY.

DELETE	vol_name

Removes the specified volume from the list of space to be allo-
cated on the disk.

Where:

vol_name is the name of the volume which is to be removed from
          the space allocation list.

Responses: The result of the command is that the list of pending
allocation of space on the disk is updated internally to exclude
the specified volume. The Root Directory (see DIRADD command) is
also updated to remove the reference to the volume.

Notes:

1. This command does not result in the specified volume being
    immediately removed from the disk. All creations and
    deletions of volumes are done when the UPDATE command is
    issued, at the completion of the allocation process.

2. After the DELETE command has been used, an up-to-date list of
    the pending space allocation on the DDU is obtained by issu-
    ing the command DISPLAY. The storage blocks previously
    assigned to a volume which is to be deleted are shown as
    being unallocated (Unallocd). Adjacent unallocated volumes
    are combined and considered as one volume, reducing the total
    number of volumes shown on the Allocation display for that
    DDU.

3. When a volume is deleted by using the DELETE command, fol-
    lowed by the UPDATE command, any files contained on that vol-
    ume are automatically erased.

DIRADD	vol_name

Makes the specified volume accessible to the user.

<u>Where:</u>

vol_name   is the name by which the volume is known on its DDU.
           The name was assigned when the volume was created (see
           ADD command).

<u>Responses:</u>

DONE

          <u>Explanation:</u> The name of the specified volume has been
          entered into an internal list, known as the Root Direc-
          tory (ROOTDIR). The name must be on this list before
          the user can access the volume to read or write data.
          If DIRADD is unsuccessful, an appropriate error message
          appears.

<u>Notes:</u>

1. After new volumes are created during the disk allocation pro-
    cedure, their names may be added to ROOTDIR by using this
    command, once for each new volume.

2. The DIRADD command is only required for volumes which are to
    be accessed directly by operating company personnel, using
    Command Interpreter (CI) commands. Volumes to be used by the
    system only, can be accessed by the system regardless of
    whether or not they are included in ROOTDIR.

3. When the DIRADD command has been used for a volume, and the
    UPDATE procedure has been performed (see UPDATE command), an
    internal flag is set so that the volumes will be automat-
    ically readded to ROOTDIR during restart and RTS procedures.

4. The name which is added to ROOTDIR is a concatenation of the
    ADDR and VOL_NAME field entries from the ALLOC display (see
    ALLOC command).   Therefore, the VOL_NAME entry need only be
    unique within its DDU.


```
┌─────────┬──────────────────────────────────────────────────────┐
│ DIRDEL  │   vol_name                                           │
└─────────┴──────────────────────────────────────────────────────┘
```

Removes the specified volume name from an internal system list of
accessible volumes.

<u>Where:</u>

vol_name   is the name by which the volume is known on its DDU.

Responses: The effect of this command is that the specified vol-
ume name is removed from the internal system list ROOTDIR.

Notes:

1. This command is used when a volume is no longer required to
   be available for manual access. System access to the volume
   is not inhibited by its deletion from ROOTDIR.

2. The DIRDEL command also resets an internal flag (see DIRADD
   command) to ensure that the volume name is not automatically
   readded to ROOTDIR during RTS and restart procedures.

```
┌──────────┬──────────────────────────────────────────────────┐
│ DISPLAY  │                                                  │
└──────────┴──────────────────────────────────────────────────┘
```

Display the current or pending allocation of space on the DDU.

Responses:

NAME   ADDR O   R   A   D   M   I   SERIAL   ALLOC

Explanation: The significance of the information that
appears under the various headings, in the response to
DISPLAY, is as follows:

NAME: the name assigned to each volume by the ADD
          and UPDATE commands.

ADDR: the system address of the DDU on which the
          volume is recorded.

O: shows YES or NO. The volume has been opened
          properly.

R: shows YES or NO. The volume is in read-only
          mode.

A: shows YES or NO. This group of blocks is
          allocated.

