DIGITAL SWITCHING SYSTEMS

DMS*-100 FAMILY

DISK MAINTENANCE SUBSYSTEM
REFERENCE MANUAL

* DMS is a trademark of Northern Telecom
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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 Publications 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 similar 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

<table>
<thead>
<tr>
<th>DOCUMENT NUMBER</th>
<th>TITLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>297-1001-110</td>
<td>Maintenance and Administration Position</td>
</tr>
<tr>
<td>297-1001-513</td>
<td>Input/Output Devices Man-Machine Interface</td>
</tr>
</tbody>
</table>
Informative References

<table>
<thead>
<tr>
<th>DOCUMENT NUMBER</th>
<th>TITLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>297-1001-001</td>
<td>DMS-100 Family Master Index of Practices</td>
</tr>
<tr>
<td>297-1001-310</td>
<td>Table Editor Reference Manual</td>
</tr>
<tr>
<td>297-1001-312</td>
<td>Device Independent Recording Package (DIRP) User Guide</td>
</tr>
<tr>
<td>297-1001-450</td>
<td>Provisioning</td>
</tr>
<tr>
<td>297-1001-451</td>
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</tr>
<tr>
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<td>Maintenance System Man-Machine Interface Description</td>
</tr>
<tr>
<td>297-1001-524</td>
<td>Remote Data Polling System Description and Man-Machine Interface</td>
</tr>
<tr>
<td>GS1X55</td>
<td>Disk Drive Controller</td>
</tr>
<tr>
<td>GS1X78</td>
<td>Disk Store Power Converter</td>
</tr>
</tbody>
</table>
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 following:

* 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 volumes 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 distributed throughout a volume. Up-to-date charts of the space utilization 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
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 information 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, section 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 appropriate 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 corruption 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 volume, 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 commands are organized in four groups named IOC, DDU, DSKALLOC 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 commands that can be input at the IOC and DDU levels appear on the associated MAP display in order of their menu item numbers. 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 utilities 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 associated 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 connected (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, illustrated 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.
Fig. 2 - Disk Maintenance Command Organization
Fig. 3 - IOC Status and Menu Display
**TABLE A**

**IOC PORT STATUS CODES**

<table>
<thead>
<tr>
<th>CODE</th>
<th>STATUS OF THE PORT</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>System Busy</td>
</tr>
<tr>
<td>M</td>
<td>Manual Busy</td>
</tr>
<tr>
<td>C</td>
<td>Central Control side (C-side) busy</td>
</tr>
<tr>
<td>P</td>
<td>Peripheral side (P-side) busy</td>
</tr>
<tr>
<td>O</td>
<td>Offline</td>
</tr>
<tr>
<td>*</td>
<td>OK, no faults exist</td>
</tr>
<tr>
<td>-</td>
<td>Unequipped</td>
</tr>
</tbody>
</table>

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 illustrated in Figure 4 on page 17 appears on the screen. Read horizontally, lines 15 through 17 display information concerning the DDU. On line 15, the IOC card number (4) for the NT1X55 controller 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’. Information is read vertically (displayed beneath the header), and possible drive state codes are described in Table C on page 19.
Fig. 4 - Card Status and DDU Menu Display
### TABLE B
DDU CONTROLLER SYSTEM STATUS CODES

<table>
<thead>
<tr>
<th>CODE</th>
<th>MEANING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ready</td>
<td>the DDU is available</td>
</tr>
<tr>
<td>Not Ready</td>
<td>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.</td>
</tr>
<tr>
<td>MBsy</td>
<td>Manual Busy</td>
</tr>
<tr>
<td>SBsy</td>
<td>System Busy</td>
</tr>
<tr>
<td>Off1</td>
<td>Offline</td>
</tr>
<tr>
<td>Uneq</td>
<td>Not equipped, indicating that the corresponding data entry for the unit in Table DDU has been deleted.</td>
</tr>
<tr>
<td>- - -</td>
<td>an error has occurred during a system restart procedure. This state can be cleared by busying the unit and returning it to service.</td>
</tr>
</tbody>
</table>
TABLE C
DDU DRIVE STATE CODES, ON CARD STATUS DISPLAY