D: shows YES or NO. The volume name has been
          recorded internally in the Root Directory
          (ROOTDIR).

M: shows YES or NO. The volume label has been
          modified. If any of the conditions under the
          headers O,R,A,D have changed since the volume
          was created, the label is rewritten to
          reflect the changes.

Page 41

I: shows YES or NO. The volume is to be initial-
            ized.

SERIAL: the system-assigned identifier indicating the
            device type, controller number, drive number
            and volume sequence.

ALLOC: nnnnn. The number of blocks of storage space
            allocated to each volume. If no number, then
            one of the following:

                    UNALLOCD. The blocks assigned to the vol-
                    ume name have been deallocated by the
                    DELETE and UPDATE commands.

                    UNKNOWN. The volume label associated with
                    the volume name contains an error which
                    occurred during the allocation process,
                    and is unreadable.

                    MISMATCH. Invalid information within the
                    volume label data associated with the
                    volume   name.   See 297-1001-118 for
                    details of standard volume label format.

UNUSED: nnnnn BLOCKS

            Explanation: Initially, nnnnn is the same as the num-
            ber of blocks available on the specified DDU when no
            volumes have been allocated. As volumes are allocated,
            the number reduces to show the balance of unused blocks
            available for further allocation.

See Part 6 on page 46 for a typical response following the use
of DISPLAY.

Note: When the DISPLAY command is used during a series of allo-
cations and deletions, the resulting chart appearing on the
screen is the pending allocation. This means that the chart shows
what the resulting allocation will be, after the UPDATE command
is issued.   If the user decides not to update the actual DDU
allocation, and issues the QUIT command instead of UPDATE, then
when the DSKALLOC utility is reentered and the DISPLAY command is
reissued, the actual current allocation of space will be shown.

DSKALLOC	ddu_num

Access the DSKALLOC utility commands, and specifies the DDU to
which the commands are to be applied.

<u>Where:</u>

ddu_num   is the number of the DDU on which the allocation proc-
           ess is to be performed.

<u>Responses:</u> Displays   information   concerning   the   current allo-
cation of volumes on the disk, and asks whether the user wants to
continue with the process. If the user replies with YES, prelim-
inary procedures are begun, including formatting the disk, if
required.

<u>Example</u>

See SAMPLE SESSIONS, Part 6 on page 46 for an example of the com-
mands and responses involved in a typical allocation process.


```
┌────────┬──────────────────────────────────────────────────────┐
│ QUIT   │                                                      │
└────────┴──────────────────────────────────────────────────────┘
```


Ends a disk allocation session and returns the MAP to its previ-
ous level.

<u>Responses:</u> The MAP returns to the level that it was in before
DSKALLOC was entered.

          <u>Explanation:</u> QUIT is normally used after the process
          of preparing the list of space to be allocated (via ADD
          and DELETE), and implementing the changes (via UPDATE),
          has been completed.

   ** WARNING ** "QUIT" BEFORE "UPDATE"
   ALLOCATION CHANGES HAVE BEEN LOST

          <u>Explanation:</u> This response indicates that   pending
          allocation changes have been listed but not implemented
          by the UPDATE command before QUIT was used. This could
          have been done deliberately (see Note 1) or in error
          (see Note 2).

<u>Notes:</u>

1. If the user decides not to update the DDU to implement chang-
    es that have been made on the list of space allocation (see
    DISPLAY command), then QUIT is issued instead of the UPDATE.

2. If QUIT is used in error, before the DDU was updated, the
    Disk Allocation process must be repeated from the beginning,
    starting by using the DSKALLOC command and proceeding to use

the ADD and DELETE commands to prepare the list of pending
changes.


```
┌──────────┬────────────────────────────────────────────────────┐
│ REINIT   │  vol_name                                           │
└──────────┴────────────────────────────────────────────────────┘
```

Sets a field which indicates that a specified disk volume is to
be reinitialized.

Where:

vol_name is the name of the volume to be initialized.

Responses: The entry in the information field 'I' in the pending
allocation display (see response to DISPLAY command) changes to
'YES'. As a result, when UPDATE is issued, the specified volume
is reinitialized.

Notes:

1. Reinitialization of a volume causes all files on the volume
    to be erased.

2. The process can be used when a disk volume is being reas-
    signed to a different usage. In such a case, REINIT is used
    instead of erasing each individual file with ERASEFL command.

3. Reinitialization can be used to attempt to return a volume to
    use when excessive errors have occurred on it. The data
    recorded on the volume prior to reinitialization will be
    lost. Backup and restoration of any readable data contained
    on the volume becomes the responsibility of operating company
    personnel.


```
┌──────────┬────────────────────────────────────────────────────┐
│ UPDATE   │                                                    │
└──────────┴────────────────────────────────────────────────────┘
```

Implements the changes made to the list of space allocation on
the DDU.

Responses: After this command is issued, the system begins the
process of actually allocating the various volumes that have been
added to or changed on the list of space allocation (see ADD,
DELETE, DIRADD, DIRDEL, DISPLAY, and REINIT commands). Responses
appear on the screen indicating the beginning and completion of
various operations, such as the updating of the space chart on
each volume of the DDU, the initialization of new volumes, the
writing of volume labels, and the counting of bad data blocks.

┌─────────────┐
│   CAUTION   │
└─────────────┘

Do not break stop from DSKALLOC. If an error has been
made, allow the update to finish and make corrections
at that time. If a break stop is done from DSKALLOC
while the UPDATE command is executing, it is likely
that the volume being update will come up in 'mismatch'
status. If a volume is in mismatch status, contact
your regional maintenance support group for assistance.

<u>Example</u>

See SAMPLE SESSIONS, Part 6 on page 46 for an example of the use
of UPDATE.

<u>Notes:</u>

1. This process may take up to ten minutes to complete.

2. If, during the UPDATE procedure, a volume fails to initial-
    ize, as indicated by an error message to that effect, contact
    your maintenance Support Group.

6. SAMPLE SESSIONS

GENERAL

6.01   The following sample sessions demonstrate some aspects of
        DDU usage.   They are intended to illustrate operations
mentioned elsewhere in this document, rather than to fully
describe maintenance procedures.   Detailed step-by-step mainte-
nance procedures are contained in 297-1001-500.

REMOVING A DDU FROM SERVICE

6.02   In this sample session, DDU 3, whose controller is in card
        position 2 of IOC 1 is taken out of service, pending main-
tenance action.   Before it is removed from service, open files
must be identified and closed. The DDU can then be busied and
removed from service.

        > MAPCI; MTC; IOD; IOC 1

                    (MAP display for IOC 1 appears on screen)

By observing the IOC display, the DDU controller for DDU 3 is
seen to be Card 2.

        > CARD 2

                    (DDU menu and display appears)

        > ALLOC   (to determine if files are open on the DDU)

VOLID	VOL_NAME	SERIAL_NO	BLOCKS	ADDR	TYPE	R*O	FILES_OPEN
0	RESULT1	A000	12288	D030	0	NO	0
1	CONTENT4	A001	3000	D030	0	NO	0

This display shows two volumes, one called RESULT1 and another
called CONTENT4, with no files open on them. Because no files are
open, the unit can be removed from service by using the BSY com-
mand without the FORCE parameter, and then the OFFL command.

        > BSY

                    OK

        > OFFL

                    OK

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ALLOCATING VOLUMES ON A NEW DDU

6.03   In this example, DDU 0, whose controller is in card posi-
       tion 4 of IOC 0, is being brought into service for the
first time. Four volumes are to be allocated on it.   They are
called IMAGE, PMLOAD1, PMLOAD2 and NONRES. Due to their respec-
tive sizes, there will be unused space on the disk.