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

3.06 At the DDU Controller Card level of the telescoping process, 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.
<table>
<thead>
<tr>
<th>CC</th>
<th>CMC</th>
<th>IOD</th>
<th>Net</th>
<th>PM</th>
<th>Lns</th>
<th>Trks</th>
<th>Ext</th>
</tr>
</thead>
<tbody>
<tr>
<td>*</td>
<td>*</td>
<td>1DDUOS</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>

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

Fig. 5 - Drive Status and DDU Menu Display
### TABLE D

**DDU DRIVE STATUS MESSAGES (FOLLOWING STATUS COMMAND)**

<table>
<thead>
<tr>
<th>DRIVE IS</th>
<th>MEANING</th>
</tr>
</thead>
<tbody>
<tr>
<td>allocated and spun up</td>
<td>volumes here have been allocated on the drive and it is ready for use.</td>
</tr>
<tr>
<td>being allocated</td>
<td>the allocation process is currently being performed on the DDU.</td>
</tr>
<tr>
<td>added but not allocated</td>
<td>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.</td>
</tr>
<tr>
<td>not OK has drive faults</td>
<td>there are faults in the drive.</td>
</tr>
<tr>
<td>stopped</td>
<td>drive is not rotating.</td>
</tr>
<tr>
<td>disconnected</td>
<td>drive is physically disconnected, or the power converter requires resetting.</td>
</tr>
</tbody>
</table>

#### 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. Commands associated with DSKALLOC and DSKUT will be covered in subsequent sections.

ALLOC

Displays information concerning the allocation of recording volumes on the drive.

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

VOLID

Explaination: The number assigned to the volume.

VOL_NAME

Explaination: The name assigned to the volume when it was allocated.

SERIAL_NO

Explaination: A system-assigned identifier, the last digit of which is the same as the VOLID.

BLOCKS

Explaination: The total number of 1K blocks of storage allocated to the volume.

ADDR

Explaination: The letter D followed by three digits, identifying the DDU on which the volume is located.

TYPE

Explaination: 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

Explanation: 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

Explanation: the count of the number of files currently open on the volume.

Notes:

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.

Note: 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 directory ROOTDIR. Volume recovery is accomplished using commands REINIT and UPDATE of the DSKALLOC utility.

Note: Volume files are lost following use of the REINIT command.
Fig. 6 - Response to the ALLOC Command
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.

Corrects a software error condition.

**Notes:**
1. This command should be used in response to the following system 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 maintenance requests pending.

4. This command does not appear on the DDU menu, but is available by entering CLRBUFF when the DDU menu is displayed.
Resets the values of the specified disk controller firmware counters to zero.

**Where:**

- `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.

**Responses:** If the firmware counter is specified by number, the value of that particular counter is reset to zero. If the parameter `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.

**Note:** The CLRFCNT 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.
TABLE E
DDU CONTROLLER Firmware Counter Titles

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

Display the current values of the specified disk controller firmware 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.
Responses: 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.

Note: 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.

Responses: 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.

Note: 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.

Responses: 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 (*).

Note: 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 command 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 display 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 displayed, 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 following in-service tests are initiated by this command: Reset Controller Sequence Test, which checks the Random Access Memory 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 current 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 volumes.