6.04   Before space can be allocated on the unit, the DDU con-
       troller must be in the Manual Busy state and the drive
must be spinning.

       > MAPCI; MTC; IOD; IOC 0; CARD 4

              (DDU MAP display appears on screen)

       > STATUS

              DDU 0
              is offline
              Drive is stopped

       > BSY   (to make the controller Manual Busy)

              OK

       > RTS   (to spin up the drive)

              PROCESS MAY TAKE UP TO 3 MINUTES

              OK (indicating successful completion)

       > STATUS

              DDU 0
              is in service
              Drive is added but not allocated

       > BSY

              OK

6.05   At this point, the allocation process can begin.   First,
       access the allocation command utility:

> DSKALLOC 0

          **WARNING
          Disk unformatted or unallocated
          Proceed with formatting of Drive?
          Please confirm ("YES" or "NO"):

> YES

          Starting Format Process-May take up to 10 mins.
          Drive has been Formatted
          No Volumes allocated
          Unused :30292 Blocks.

6.06   Next, four volumes of various sizes are added to the list
        of pending space allocations.

> ADD IMAGE 12200

          Addition Done

> ADD PMLOAD1 4000

          Addition Done

> ADD PMLOAD2 5000

          Addition Done

> ADD NONRES 5500

          Addition Done

6.07   To see the pending allocation of space, issue the DISPLAY
        command.

> DISPLAY

          NAME   ADDR 0 R A D M I   SERIAL ALLOC
          IMAGE   D000 NO NO YES NO YES YES A000   12200
          PMLOAD1   D000 NO NO YES NO YES YES A001   4000
          PMLOAD2   D000 NO NO YES NO YES YES A002   5000
          NONRES   D000 NO NO YES NO YES YES A003   5500

          Unused: 3592 Blocks.

6.08   After checking that the pending allocation is correct,
        make the system aware of the new volume names, by adding
them to the Root Directory.

> DIRADD IMAGE

        DONE

> DIRADD PMLOAD1

        DONE

> DIRADD PMLOAD2

        DONE

> DIRADD NONRES

        DONE

> DISPLAY

NAME	ADDR	O	R	A	D	M	I	SERIAL	ALLOC
IMAGE	D000	NO	NO	YES	YES	YES	YES	A000	12200
PMLOAD1	D000	NO	NO	YES	YES	YES	YES	A001	4000
PMLOAD2	D000	NO	NO	YES	YES	YES	YES	A002	5000
NONRES	D000	NO	NO	YES	YES	YES	YES	A003	5500

        Unused: 3592 Blocks.

6.09   Now that the list of pending allocations has been prepared
and checked, and new volume names have been given to the
system, actual volume allocation on the disk is performed:

> UPDATE

        Firmware Allocation Map Updated
        Starting initialization of Volume IMAGE
        Number of Bad Blocks = 0
        Successful
        Writing Label of Volume IMAGE
        Successful
        Starting initialization of Volume PMLOAD1
        Number or Bad Blocks = 0
        Successful
        Writing Label of Volume PMLOAD1
        Successful
        Starting initialization of Volume PMLOAD2
        Number of Bad Blocks = 0
        Successful
        Writing Label of Volume PMLOAD2
        Successful
        Starting initialization of Volume NONRES
        Number of Bad Blocks = 0
        Successful
        Writing Label of Volume NONRES
        Successful
        Update Done

6.10   The process is completed by again examining the allocation
        list, to verify the entry.

        > DISPLAY

```
            NAME     ADDR 0  R   A   D   M   I   SERIAL ALLOC
            IMAGE    D000 NO NO  YES YES NO  NO  A000   12200
            PMLOAD1  D000 NO NO  YES YES NO  NO  A001    4000
            PMLOAD2  D000 NO NO  YES YES NO  NO  A002    5000
            NONRES   D000 NO NO  YES YES NO  NO  A003    5500

            Unused: 3592 Blocks.
```

        > QUIT   (to leave the Disk Allocation utility)

6.11   With the MAP currently at the DDU display level, the DDU
        is placed in service as follows:

        > STATUS

                    DDU 0
                    is Manual Busy
                    Drive is allocated and spun up

        > TST

                    PROCESS MAY TAKE UP TO 3 MINUTES

                    OK (indicating successful completion)

        > RTS

                    PROCESS MAY TAKE UP TO 3 MINUTES

                    OK (indicating successful completion)

        > STATUS

                    DDU 0
                    is In Service
                    Drive is allocated and spun up

        > QUIT   (to leave the DDU display level)

7. OFFICE IMAGE ON DISK

DESCRIPTION

7.01   The contents of the program and data store of a DMS can be
        copied to produce an Office Image. This Office Image is
used to reload the DMS, in order to restore it to operation in
the event of a processing failure. It is recommended that images
be taken at regular intervals, as described in 297-1001-500, or
according to local procedures.

7.02   The Image is recorded, or dumped, onto magnetic recording
        devices, such as MTD or DDU. If a reload is required, the
information is read back from the recording device into the Cen-
tral Control.

7.03   The most recent Office Image is constantly available to
        the system by being kept on a recording device, accessible
to the DMS.

7.04   When a new Office Image is dumped, the previous image is
        kept as a further backup. An organized system for archiv-
ing Images is described in 297-1001-500. If an office is config-
ured with a sufficiently large number of recording devices, more
than one image can be accessible, by having them on different
recording devices. In these cases, backup images are available,
in addition to the current image.
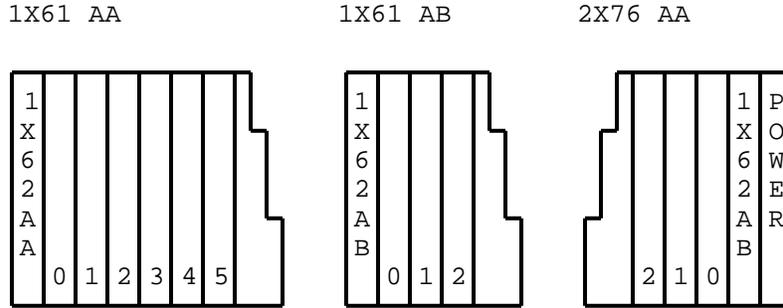
7.05   The particular recording devices on which images are
        stored are referred to as Load Devices. There may be up
to four Load Devices in an office. A mix of MTD and DDU can be
used as Load devices, but at least one must be an MTD.   This
ensures that an image or updated software tape can be brought
into the office and loaded, since the disk of a DDU is not acces-
sible.

7.06   A DDU is the preferred Load Device, because an office will
        reload faster from a DDU than from an MTD.
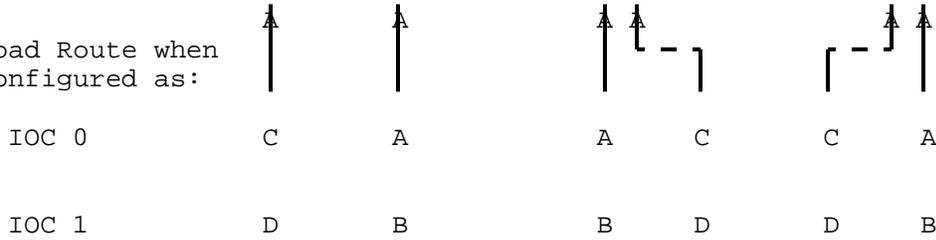
7.07   In the event that a reload is required, one of four Load
        Routes is selected.   A load route is simply a way to
define from which Load Device the image is to be read during the
reload.   As shown in Figure 7 on page 52, these routes, and the
corresponding load devices are identified as A, B, C and D.   The
routes are determined on the basis of the device controller card
slots, to which the load devices are configured, in the IOC.   The
actual slot-to-route correlation depends on the type of IOC which
is installed in the office.   The recommended selection and
arrangement of Load Devices for offices equipped with DDU are
described in Figure 7 on page 52.