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

### CLEARBOOT

```
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

```
DSKUT
```

Provides access to the Disk Utility commands.

**Responses:**
Explanations: indicates that the Disk Utility commands are ready for use.

Notes:
1. The commands which are made available are: CLEARBOOT, ERASEFL, 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 accessible 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 command 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.

Where:

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

Responses:

DONE

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

Note: 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.

Where:

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

Responses:

CURRENT IMAGE FILE IS filename id_no date

Explanation: identifies the Current Image File by filename, 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.
Where:

filename the name of the file whose information is to be displayed.

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

Responses:

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 Operating 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.

Note: 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.

Where:

vol_name the name of the volume whose information is to be displayed.

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

Responses:

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 process. 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.

<table>
<thead>
<tr>
<th>DELETE</th>
<th>vol_name</th>
</tr>
</thead>
</table>

Removes the specified volume from the list of space to be allocated 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 issuing 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, followed by the UPDATE command, any files contained on that volume are automatically erased.

<table>
<thead>
<tr>
<th>DIRADD</th>
<th>vol_name</th>
</tr>
</thead>
</table>

Makes the specified volume accessible to the user.
Where:

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).

Responses:

DONE

Explanation: The name of the specified volume has been entered into an internal list, known as the Root Directory (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.

Notes:

1. After new volumes are created during the disk allocation procedure, 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 automatically 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.

Where:

vol_name is the name by which the volume is known on its DDU.
Responses: The effect of this command is that the specified volume 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:

<table>
<thead>
<tr>
<th>NAME</th>
<th>ADDR</th>
<th>O</th>
<th>R</th>
<th>A</th>
<th>D</th>
<th>M</th>
<th>I</th>
<th>SERIAL</th>
<th>ALLOC</th>
</tr>
</thead>
</table>

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.
I:     shows YES or NO. The volume is to be initialized.

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 volume 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 number 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 allocations 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.
Where:

**ddu_num**  is the number of the DDU on which the allocation process is to be performed.

**Responses:** Displays information concerning the current allocation of volumes on the disk, and asks whether the user wants to continue with the process. If the user replies with YES, preliminary procedures are begun, including formatting the disk, if required.

**Example**

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

**QUIT**

Ends a disk allocation session and returns the MAP to its previous level.

**Responses:** The MAP returns to the level that it was in before DSKALLOC was entered.

**Explanation:** 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

**Explanation:** 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).

**Notes:**

1. If the user decides not to update the DDU to implement changes 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 reassigned 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.

Example

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

Notes:

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

2. If, during the UPDATE procedure, a volume fails to initialize, 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 maintenance 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 maintenance 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)

<table>
<thead>
<tr>
<th>VOLID</th>
<th>VOL_NAME</th>
<th>SERIAL_NO</th>
<th>BLOCKS</th>
<th>ADDR</th>
<th>TYPE</th>
<th>R*O</th>
<th>FILES_OPEN</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>RESULT1</td>
<td>A000</td>
<td>12288</td>
<td>D030</td>
<td>0</td>
<td>NO</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>CONTENT4</td>
<td>A001</td>
<td>3000</td>
<td>D030</td>
<td>0</td>
<td>NO</td>
<td>0</td>
</tr>
</tbody>
</table>

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 command without the FORCE parameter, and then the OFFL command.

> BSY

OK

> OFFL

OK
ALLOCATING VOLUMES ON A NEW DDU

6.03 In this example, DDU 0, whose controller is in card position 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 respective sizes, there will be unused space on the disk.

6.04 Before space can be allocated on the unit, the DDU controller 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:
**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

<table>
<thead>
<tr>
<th>NAME</th>
<th>ADDR</th>
<th>0</th>
<th>R</th>
<th>A</th>
<th>D</th>
<th>M</th>
<th>I</th>
<th>SERIAL</th>
<th>ALLOC</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMAGE</td>
<td>D000</td>
<td>NO</td>
<td>YES</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
<td>A000</td>
<td>12200</td>
<td></td>
</tr>
<tr>
<td>PMLOAD1</td>
<td>D000</td>
<td>NO</td>
<td>YES</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
<td>A001</td>
<td>4000</td>
<td></td>
</tr>
<tr>
<td>PMLOAD2</td>
<td>D000</td>
<td>NO</td>
<td>YES</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
<td>A002</td>
<td>5000</td>
<td></td>
</tr>
<tr>
<td>NONRES</td>
<td>D000</td>
<td>NO</td>
<td>YES</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
<td>A003</td>
<td>5500</td>
<td></td>
</tr>
</tbody>
</table>

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.
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

<table>
<thead>
<tr>
<th>NAME</th>
<th>ADDR</th>
<th>R</th>
<th>A</th>
<th>D</th>
<th>M</th>
<th>I</th>
<th>SERIAL</th>
<th>ALLOC</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMAGE</td>
<td>D000</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
<td>NO</td>
<td>A000</td>
<td>12200</td>
</tr>
<tr>
<td>PMLOAD1</td>
<td>D000</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
<td>NO</td>
<td>A001</td>
<td>4000</td>
</tr>
<tr>
<td>PMLOAD2</td>
<td>D000</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
<td>NO</td>
<td>A002</td>
<td>5000</td>
</tr>
<tr>
<td>NONRES</td>
<td>D000</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
<td>NO</td>
<td>A003</td>
<td>5500</td>
</tr>
</tbody>
</table>

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 Central 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 archiving Images is described in 297-1001-500. If an office is configured 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 accessible.

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 considered to consist of individual volumes. To ensure that the system
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 manually 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 volume. 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