7.08   As described elsewhere in this practice, under the title
        'FILES ON DISK', the data recorded on a DDU can be consid-
ered to consist of individual volumes. To ensure that the system

IOC, with   1X61 AA   1X61 AB   2X76 AA
controller
card slots
numbered.

```
 1                   1              P
 X                   X        1     O
 6                   6        X     W
 2                   2        6     E
 A                   A        2     R
 A             A     B        A
       0 1 2 3 4 5      0 1 2  B
                                 2 1 0
```

Load Route when
configured as:

   IOC 0   C   A   A   C   C   A

   IOC 1   D   B   B   D   D   B

                                Served by an appropriate
                                controller, installed in
              Number of   Load   the slot identified above,
              DDU in office   Device   for load route:

              1   DDU0   A   (IOC0)
                               MTD0   D   (IOC1)

              2   DDU0   A   (IOC0)
                               DDU1   B   (IOC1)
                               MTD0   D   (IOC0)

              3 or more   DDU0   A   (IOC0)
                               DDU1   B   (IOC1)
                               DDU2   C   (IOC0)
                               MTD0   D   (IOC1)

   Fig. 7 - Load Routes and Load Devices

can locate an Image on a DDU configured as a Load Device, the
volume bearing VOLID 0 (see ALLOC command and Figure 6 on page
25) is reserved for images.

7.09   To prevent a known bad or outdated image being loaded from
       a DDU, an internal indicator, the Boot flag, must be manu-
ally set to identify the image as being valid. This is done on a
per DDU basis, using the commands SETBOOT, SHOWBOOT and CLEAR-
BOOT.

OFFICE IMAGE PROCEDURES

7.10   If the image is pre-BCS26, the taking of a new image on a
        volume already containing an older image requires that the
older image first be erased, then the new image dumped.

7.11   Before BCS26 the size of a volume was less than 32,767
        blocks.   Since a system image is recorded as one record
per block, there was not room on a volume for more than one
image.   For example, a typical NT40 image takes up approximately
24,000 blocks and a typical ECORE image takes up approximately
30,000 blocks, therefore the two images would exceed the size of
the volume.   After BCS26, volumes have 65,535 blocks, so two
images fit on one volume.

```
┌─────────────────────┐
│  ┌───────────────┐  │
│  │   WARNING     │  │
│  └───────────────┘  │
└─────────────────────┘
```
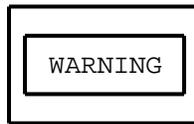
    Do not store images taken before BCS26 on volumes that
    are greater than 32,767 blocks. You can store images
    that are BCS26 and later on volumes greater than 32,767
    blocks.   You can store more than one image on a volume
    if the image is BCS26 or later.

7.12   Once the new image has been verified through the checkdump
        procedure, the SETBOOT command is used to change the Boot
flag to identify the new image as the preferred one. CLEARBOOT
is useful to prevent a particular image from being loaded into
the DMS, since it deletes the boot flag for a particular DDU vol-
ume.   See 297-1001-500 for detailed step-by-step procedures for
all imaging tasks.

8. ABBREVIATIONS

AMA   Automatic Message Accounting
BCS   Batch Change Supplement
CC   Central Control
DDU   Disk Drive Unit
DIP   Dual Inline Package
DIRP   Device Independent Recording Package
I/O   Input/Output
IOC   Input/Output Controller
IOD   Input/Output Devices (subsystem)
IOE   Input/Output Equipment
JF   Journal File
MAP   Maintenance and Administration Position
MTD   Magnetic Tape Drive
NT   Northern Telecom
OM   Operational Measurements
PCB   Printed Circuit Board
PEC   Product Engineering Code
POP   Performance Oriented Practice
P-Side   Peripheral-Side
R/W   Read/Write
RTS   Return to Service